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Sustainable Performance of Small Dynamic Enterprises in the Digital Business Era

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Abstract

Purpose – This study aims to identify factors that can influence the sustainable performance of small dynamic enterprises by analyzing the influence of technological capability, digital innovation, and sustainable competitive advantage on the sustainable performance of microenterprises.

Methodology – The research data were collected through questionnaires filled out by 260 micro-enterprises in Batam as the research objects. We used Partial Least Squares - Structural Equation Model.

Findings – The results of this study found the influence of technological capability, digital innovation, and sustainable competitive advantage on the sustainable performance of micro-enterprises in Batam City. As well as the discovery of the impact of mediation on the influence relationship. As well as the discovery of the mediating impact of Digital Innovation (DI) on the indirect effect of Technological Capability (TC) on Sustainable Performance (SP) and Sustainable Competitive Advantage (SCA). Then, the mediating impact of SCA on the indirect effect of TC and DI on SP.

Originality – This research shows the discovery or novelty that digital innovation can act as a mediator for technological capability in encouraging the sustainable competitive advantage of a micro business. The findings are expected to be helpful for micro business entrepreneurs in boosting their business performance in general.

1. Introduction

The emergence of a digital economy based on Information and Communication Technology (ICT) has altered the structure and prospects of the global economy (Xia et al., 2024). The rapid development of information technology worldwide creates new opportunities for small and large companies. Innovative digital technologies are reshaping the global economic market and impacting various industrial and business sectors (Pfister & Lehmann, 2023). Indonesia has significant opportunities and potential. According to data from the Coordinating Ministry for Economic Affairs, the value of Indonesia's digital economy reached 1,266.67 trillion rupiah in 2023 and is expected to increase to approximately 1,751 trillion rupiah by 2025 (Ramdhani, 2024).

Digital transformation has become crucial for the survival of Micro, Small, and Medium Enterprises (MSMEs) (Fitrianingrum et al., 2023). Over 85% of organizations and business entities recognize that adopting the latest technologies and digitalization is a major driver of transformation (Mamuaya, 2023). This shift not only boosts the long-term financial performance of MSMEs but also positively impacts overall economic growth (Soomro et al., 2024). Digitalization has been proven to help not only large businesses but also small-scale businesses such as MSMEs. Research by Marolt et al. (2025) revealed in the context of digital technology adoption among MSMEs, 44% of MSMEs have adopted enterprise resource planning (ERP) systems, with 40% leveraging mobile applications. Additionally, 32% utilize customer relationship management (CRM) tools, and 30% rely on business intelligence (BI) solutions to support decision-making and operational efficiency.

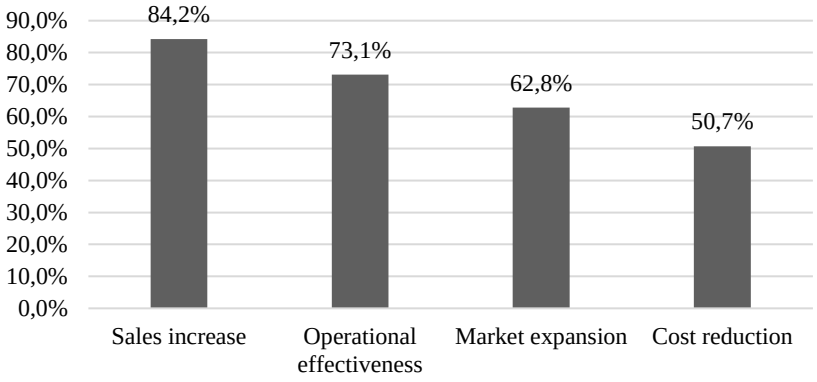

Figure 1. MSME Empowerment Report (2022)

Digitalization offers numerous benefits and advantages for MSMEs and micro businesses. Such as, reducing operational costs, enhancing efficiency, fostering innovation, improving consumer interaction, and opening new opportunities for market growth (Tsou & Chen, 2023). However, these enterprises face several challenges during the digital transformation process that can impede their progress. According to the Ministry of Cooperatives and SMEs, there were 65 million MSMEs in Indonesia in 2021, but only 22.8 million of these had adopted digital technologies (Ayudiana, 2024). Common challenges faced by small businesses in digitalization include a lack of technological capacity and limited access to reliable internet in many regions of Indonesia (Aini et al., 2024).

A survey by Boston Consulting Group (BCG) and Telkom Indonesia, which included 3,700 local MSMEs, reveals that only 26% of food and beverage businesses have embraced digitalization in their daily operations. This trend is similar across other sectors, with just 20-30% of businesses adopting digital technologies (Ahdia, 2022). Data from the Central Statistics Agency for the Riau Archipelago in 2020 shows that out of 8,333 food and beverage businesses, only 2,198 use the Internet, and a mere 12 have integrated technological innovations into their production processes (BPS Kepri, 2020). These figures underscore the crucial role of digital skills and technology in driving sustainable business performance (Heredia et al., 2022).

Research by Salisu and Abu Bakar (2020) highlights that technology capability is a vital factor influencing the performance of digital MSMEs. This finding highlights the importance of MSMEs improving their digital literacy and adapting to new technologies (Neumeyer & Liu, 2021). Lady et al. (2023) further reveals that digital technology can significantly benefit small business owners by enhancing their promotional strategies and boosting sales. Additionally, DI is a powerful enabler of digital transformation across various industries. The ongoing advancements

in digital technology and trends in digitalization are driving companies to innovate more and improve their performance (Yaxin Zhang & Jin, 2023).

Digital innovation has also been found to contribute to sustainable company performance (Bican & Brem, 2020). This technology can bring about a competitive advantage and impact the SP of SMEs. Digital SMEs with a competitive advantage can enhance and drive their performance (Haseeb et al., 2019). Furthermore, DI can strengthen technological capabilities, which improves adaptation, product and service innovation, and the company's competitive advantage (Khin & Ho, 2019). Given the significant role of DI and TC in driving competitive advantage and achieving SP for small dynamic enterprises, this research is motivated by this importance. Additionally, while many studies have examined factors influencing the SP of micro-enterprises, there is still a lack of research focusing on the impact of digital technology and innovation on micro-enterprise performance. In particular, research on the SP of micro-enterprises (small dynamic enterprises) in Batam City and focusing on the culinary business sector. Therefore, this study seeks to fill this research gap.

Based on the theory of dynamic capabilities by Teece et al. (1997) which shows the important role of specialized skills, technological excellence, and innovation in micro-enterprises to continue to compete and grow. This research intends to examine the effect of DI on the SP of a micro enterprises, inspired by the research of Khin and Ho (2019). Also tests the effect of TC and SCA, which was inspired by the research of Haseeb et al. (2019) and Salisu and Abu Bakar (2020). This study also includes tests to explore the potential indirect effects of TC and DI on SP, with SCA as a mediating factor (Çelik & Uzunçarşılı, 2023; Elgarhy & Abou-Shouk, 2023). The indirect effect of Technological TC on SP through mediation by DI Lestari and Ardianti (2019). Finally, the indirect effect of TC on SCA through mediation by DI is the novelty of this research.

1.1. Relationship Technological Capability and Digital Innovation

Technological is an adjective that describes things that are related to technology (Suyanto et al., 2023). TC is the company's ability to perform a series of production tasks related to technology, intending to improve its capabilities (Owuori et al., 2020). TC enables a company to effectively leverage its resources and meet its operational needs (MacLean & Titah, 2023). It involves selecting and implementing technologies that align with the company's objectives (Saarikko et al., 2020). Moreover, TC plays a crucial role in driving innovation in products and services (Abdurrahman et al., 2024). DI often arises from or is facilitated by TC (Ong et al., 2021). As such, TC is a key component essential for fostering successful innovation (Khin & Ho, 2019). Wang and Li (2023) highlight that enhancing the coordination between digital capability and TC is crucial for companies striving to achieve DI. TC positively influences both the breadth and depth of knowledge within a company, which can subsequently boost DI (Wei et al., 2022). Therefore, it can be concluded that TC significantly impacts the DI of micro-enterprises.

H_1: TC affects the DI of micro enterprises in Batam.

1.2. Relationship between Technological Capability and Sustainable Performance

Information technology is crucial for MSMEs to remain competitive and secure market share. Technology has proven to be a key driver of growth and performance improvement for MSMEs (Prasanna et al., 2019). According to Haseeb et al. (2019), MSMEs aiming to enhance and sustain their business performance should focus on developing and effectively applying technological resources. Furthermore, TC not only supports sustainability SP but also serves as a mediator, enhancing the impact of digital capability on the SP of MSMEs (Heredia et al., 2022).

Companies that effectively leverage their digital potential and TC often enjoy substantial benefits and higher profits (Khin & Ho, 2019). Medeiros Vila Nova and Bitencourt (2020) found that the combined effect of TC and information sharing can significantly enhance an organization's SP. TC helps companies acquire resources, streamline processes, and improve internal structures, which boosts financial performance Yongan Zhang et al. (2019). For MSMEs, investing in technological development and adapting to new technologies can enhance their TC, thereby driving SP (Salisu & Abu Bakar, 2020). So, it can be concluded that TC affects the SP of micro enterprises. However, research by Valdez-Juárez and Castillo-Vergara (2021) found no effect of TC on the SP of MSMEs.

H_2: TC affects the SP of micro enterprises in Batam.

TC expands and deepens a company's knowledge base, thereby enhancing its DI (Wei et al., 2022). Companies with superior TC have a superior position in providing innovation to meet consumer satisfaction. This certainly help to improve company performance both financially and non-financially (Khin & Ho, 2019). Therefore, it can be concluded that TC influences the SP of micro-enterprises through the mediation of DI (E. R. Lestari & Ardianti, 2019).

H_3: TC affects SP of micro enterprises in Batam City through mediation of digital innovation

1.3. Relationship Technological Capability and Sustainable Competitive Advantage

Technology plays a crucial role in trade and business. It enables companies to share information and drive innovation, which is essential for gaining a competitive edge (Saeidi et al., 2019). Technology advances can lead to numerous innovations in products and services, enhancing a company's competitiveness and overall excellence (Zhao et al., 2019). A company's TC is vital for maintaining an SCA. By leveraging technology effectively, companies can strengthen their market position and compete successfully in an ever-changing and unpredictable market (Feng et al., 2020).

TC positively influences SCA, and the core competencies of an MSME can mediate this relationship (Makhloufi et al., 2021). Additionally, firm agility plays a crucial role in this effect, particularly in the context of digital business and rapidly changing market conditions (Ottemoesoe et al., 2021). In addition, innovation in a company's TC is considered important and significantly increases competitive advantage (Çelik & Uzunçarşılı, 2023). Because companies with superior TC have a better advantage than their competitors (Muazu & Abdulmalik, 2021). So, it can be concluded that TC affects the SCA of micro enterprises.

H_4: TC affects SCA of micro enterprises in Batam City

Competitive advantage is crucial in market competition, and TC is a key driver of business development. Both factors are essential for managers aiming to enhance company growth and performance (Feng et al., 2020). Strong TC can boost a company's competitive advantage, which, in turn, positively impacts overall performance, especially in the digital economy (Qosasi et al., 2019). Therefore, it can be concluded that TC influences the SP of micro-enterprises through the mediation of SCA (Çelik & Uzunçarşılı, 2023).

H_5: TC affects SP of micro enterprises in Batam City through the mediation of SCA

1.4. Relationship between Digital Innovation and Sustainable Performance

DI involves the enhancement of products, services, or systems using technology. This type of innovation aims to develop superior or distinct offerings to improve company performance (Khin & Ho, 2019). Additionally, DI transforms a company's strategic focus and helps establish a

sustainable business model, further enhancing overall performance (Bican & Brem, 2020). Digital-based companies are encouraged to implement digital DI to boost their SP (Li et al., 2023). While innovations in products and services are vital, advancements in marketing strategies are also crucial for enhancing a company's SP. This impact is further influenced by the company's marketing capabilities and size (Jung & Shegai, 2023). Innovation capabilities, product innovation, and excellence in digitization are crucial for maintaining SP in a company (Sarfraz et al., 2022). For MSMEs, investing in the digital skills of their employees can significantly foster DI (Shah et al., 2023). This DI can enhance the digital performance of MSMEs (Sohu et al., 2023). Therefore, it can be concluded that DI positively impacts the SP of micro enterprises.
H_6: DI affects SP of micro enterprises in Batam City

1.5. Relationship Digital Innovation and Sustainable Competitive Advantage

Martínez-Caro et al. (2020) argue that to attain a competitive advantage, companies must emphasize digital technologies, including computing, integration, and innovation, to secure a sustainable competitive edge. Innovation is also critical, as it plays a key role in enhancing the company's overall system and contributes significantly to improving product and service excellence (Bendak et al., 2020). Leão and Mira da Silva (2021) found that DI, achieved through digital transformation, significantly impacts efficiency, cost reduction, and, most importantly, competitive advantage. This transformation enables companies to gain a competitive edge. This impact is strengthened by the existence of a company's innovation capability (Shehadeh et al., 2023). DI such as artificial intelligence (AI) and big data analytics are also found to affect the SCA of a business (Sumarliah & Al-hakeem, 2023). So, it can be concluded that DI affects the SCA of micro enterprises.
H_7: DI affects SCA of micro enterprises in Batam City

Innovation is another way for companies to gain and maintain a competitive edge. To achieve this, companies must develop new and innovative ideas, and products, and improve service performance to satisfy customer needs. Leveraging technology can enhance the effectiveness and efficiency of these innovations (Pramuki & Kusumawati, 2021). So, it can be concluded that DI impacts SP by mediating the SCA of micro-enterprises (Elgarhy & Abou-Shouk, 2023).
H_8: DI affects SP of micro enterprises in Batam City through mediation of SCA

1.6. Relationship Sustainable Competitive Advantage and Sustainable Performance

Competitive advantage can lead to higher firm performance. To achieve this competitive advantage, companies can focus on managerial strategies (Elgarhy & Abou-Shouk, 2023). Especially in competitive market conditions, competitive advantage is a supporting factor in achieving a satisfactory level of SP (Haseeb et al., 2019). Correia et al. (2022) argue that SCA in terms of differentiation and cost leadership positively impacts the company's SP. The competitive advantage of a business must have three aspects to compete. Such as having superior efficiency capabilities, the ability to maintain outstanding quality, and being responsible to customers (S. D. Lestari et al., 2020). Companies must plan for long-term competitive advantage to improve enterprise performance (Liao et al., 2023). In addition, SCA has also been found to improve the performance of MSMEs in terms of marketing (Pramuki & Kusumawati, 2021). Thus, it can be concluded that SCA affects the SP of micro enterprises.
H_9: SCA affects SP of micro enterprises in Batam City

The uniqueness of digital technology creates the possibility of innovations and product creations that are not mainstream (Khin & Ho, 2019). Digital technology is the main driver of innovation, so many companies are focusing on developing DI (Urbinati et al., 2020). A company's innovation capability can also be enhanced through digital technology, which can lead to the differentiation of company products and services (Shehadeh et al., 2023). This can be an advantage that certainly drives the company's performance and competitiveness. So, it can be concluded that TC affects the SCA through the mediation of DI of micro enterprises. This relationship is the novelty of this research.

H_{10}: TC affects SCA of micro enterprises in Batam City through mediation of DI

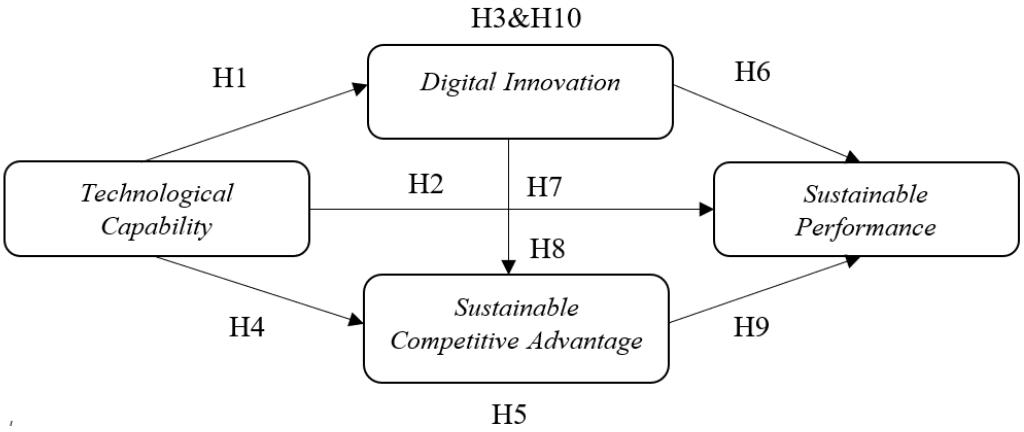

Figure 2. Research Model

2. Research Methods

This researcher will test and analyze the influence of TC, DI, and SCA. In addition, this study will also examine the mediating effect of DI and SCA on the indirect relationship of TC, DI, and SCA variables on micro business SP. The concept of SP in this study refers to the level of business or business efforts that are influenced by various factors, such as DI (Khin & Ho, 2019) and competitive advantage (Haseeb et al., 2019), and technology capability (Salisu & Abu Bakar, 2020). The study will focus on testing the micro-business population in Batam City's culinary sector. Considering the contribution of culinary sector businesses, the important role of micro-enterprises in regional economic growth, and the empowerment of local communities, it is urgent to conduct research on the SP of micro-enterprises in the culinary sector, especially in Batam City. One of them is the rapid economic growth of Batam dominated by culinary businesses, which grew by 30.95% based on data from the Central Bureau of Statistics (BPS) of Batam City in 2023 (BPS Kepri, 2020). Then, the Micro and Small Business Cooperative also stated that micro businesses have great employment potential, micro businesses have the potential to absorb 64% of the workforce based on data from the Batam city cooperative and micro business office for the 2019-2020 period (Pemerintah Kota Batam, 2022).

This study applies purpose sampling. The samples to be tested in this study are micro businesses engaged in the culinary sector in Batam City and have been operating for at least three years. This is necessary to determine whether the business can be declared sustainable and whether the SP of the business can be measured according to research by Salisu and Abu Bakar (2020). The research variable indicators determined the minimum number of research samples by multiplying 5-10. This method is used when the exact population of the research object is unknown (Hair et al., 2014). Therefore, the number of samples in this study was at least 260 samples (26 x

10). The research used quantitative data through a questionnaire with a Likert scale (1-5) (see Table 1).

Table 1. Variable Measurement

Variables	Indicator	Measurement
Technological Capability (TC) (Salisu & Abu Bakar, 2020)	TC_1	This micro enterprise is one of the micro-enterprises in the industry that sets technology standards.
	TC_2	This micro enterprise is one of the micro-enterprises in the industry that improves technological standards.
	TC_3	This micro enterprise has an industry-leading competitive technology strategy.
	TC_4	This micro enterprise has strong technological skills in several areas of operation.
	TC_5	The micro enterprise is competent in applying innovative technologies for problem solving.
	TC_6	The micro enterprise has the monitoring capacity to accurately predict changes in the technological environment.
	TC_7	The micro enterprise has a strong ability to integrate internal and external technology resources.
	TC_8	The micro enterprise has the capacity to attract and hire talented labor.
	TC_9	The micro enterprise enhances technical skills through continuous training programs.
Digital Innovation (DI) (Khin & Ho, 2019)	DI_1	The quality of this micro enterprise's digital solutions is superior compared to other micro enterprises.
	DI_2	The features of this micro enterprise's digital solutions are superior to other micro enterprises.
	DI_3	The implementation of this microbusiness's digital solutions is very different from other microbusinesses.
	DI_4	This micro enterprise's digital solution is different from other micro-enterprises in terms of product platform.
	DI_5	This micro enterprise's new digital solution is a minor improvement on an existing product.
	DI_6	Some of the micro enterprise's digital solutions are new to the market at the time of launch.
Sustainable Competitive Advantage (SCA) (Haseeb et al., 2019)	SCA_1	The quality of the micro enterprise's product or service is better than competitors' products or services.
	SCA_2	It puts a lot of effort into building a strong micro enterprise name and brand.
	SCA_3	This micro enterprise's production costs are lower than other competing micro enterprises.
	SCA_4	This micro enterprise has better managerial skills than competitors.
	SCA_5	The profitability of this micro enterprise is better than competitors.
Sustainable Performance (SP) (Salisu & Abu Bakar, 2020)	SP_1	Over the past 3 years, this micro enterprise has recorded success.
	SP_2	The profitability of this micro enterprise has increased over the past few years.
	SP_3	Over the past 3 years, the micro enterprise's employee satisfaction has increased.
	SP_4	Over the past 3 years, this micro enterprise's customer satisfaction has improved.
	SP_5	Over the past 3 years, the social performance of this micro enterprise has improved significantly.
	SP_6	Over the past 3 years, this micro enterprise's performance in terms of environmental stewardship has improved.

This questionnaire was in the form of a Google form that was randomly distributed to the owners or employees of micro-businesses in Batam City. This study uses the PLS-SEM (Partial Least Squares-Structural Equation Model) analysis method. This method is applied to analyze variable relationships in the research model (Hair et al., 2017). The validity of the questions will be assessed using the outer loading value test, with a value > 0.7 indicating validity. Additionally, the validity of the research construct will be evaluated based on the Average Variance Extracted (AVE) value, which must be > 0.5 to be considered valid. Reliability will be measured by ensuring that Cronbach's alpha value is greater than 0.6, and composite reliability is greater than 0.7. The inner model will be used to examine the relationship between variables and indicators, with significance determined by the t-Statistic value, which must be > 1.96 and p value <0.05 (Hair et al., 2017).

3. Results and Discussions

3.1. Characteristics of Respondents

The respondents of this research are small, dynamic enterprises (micro enterprises) located in Batam City. This research successfully collected 260 (100%) micro business respondents who became the research sample, and no responses were affected by outliers. The characteristics of the respondents in this study are divided into several groups. Based on gender, age, and the level of education of the respondent. The respondents consisted of 149 (57.3%) male respondents and 111 (42.7%) female respondents. 154 (59.2%) respondents aged 20-29 years, 91 (53%) respondents aged 30-39 years, and 15 (5.8%) respondents aged 40-49 years. There were no respondents aged more than 50 years. 16 (6.2%) respondents with elementary school education, 11 (4.2%) respondents with junior high school education, 232 (89.2%) respondents with high school education, and 1 (0.4%) respondent with undergraduate education. There were no respondents who did not attend school in this study. The majority of respondents were male, aged 20-29 years, and had a high school education level.

3.2. Validity and Reliability Test

Outer loading and average variance extracted (AVE) are carried out to test the validity of research data. Variable indicators must have an outer loading value above 0.7 (>0.7) and an AVE above 0.5 (>0.5) (Hair et al., 2017) to meet the validity requirements. Meanwhile, the reliability test was carried out using Cronbach's alpha and composite reliability testing. Research variables are declared reliable and can be used for data processing if they have a Cronbach's alpha value above 0.6 (>0.6) and composite reliability above 0.7 (>0.7) (Hair et al., 2017). Only indicators and variables that are declared valid and reliable can be used for testing and analysis.

Based on the data processing results in Table 2, the results of the outer loading test of all indicators on the research variables have a value of more than 0.7 (>0.7). The average variance extracted test results for all variables in the research model have a value of more than 0.5 (>0.5). The digital innovation variable has an AVE value of 0.650 (>0.5), sustainable competitive advantage 0.553 (>0.5), sustainable performance 0.571 (>0.5), and technological capability 0.547 (>0.5). The Cronbach’s alpha results of all variables in the research model are more than 0.6 (>0.6). The digital innovation variable has a Cronbach's alpha value of 0.900 (>0.6), sustainable competitive advantage 0.795 (>0.6), sustainable performance 0.848 (>0.6), and technological capability 0.894 (>0.6). The results of the composite reliability of all variables in the research model have a value of more than 0.7 (>0.7).

Table 2. Validity and Reliability Test

Variables	Indicators	Outer Loading	AVE	Cronbach's Alpha	Composite Reliability
Digital Innovation	D_{I1}	0.878	0.650	0.900	0.916
	D_{I2}	0.869			
	D_{I3}	0.734			
	D_{I4}	0.725			
	D_{I5}	0.747			
	D_{I6}	0.860			
Sustainable Competitive Advantage	SCA_1	0.754	0.553	0.795	0.859
	SCA_2	0.761			
	SCA_3	0.701			
	SCA_4	0.772			
	SCA_5	0.722			
Sustainable Performance	SP_1	0.763	0.571	0.848	0.888
	SP_2	0.773			
	SP_3	0.784			
	SP_4	0.705			
	SP_5	0.744			
	SP_6	0.755			
Technological Capability	TC_1	0.741	0.547	0.894	0.914
	TC_2	0.701			
	TC_3	0.771			
	TC_4	0.701			
	TC_5	0.756			
	TC_6	0.751			
	TC_7	0.717			
	TC_8	0.755			
	TC_9	0.746			

Source: processed data

The digital innovation variable has a composite reliability value of 0.916 (>0.7), sustainable competitive advantage 0.859 (>0.7), sustainable performance 0.888 (>0.7), and technological capability 0.914 (>0.7). The test results show that all indicators and variables in this research model have met the validity and reliability requirements, so all indicators and variables can be used for subsequent data processing.

3.3. Inner Model Test

The inner model test examines the relationship between the variables in the research model. This relationship can be direct or indirect, possibly mediated by other variables. The path coefficient test helps determine the direct relationship, while the specific indirect effect reveals any indirect relationships or mediations. A relationship is considered significant if it meets certain conditions, such as having a t-statistic value > 1.96 and a p-value < 0.05 in the path coefficient test table (Hair et al., 2017).

Table 3. Direct and Indirect Effects in Inner Model Test

Path	Sample Mean	T Statistics (|O/STDEV|)	P-values	Hypothesis
TC => DI	0.397	7.143	0.000	H_1: Accepted
TC => SP	0.334	3.020	0.003	H_2: Accepted
TC => DI => SP	0.082	2.229	0.026	H_3: Accepted
TC => SCA	0.600	9.582	0.000	H_4: Accepted
TC => SCA => SP	0.234	3.285	0.001	H_5: Accepted
DI => SP	0.205	2.532	0.012	H_6: Accepted
SCA => SP	0.391	3.415	0.001	H_7: Accepted
DI => SCA => SP	0.111	2.931	0.004	H_8: Accepted
DI => SCA	0.285	4.911	0.000	H_9: Accepted
TC => DI => SCA	0.112	4.650	0.000	H_{10}: Accepted

Source: processed data

TC has a positive effect on DI, this relationship has a t-statistic value of 7.143 (>1.96) and p value of 0.000 (<0.05) with significancy value 0.397 (>0.05). Thus, H_1 is accepted. TC has a positive effect on SP, this relationship has a t-statistic value of 3.020 and p value of 0.003 with significancy value 0.334 (>0.05). Thus, H_2 is accepted TC SP through the mediation of DI. This relationship has a t-statistic value of 2.229 and p value of 0.026 with significancy value 0.082 (>0.05). Thus, H_3 is accepted. TC has a positive effect on SCA, this relationship has a t-statistic value of 9.582 and a p value of 0.000 with significancy value 0.600 (>0.05). Thus, H_4 is accepted. TC has a positive effect on SP through the mediation of SCA. This relationship has a t-statistic value of 3.285 and a p value of 0.001 with a significancy value 0.234 (>0.05). Thus, H_5 is accepted. DI has a positive effect on SP, this relationship has a t-statistic value of 2.532 and a p value of 0.012 with significancy value 0.205 (>0.05). Thus, H_6 is accepted. DI has a positive effect on SCA, this relationship has a t-statistic value of 4.911 and a p value of 0.000 with significancy value 0.285 (>0.05). Thus, H_7 is accepted. DI has a positive effect on SP through the mediation of SCA. This relationship has a t-statistic value of 2.931 and a p value of 0.004 with a significancy value 0.111 (>0.05). Thus, H_8 is accepted. SCA has a positive effect on SP, this relationship has a t-statistic value of 3.415 and a p value of 0.001 with significancy value 0.391 (>0.05). Thus, H_9 is accepted. TC has a positive effect on SCA through mediation by DI. This relationship has a t-statistic value of 4.650 and a p-value of 0.000 with a significancy value 0.112 (>0.05). Thus, H_{10} is accepted.

3.4. Q Square (Q^2)

Predictive relevance (Q^2) represents the value of R square in the PLS-SEM research model. A research model can be stated to have predictive relevance when it satisfies the condition, that is, it has a value of q square greater than zero (>0) (Hair et al., 2017). Based on the test results (Table 4), the DI variable has a q square value of 0.078 (>0), SCA of 0.302 (>0) and SP of 0.344 (>0). This suggests that the research model has predictive relevance values and has good observational values.

Table 4. Q Square

Variables	Q Square
DI	0.078
SCA	0.302
SP	0.344

Source: processed data

TC has a positive effect on DI of culinary micro-enterprises in Batam City. This result shows that micro businesses in Batam City have good enough TC to conduct DI. This factor can also be supported because most micro business owners in Batam City are young and have a high level of education, making the use of digital technology easier and more effective. The level of TC owned by a business determines how much DI can be done. Micro businesses that do not have sufficient TC can hinder DI and digital capability of the business (Sohu et al., 2023). TC and DI are needed in the development of digital business models (Bican & Brem, 2020). This finding is supported (Nasiri et al., 2023; Song et al., 2023; Wang & Li, 2023; Wei et al., 2022; Ong et al., 2021; Khin & Ho, 2019). TC has a positive effect on SP of culinary micro-enterprises in Batam City. This result shows that the TC of culinary micro-enterprises in Batam City can encourage the SP of their business. Such as using smartphones to facilitate services and using fintech to make payments, are very common for culinary micro-enterprises in Batam City. TC has been proven to be one of the factors that affect the performance of a company (Ottemoesoe et al., 2021). The sustainability of a business is determined by its ability to keep up with the times and technology, especially in the digital era of business (Salisu & Abu Bakar, 2020). So, companies need to increase TC to keep up with technological advances to improve company performance (Sarfraz et al., 2022). This finding is supported (Heredia et al., 2022; Liu & Yang, 2021; Medeiros Vila Nova & Bitencourt, 2020; Khin & Ho, 2019; Yongan Zhang et al., 2019). But unsupported by Valdez-Juárez and Castillo-Vergara (2021).

TC has a positive effect on SP of culinary micro-enterprises in Batam City through the mediation of DI. The results of this study indicate the importance of investing in improving TC and conducting DI for micro-enterprises to support SP, especially culinary micro-enterprises in Batam City, a developing region. Technology can be utilized to improve performance by innovating through technological innovation (Guo et al., 2020). DI can help a company deal with technological change and digital transformation to achieve SP (Yaxin Zhang & Jin, 2023). This finding is supported by E. R. Lestari and Ardianti (2019). TC has a positive effect on SCA of culinary micro-enterprises in Batam City. The potential of culinary businesses in Batam City makes market competition more intense. TC was founded to help culinary micro-enterprises to create SCA, not only in terms of price but also in terms of innovation, improving product quality, and providing superior service. Technological changes and the digital business era are also a challenge for entrepreneurs (Bican & Brem, 2020). So, the innovation and technological capabilities of a company are some of the indicators that determine whether a company can compete (Feng et al., 2020). This finding is supported (Çelik & Uzunçarşılı, 2023; Makhloufi et al., 2021; Muazu & Abdulmalik, 2021; Ottemoesoe et al., 2021).

TC has a positive effect on SP of culinary micro-enterprises in Batam City through the mediation of SCA. This finding shows that the TC of the culinary micro-enterprises in Batam City can bring a SCA that improves their SP. Considering the potential and tight market competition of culinary businesses in Batam City, culinary micro-enterprises in Batam City must have adequate TC and superior SCA. TC can increase the competitive advantage of a company, and this of course can boost their performance level both financially and non-financially (Rahim & Zainuddin, 2019). This finding is supported (Çelik & Uzunçarşılı, 2023).

DI has a positive effect on SP of culinary micro-enterprises in Batam City. Making it important for culinary micro entrepreneurs in Batam City to carry out DI to improve SP. Given the accessibility and availability of digital technology in Batam City, such as the existence of the internet, social media and online ordering platforms. Technology and digital transformation are some of the factors hindering small businesses, especially home-based businesses (Bican & Brem, 2020). So, businesses need to realize and carry out DI to maintain the SP of their business

(Mubarak et al., 2019). This DI can be done by digital transformation and adopting digital marketing (Jung & Shegai, 2023). This finding is supported (Shah et al., 2023; Sohu et al., 2023; Sarfraz et al., 2022; Khin & Ho, 2019). DI has a positive effect on SCA of culinary micro-enterprises in Batam City. The competitive culinary business in Batam City and the rise of unique culinary trends make culinary micro-enterprises constantly innovate and keep up with technological developments. The results of this study show the importance of DI in helping culinary micro-enterprises in Batam City compete and increase SCA. DI can create a competitive advantage (Berawi et al., 2020). DI is the main key for small enterprises to compete in today's business world (Wang & Li, 2023). So, the importance of DI for a business to achieve SCA (Pramuki & Kusumawati, 2021). This finding is supported (Shehadeh et al., 2023; Sumarliah & Al-hakeem, 2023; Yaxin Zhang & Jin, 2023; Leão & Mira da Silva, 2021; Verhoef et al., 2021).

DI has a positive effect on SP of culinary micro-enterprises in Batam City through the mediation of SCA. The positive influence of DI on SP in culinary micro-enterprises in Batam City is evident through the role of SCA. The utilization of digital tools and strategies in micro-enterprises is to improve operational efficiency, engage customers effectively, adapt to market changes, and promote sustainability. Strengthening the relationship between DI and competitive advantage is one way that can be done to improve the performance of a business (Pramuki & Kusumawati, 2021). Especially for micro businesses that must continue to innovate to compete in a competitive market (Sumarliah & Al-hakeem, 2023). This finding is supported by Elgarhy and Abou-Shouk (2023).

SCA has a positive effect on SP of culinary micro-enterprises in Batam City. SCA plays an important role in improving the performance of micro-enterprises in Batam City, especially in the competitive culinary sector. Every year, the increasing number of culinary businesses means that micro-enterprises in the culinary sector must pay more attention to their SCA to maintain SP. Competitive advantage owned by a company is proven to improve operational performance (Liao et al., 2023). Technological challenges are also one of the influences that make companies, especially small businesses, need to pay attention to their competitive advantages, which can reflect the SCA and SP of the company (Haseeb et al., 2019). This finding is supported (Liao et al., 2023; Correia et al., 2022; Pramuki & Kusumawati, 2021; S. D. Lestari et al., 2020).

TC has a positive effect on SCA of culinary micro-enterprises in Batam City through mediation by DI. This relationship is the latest finding of this study. The results of this study show that strong TC enables culinary micro-enterprises in Batam City to adopt DI, such as online ordering and marketing through social media, which can improve their competitiveness. Using DI in culinary businesses can create better and more efficient customer experience, resulting in a SCA in Batam City's growing culinary sector. Technological developments and digital transformation affect competition in this digital era of business (Shehadeh et al., 2023). Therefore, a business needs to utilize this technology and carry out DI to encourage business competitive performance (Sumarliah & Al-hakeem, 2023). TC can drive a business's competitive advantage if accompanied by good innovation. This relationship is the novelty of this study.

4. Conclusions

This study concludes that the mediating impact of digital innovation on the relationship between technological capability and sustainable competitive advantage is novel in this study. The information and analysis presented in this study are expected to provide valuable insights for academics exploring related topics, offering theoretical implications that can enhance research on technology, innovation, competitive advantage, and SP. Then, the mediating impact of DI on the relationship between TC and SCA was also found to be a novelty in this study. The information

and analysis presented in this study aim to provide valuable insights for academics exploring related topics, offering theoretical implications that can enhance research on technology, innovation, competitive advantage, and SP. Additionally, the findings are expected to assist future research in elucidating the role of digital technology in driving SP, contributing to a deeper understanding of these dynamics. Also, it aims to benefit entrepreneurs and microbusiness owners by providing practical insights for business operations. It serves as a reference for making informed technological investment decisions and enhancing knowledge and innovation processes, thereby increasing competitive advantages. Ultimately, these insights can drive more SP, encompassing both financial and non-financial aspects. The findings of this research focus on the SP of micro and small enterprises in Batam and may not apply to other locations.

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