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Leveraging digital transformation leadership and customer agility to enhance SME performance in the Riau Islands, Indonesia

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ABSTRACT

This study investigates the impact of digital transformation leadership and customer agility on the performance of small and medium-sized enterprises (SMEs) in the Riau Islands, Indonesia. SMEs are pivotal to economic growth, yet they often face challenges in adapting to rapidly changing market conditions. Employing a sustainable development theory framework, the research explores how effective leadership in digital transformation and an agile approach to customer engagement can drive better performance outcomes. Findings reveal that while customer agility does not significantly correlate with SME performance, strong digital transformation leadership and well-implemented digital strategies initiatives are play crucial roles in enhancing operational effectiveness and performance. Study result highlights the necessity for SMEs to focus on cultivating innovative leadership that embraces digitization and developing strategies that respond swiftly to evolving customer needs. This research underscores the importance of integrating digital practices as a core component of sustainability efforts within SMEs. Ultimately, embracing effective digital transformation leadership is essential for SMEs seeking to thrive in increasingly competitive environments. The study recommends that future research should examine additional factors that may influence the performance of SMEs, providing a broader understanding of the dynamics at work in this critical sector.

Introduction

SMEs are a vital pillar due to their resilience and ability to drive economic growth (Sinaini et al., 2024). SMEs are a type of business that plays an important role in increasing the GDP (Gross Domestic Product) of a country, especially Indonesia in facing the Industry 4.0 era. According to Akbari & Beigi (2023) in recent years, the role of SMEs in developing countries especially the so-called emerging economies market has increased rapidly, the business activities of SMEs are considered as one of the important factors in economic growth and development. Data on SMEs has an important role in spurring Indonesia's economic growth and creating jobs.

Based on data from the Coordinating Ministry for Economic Affairs of the Republic of Indonesia (2021) released in a press release, states that there are currently around 64.2 million SMEs in Indonesia, and the contribution of SMEs to Gross Domestic Product (GDP) in Indonesia reaches 61.07% or equivalent to IDR 8,573.89 trillion. According to data from the Indonesian Chamber of Commerce and Industry, by 2023, SMEs business actors will reach around 66 million. The contribution of SMEs reached 61% of Indonesia's Gross Domestic Product (GDP), equivalent to Rp9,580 trillion. SMEs alone absorb around 117 million workers (97%) of the total workforce. Although SMEs in Indonesia use and adapt technology quite a lot, the utilization has not been maximized. It is only for the use of instant messaging services and social media (such as WhatsApp, LINE Messenger, Facebook Messenger, Facebook, Twitter, Instagram, TikTok, etc.) which amounted to 81.70 percent, then to receive orders/sell goods and or services at 61.33 percent, to send and receive emails which amounted to 49.80 percent, and to order or purchase goods and or services at 48.01 percent.

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The previous explanation indicates that SMEs that integrate technology into their operations still do not lead to the integration of business operations, especially in the ability to understand customers, which is related to customer agility (Maura & Darshana, 2013). According to the Central Bureau of Statistics in the Statistics of Business Characteristics 2022/2023 (2023) regarding the collection of customer information, 33.81 percent of SMEs carry out these activities, which in this case indicates that customer agility is still a factor that SMEs have not paid much attention to. Furthermore, SMEs in collecting data about customers obtained directly through customers accounted for the highest percentage, which amounted to 86.87 percent, followed by third-party data at 8.19 percent, and through other sources at 7.06 percent. There are 22.74 percent of SMEs that store customer information electronically. Based on this data, it is also a consideration that SMEs need to pay attention in terms of digital transformation and more special attention to managing customers, especially with a digital strategy approach.

This research will certainly focus on the performance of SMEs (SMEs performance) mainly related to testing in increasing agility, increasing technology and digitalization, market share growth, revenue, and related to efficiency and effectiveness (Le et al., 2024). Business activities that are currently facing national and global uncertainties, the main contribution is to improve the capabilities of SMEs by approaching digitalization and based on customer agile in Indonesia, especially in sustaining and reviving the economy with a level of turnover and also dynamic and innovative businesses, both now that it is post-pandemic or later with unpredictable situations or various turbulences (Kowalik & Pleśniak, 2022).

The current era and especially in the current digital age will be very incomprehensive if the discussion is left out of the digital elements, especially those that are being intensified in Indonesia, the novelty of the research conducted is the existence of variables from digital strategy as mediation in strengthening or weakening between the influence of digital transformation of leadership, as well as corporate strategies in marketing based on customer, as well as the agility aspect that SMEs need to pay attention to in developing strategies and tactical responses to customers (Abdul Wahab & Radmehr, 2024; AlNuaimi et al., 2022; Wamba, 2022). Several studies that have been conducted previously focus more on the RBV theory approach in analyzing related to the performance of SMEs, especially for achieving competitive advantage and business sustainability (Utama et al., 2024; Tarihoran et al., 2023; Yadegaridehkordi et al., 2023; Karnowati & Handayani, 2022; Varadarajan, 2020; Wachidin et al., 2020). The novelty of this paper lies in its comprehensive exploration of the interplay between digital transformation leadership, customer agility, and SME performance within an under-researched context. Unlike previous studies that often focus on larger corporations, this research emphasizes the unique challenges faced by small and medium-sized enterprises, particularly in adapting to fast-evolving market conditions. The previous explanation clearly shows the gap found, which is that there is still little debate in research that tries to focus on the use of the theory of sustainable development developed Daly (1990), which states that technological progress for sustainable development must be an increase in efficiency, not an increase in yield, and of course SMEs in this case are closely related, especially in business practices and operational activities.

The goal and advantages of this study are to carry out an in-depth study of digital transformation leadership, customer agility, and digital strategy to support SMEs in navigating turbulence by taking into business performance metrics. Key novel contributions include: First, The study establishes a novel integrated framework that connects digital transformation leadership and customer agility with SME performance, offering a fresh perspective on how these elements interact to influence operational effectiveness. Second, by prioritizing the role of digital transformation leadership, the paper highlights how effective leadership can facilitate the implementation of digital strategies, which is often overlooked in SME literature. Third, Utilizing a robust dataset from SME owners and managerial staff, this research provides empirical evidence of the significant positive impact of digital transformation leadership and digital strategies on performance, while also critically assessing the less impactful role of customer agility. Finally, the study findings have crucial implications for policymakers and educators, underlining the need for focused support in strengthening leadership qualities inside SMEs to effectively leverage digital potential.

Literature Review

Theoretical and Conceptual Background

Sustainable Development Theory has been widely debated by practitioners and academics, particularly regarding its effective implementation. Companies, businesses continue to exploit to achieve their goals, currently more large companies are starting to pay attention to achieving economic goals by paying attention to performance that is also based on environmental friendliness, of course this is also the pressure from outsiders or stakeholders, namely the government, society, and even the regulation itself, of course, improving performance based on environmental friendliness will have many advantages such as in terms of financial, commercial, legality, reputation, and related to the retention of human resources (Domingues et al., 2023). So far, talking about sustainable development is synonymous with global companies, or large companies that operate on a large enough scale, damage the environment, and produce various pollution. According to Laurinkevičiūtė & Stasiškienė (2011) sustainable development is very important for SMEs, especially in improving their performance and competitiveness, furthermore most sustainable development research focuses only on large companies (Yadegaridehkordi et al., 2023), and ignores the importance of SMEs, about SMEs often have less knowledge about the environmental and social impacts carried out in supporting their business performance and less often apply preventive measures such as CSR than large companies.

Empirical Review and Hypothesis Development

The Effect of Digital Transformation Leadership on SMEs Performance

Digital transformation leadership capabilities are associated with the process of bringing an organization towards digital transformation to become more adaptive in a rapidly changing social and digital ecosystem so that it can perform optimally (Chatterjee et al., 2021). The digital transformation leadership process refers to technological changes that require leading an SMEs to be with a touch of technology, this is an ongoing process that involves the use of new digital technologies in routine business operations (Ahmad et al., 2024). Research from Ahmad et al. (2024) proves that the ability of digital transformation leadership on SMEs performance has a positive and significant effect, so that SMEs adapt to changing market conditions, survive economic uncertainty, and have the opportunity for growth and competitive advantage in an increasingly digitized world. Refer to Lathabhavan & Kuppusamy (2023) digital transformation leadership is significant and has a large influence value on the performance of SMEs, where a leader or business owner who can transform digitally will try to continue to adapt to whatever conditions occur, by continuing to learn to implement day-to-day operations, make better strategic decisions, competent digital leaders can easily adapt to technological advances. Moreover Senadjki et al. (2024) state digital leadership will not directly affect the performance of an SMEs, but requires digital transformation so that there is a positive influence of digital transformation leadership on SMEs performance.

H1: Digital transformation leadership has a positive influence on SMEs performance.

The Effect of Customer Agility on SMEs Performance

Research from Agag et al. (2024) explains that in achieving performance, SMEs must be able and have the ability to adapt to customer needs and market conditions, known as agility to understand customers (customer agility), this allows SMEs to improve their performance capabilities and proactively take advantage of any opportunities that arise in market share. The previous explanation is also supported by Elazhary et al. (2022) which proves the positive effect of customer agility on SMEs performance, further explaining that customer agility can provide resilience and also staying power, especially achievement in performance even in turbulent market conditions. According to Tseng et al. (2022) the ability of SMEs to implement a strategic approach based on customer-oriented in this case the ability of customer agility which means agile, agile, has the right sensing or prediction of responsiveness in responding to customers. Furthermore, Wamba (2022) proves that customer agility is a factor that affects performance with considerable and positive significance, according to him customer agility is the only way for company managers or owners of SMEs also to create and capture the full value of business performance.

H2: Customer agility has a positive influence on SMEs performance.

The Effect of Digital Transformation Leadership on Digital Strategy

Research by AlNuaimi et al. (2022) proves that there is an influence of digital transformation leadership on digital strategy which does require implementers, in this case the owners of SMEs that are digitally transformed so that they can have and implement a digital strategy in their operations. According to research by Senadjki et al. (2024) digital transformation leadership positively influences digital strategy. Although the results of the effect are small, what needs to be considered is that SMEs through digital transformation leadership are better able to manage change, especially in a digital context, which in turn will become a digital strategy that brings many benefits. According to Malik et al. (2024) digital transformation leadership has a positive effect on digital strategy in achieving performance, this positive influence is better able to manage organizational change, especially in a digital context, which in turn improves strategy to impact performance. Moreover, Majumdarr et al. (2024) proves that leadership strategies are increasingly relevant during uncertainty or changes such as digital transformation (digital transformation leadership) due to the shift in focus from human resources to social resources, which refers to the interconnection between individuals, thus creating a competitive advantage. Therefore, through digital strategy, leadership in complex systems strives to create an adaptive space that adapts to change, as well as the importance of management accountability, in this case, leaders or owners of SMEs that are digitally transformed must pay attention as a strategy (Levy et al., 2020).

H3: Digital transformation leadership has a positive influence on digital strategy.

The Effect of Customer Agility on Digital Strategy

The importance of digital strategy linkages in supporting SMEs to take an approach based on customer agility in overcoming uncertainty in today's competition. Furthermore, according to Sharif et al. (2024) SMEs must be able to adapt to internal and external factors, internal factors that are strengthened by digital strategies and to overcome changes from customers that require companies to have good agility. Giacosa et al. (2022) revealed that customer agility and digitalization in a business have a very positive effect. The application of customer agility requires companies to quickly adapt and take action quickly and responsively to customer expectations, as well as a step that can detect based on customer-based opportunities so that digital strategy will be affected in smoothing the strategy of creating competitive advantage, surviving, and making profits in monitoring customer data. According to Yawized et al. (2024) flexibility, adaptation, and also agility in this case the owners of SMEs who need to implement customer agility have a positive influence on the digital strategy to be carried out, in this case implying that the strategy of using technology to provide entertainment and convenience to customers, digital strategy can be considered an innovative marketing strategy rather than an existing or conventional marketing tool (Alfaro et al., 2019). Finally, Maura & Darshana's (2013) research on the perspective of

implementing digital strategy provides an overview of the need to pay attention from a customer perspective so that customer agility in this case has a positive effect on digital strategy.

H4: Customer agility has a positive influence on digital strategy.

The Effect of Digital Strategy on SMEs Performance

The performance of SMEs can be done with the support of strategies in digitization to achieve business performance that is not optimal in engaging with customers and improving their performance (Kujur & Singh, 2019). In a field full of digital innovations, many business strategists are surprisingly reluctant to adopt new digital technologies in their strategies and even just use a wait-and-see approach, or just ignore them at considerable risk (Son & Han, 2011). Moreover, Holopainen et al. (2024) explains digital technology which is considered a strategic issue, in this case concerning digital strategy, has a huge influence beyond the boundaries of the organization by affecting business processes, supply chains, sales channels, and others. Thus, digital strategy has a positive effect on SMEs performance, especially on business development and increasing sales to performance by offering more variety to customers. Research from Holopainen et al. (2024); Holopainen et al. (2023) states that identifying digital business strategy as a key determinant of the performance of SMEs has a positive and significant effect.

H5: Digital strategy has a positive influence on SMEs performance.

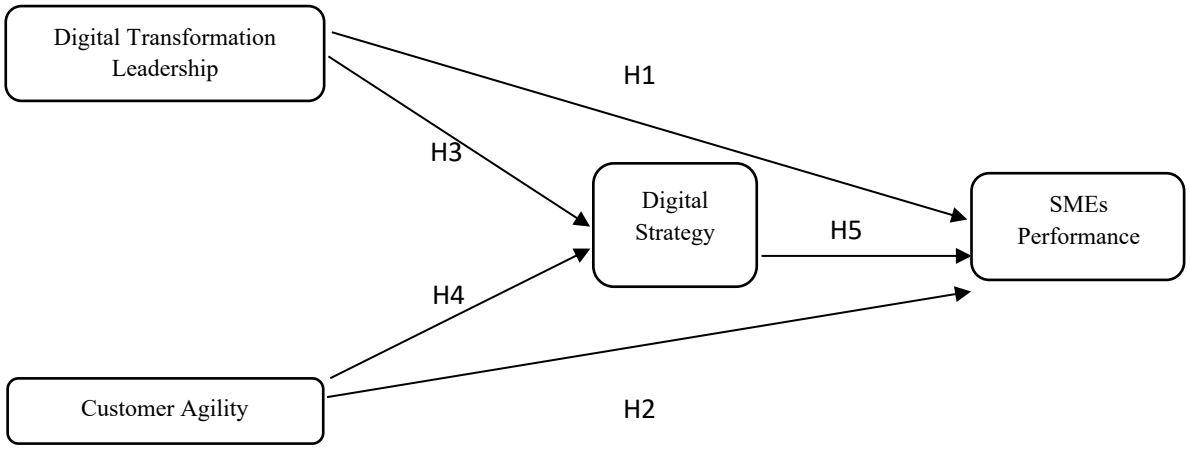

Figure 1: Conceptual Model of the Study; *Source:* Authors Conception

Research and Methodology

A quantitative method was taken in its implementation with an explanatory research type approach being the research design adopted by this study. Explanatory research is research to describe the position of each variable under study and also includes the influence between each variable and other variables (Hair et al., 2020). Process of collecting data are using cross sectional approach because in the process it is possible to collect quantitative and qualitative data on various types of research questions, then *a cross sectional* approach is to observe, analyze data within a certain period (Bougie & Sekaran, 2020). The sampling technique in this study is using non probability, judgmental sampling is chosen to be sampling criteria by determining that SMEs that have implemented minimal technology such as QRIS (Indonesia cashless payments standard) or those that already have a point of sale system.

Questionnaire in this study was developed using measurement items from the variables tested for influence, a combination of closed and open questions was carried out to optimize and provide more accurate results due to research in the field of complex marketing strategies (Hair et al., 2020). Four variables consist of digital transformation leadership measured by six indicators (DTL1-DTL6) adapted from Kusuma et al., (2024); Weber et al. (2022a), customer agility variabel measured by five indicator (CA1-CA5) adapted from Roberts & Grover (2012), digital strategy variable measured by seven indicators (DS1-DS7) adapted from Proksch et al. (2024); AlNuaimi et al. (2022); Goldman et al (2021)**,** last is SMEs performance which is dependent variabel are measured by eight indicator (SP1-SP8) adapted from Abdul Wahab & Radmehr (2024); Le et al. (2024); Dwikat et al. (2023). Total population of SMEs engaged in the food and beverage sector, especially those that are well digitized, is still difficult to know the total number or sample, so that the population analysis in this study is unknown, so further sampling will use the minimum sample approach proposed by Hair et al. (2020) which can use the 10-times rule of the total questionnaire items contained from the research variables, which then at least fulfills the eligibility criteria for research analysis that can represent the results of this study minimal 380 respondents or samples. In the process of data collection of this research then received feedback from 407 respondents. This research using SEM (Structural Equation Modeling) analysis method, analysis with the SEM approach is important in business research because it allows for testing a series of dependent effects simultaneously, which is very useful in testing theories with several interrelated equations (Hair et al., 2019). Research analysis uses SEM because it is considered more appropriate for the theory development stage on indicator variables

and the potential influence between variables, and SEM can simultaneously test the influence of multi-level variable dependencies (Astrachan et al., 2016).

Findings and Discussions

The overall aim of the study was to examine the effect digital transformation leadership, customer agility, and digital strategy in a selected food and beverages SMEs in Riau Island from Indonesia as a industry and tourism town border with Singapore and Malaysia. The demographics of the 407 participants from SMEs owner and managerial are presented in Table 1 along the parameters of age, gender, qualification, and other description needed.

Table 1: Demographic analyses

Characteristics	Total	Percentage
Age		
less than 30 years	36	8.8%
30 - 35 years old	77	18.9%
36 - 40 years	132	32.4%
41 - 50 years	147	36.1%
51 years or older	15	3.7%
Education		
Junior high school equivalent	101	24.8%
High school equivalent	132	32.4%
Diploma	10	2.5%
Bachelor	143	35.1%
Master	17	4.2%
Doctor	4	1.0%
Position		
Manager	59	14.5%
Director	42	10.3%
Owner + Director/Manager	306	75.2%
Length of Service		
1 - 3 years	153	37.6%
4 - 6 years	145	35.6%
7 - 10 years	54	13.3%
> 11 years	55	13.5%
Business Operating Age		
3 years	144	35.4%
4 - 5 years	39	9.6%
6 - 10 years	149	36.6%
> 11 years	75	18.4%
Total	407	100%

The samples in this study are SMEs engaged in the food and beverages sector where the participants or respondents studied specifically have a managerial role in operations to the level of policy makers or strategic decisions related to the business performance of the SMEs being managed. The results of the analysis show the dominance of owners who act as directors or managers as many as 306 samples or 75.2%, which shows that generally SMEs in the Riau Islands still tend to be privately owned and there is still direct intervention from the owner in management, especially for the size of SMEs that are still in the form or not yet different from the law, but if the SMEs are in the form of franchises and or run through partnerships, they will tend to only be managed by Managers to Directors and the results of this analysis are less likely to have a high bias. Furthermore, followed by management from Managers as many as 59 samples or 14.5%, and Directors as many as 42 samples or 10.3%. The majority are aged 36 - 40 years as many as 132 samples or 32.4%, then 41 - 50 years of age as many as 147 or 36.1% with an indication that managers have long been involved in managing SMEs, the tenure of SMEs management from respondents ranges from 1-3 years, and in the period 4-6 years with a percentage of 37.6% and 35.6% respectively. The education level of the respondents as managerial in the SMEs studied is more at the junior high school level equivalent to 24.8%, high school level equivalent to 32.4%, and more dominated by the last education, namely Bachelor (S1) at 35.1%. The figure of the last education owned by the managerial of SMEs in the field of food and beverages shows that many today not only have a permanent job and a good career, but also have a side business that is most accessible, namely in the culinary field.

Table 2: Instruments testing results

Variables	Indicator	Outer Loading	AVE	Decision	Cronbach's Alpha	Decision
Digital Transformation Leadership	DTL1	0,764	**0.640**	Valid	**0.887**	Reliable
	DTL2	0,756		Valid		
	DTL3	0,839		Valid		
	DTL4	0,840		Valid		
	DTL5	0,818		Valid		
	DTL6	0,778		Valid		
Customer Agility	CA1	0,630	**0.618**	Valid	**0.842**	Reliable
	CA2	0,798		Valid		
	CA3	0,802		Valid		
	CA4	0,870		Valid		
Digital Strategy	CA5	0,810		Valid		
	DS1	0,652	**0.568**	Valid	**0.872**	Reliable
	DS2	0,711		Valid		
	DS3	0,794		Valid		
	DS4	0,809		Valid		
	DS5	0,711		Valid		
SMEs Performance	DS6	0,789		Valid		
	DS7	0,794		Valid		
	SP1	0,755	**0.520**	Valid	**0.816**	Reliable
	SP2	0,803		Valid		
	SP3	0,770		Valid		
	SP4	0,674		Valid		
	SP5	0,679		Valid		
	SP8	0,632		Valid		

Based on the test results on the loading factor value of the variables contained in the research construct, there are several indicators of the SMEs performance variable with a total of 8 indicators, but two indicators which is SP6, SP7 indicator codes in this case are eliminated, this refers to the loading factor value that passes the test must meet a minimum of 0.50, hence that two indicators before aren't meet the minimum value (Hair et al., 2021). The four variables in this study that are used as constructs have passed the initial or prerequisite testing stage, where each AVE value is greater than 0.5 as well as in a reliability value greater than 0.7. The test results prove that the indicators used in measuring the research variables are feasible and meet the criteria (goodness of measures), meaning that the use of the right instrument will provide more accuracy in the research results.

Tabel 3: Model fit measurement results

Index	***Result***	***Explanation***
***Chi-Square* (X^2)**	873,16	*Good Fit*
CMIN/DF	1.827	*Good Fit*
GFI	0,900	*Good Fit*
AGFI	0,845	*Marginal Fit*
RMSEA	0,045	*Good Fit*
TLI	0,935	*Good Fit*
NFI	0,909	*Good Fit*
CFI	0,956	*Good Fit*
IFI	0,957	*Good Fit*
PGFI	0,580	*Good Fit*
PNFI	0,618	*Good Fit*

The average goodness of fit falls into the good fit category based on the analysis of multiple indicator scores. Astrachan et al. (2016) suggest that a model's viability can be determined by using 4-5 goodness of fit that satisfy the requirements. Moreover it stated the use of 4-5 goodness of fit that satisfy the requirements is adequate to assess the viability of a model (Dash & Paul, 2021)

Table 4: R-Square adjusted testing results

Variabel	R Square Adjusted
SMEs *Performance*	0.630

Analyses from Adjusted R-Square value in this study shows quite good results, especially in the dependent variable studied, namely SMEs performance, in this case it has a representation of the independent that affects 63%. The independent variables in this study in the form of digital transformation leadership, customer agility, digital strategy are quite influential on the dependent variable SMEs Performance so that the conclusion is that it can be analyzed quite well by its representation.

Table 5: Hypothesis testing results

Hypothesis	Effect	Estimate	*P-Value*	Results
H1	DTL – SP	0,139	0,002	Supported
H2	CA – SP	-,027	0,709	Rejected
H3	DTL – DS	0,086	0,037	Supported
H4	CA – DS	0,481	0,001	Supported
H5	DS – SP	0,873	0,001	Supported

Note: DTL (digital transformation leadership); CA (customer agilty); DS (digital strategy); SP (SMEs performance)

Discussions

Digital transformation leadership positive effect on SMEs performance

In line with research conducted by Chatterjee et al. (2023) where since the Covid-19 pandemic a new phenomenon has emerged which has resulted in many job shifts and even the emergence of a term that can work from home, until various digital workplaces have been created that exist today. SMEs certainly need leaders who can transform digitally so that they can implement a digital change for better customer service and also oversee their increasingly productive employees (Malik et al., 2024). Current technological adaptation requires leaders, managers, both managers and directors, even owners, to understand its application, especially in preparing strategic steps at the beginning. In the research of Ahmad et al. (2024) digital transformation leadership can function as a forum for the application of innovative management and is also able to support its application in achieving the performance of SMEs in the digital economy, this is in line with research as evidenced by the positive influence between DTL and SP. Positive influence in this case requires that leaders, managerial, and owners in SMEs must have a comprehensive vision, mission, mindset, and digital skills so that can formulate and direct well for all those involved in it (Kafa, 2025). The results of this study also provide input for the theory of Sustainable Development that digital transformation is inseparable in sustainability and is also a necessity owned by leaders who have a vision, mission, and view of sustainability. The results of testing this hypothesis are also in line with several previous studies that show a positive influence between DTL on SP, where in essence the things that are emphasized are how the role is taken, the ability to transform, as well as the leadership ability to guide, communicate to make creative employees or people involved to be motivated in achieving the goals that have been set (Malik et al., 2024; Senadjki et al., 2024; Lathabhavan & Kuppusamy, 2023).

Customer agility positive effect on SMEs performance

This finding show that is a important note that the ability to implement customer-oriented strategies needs to be complemented by other strategies, for example with a digital approach. According to Agag et al. (2024) customer agility is about how to allocate resources to adapt to market share conditions that are very dynamic and often fluctuate, as well as creating a strategy and establishing new routines for future needs that cannot be predicted precisely. Furthermore, customer agility is very dependent on information technology resources, so that in its needs it certainly needs to be equipped with a digital strategy (Fjellström et al., 2020). According to Junfeng & Butkouskaya (2025) state customer agility will improve business performance if it pays attention in terms of technology orientation, it is then revealed that the dynamic in a company, especially SMEs, needs to pay attention and consider the aspect of digitalization. This digitalization will help approach customers more proactively and also on target, sustainable development theory also emphasizes the importance of intermediaries related to customer response (customer agility) because sustainability is more complex and does not only depend on the agility of SMEs to customers, its nature is long-term and indirect so that it requires strategy and also technological support in taking a holistic customer agility approach. Furthermore, according to Fjellström et al. (2020) customer agility shows the benefits of digital marketing for SMEs where digitizing marketing activities will help reduce costs and increase dynamic capabilities to maintain competitive advantage. The results of this study are not in line with previous research put forward by so that there needs to be a policy, or complementary strategic steps that help implement customer agility using a digital strategy approach. When viewed in several ways such as things that respond to something that happens with customers, as well as identifying customer needs more quickly, it would be better to be proactive, one of which is through social media (Hanaysha, 2022; Bozkurt et al., 2021).

This analysis then becomes a new insight that the emphasis on consumers related to sustainable development theory is a view where digital strategies and executors need to adapt digitalization which is an integral part of the concept of sustainability. According to Barravecchia et al. (2025); Entsminger & McGowan (2024) the business approach that is currently needed is not only to understand the dynamics of evolving customer feedback, but also to implement targeted digital interventions that are aligned with shifting consumer needs. Moreover from Yusran et al. (2020) suggest that policy makers and marketers need to consider environmental concern to create a positive attitude, this explanation clearly show that the sustainable development theory in case of customer agility is in strongly linked. When looking at the previous descriptive data, it was found that SMEs in Riau Islands are mostly managed by owners who are also managers or directors, in which case it can be attributed that the thinking of these owners has not focused on customer-oriented agility. Research from Zhang et al. (2024) revealed that of course the treatment will be different if it is held by a manager whose function is single and not concurrent, the thought of approaching customers will be further enhanced so that good thinking and good management will have an impact on an important role for decision making that determines SMEs towards the use of digital strategies, this strategy will be very helpful in its implementation so that owners to managerial in an SMEs will be able to learn and gain insight related to current customers and also thinking more sustainable way to gain more customers.

Digital transformation leadership positive effect on digital strategy

Research by AlNuaimi et al. (2022) which states that digital transformation leadership has a positive effect on digital strategy in various levels of companies, businesses, even SMEs, this is because currently many company leaders or owners in SMEs are competing to grow larger in business scale, carrying out radical digital transformation, the hope is to be better but the reality is not as beautiful as expected. The previous explanation is a strong reason for the direction of preparing a digital strategy before taking further action, this is supported by the results of research conducted by Malik et al. (2024) states that digital transformation leadership has a positive effect on digital strategy, this positive influence will change the organization, especially in a digital context which will then be incorporated in marketing to business operations. Still referring to previous research which states that digital transformation leadership has a positive effect on digital strategy, where Majumdarr et al. (2024) state that current leadership strategies are increasingly relevant and need to be united with digital strategies due to uncertainty or changes that are increasingly difficult to predict. Furthermore, research from Levy et al. (2020) highlights the positive influence of digital transformation leadership on digital strategy seen from the managerial or leadership role to the owner in its application, especially related to decision making, which means that the role of the manager must be more flexible, adaptable and responsible for the rapidly changing technology field. The theory of sustainable development is closely related to the role of leaders who dare to transform digitally because it is a step of change that refers to sustainability, meaning that leaders who transform digitally will think about the long term so that it is in line with the implementation of digital strategies which then support sustainable innovation and more exclusive businesses, further the results of this analysis provide evidence that reinforces that the theory of sustainable development prioritizes a balance in a more responsible business that will have a very good impact on SMEs stakeholders, especially the application of sustainable development theory in this case is the integration of digitalization in the prevention of marketing myopia (Nyquist et al., 2025).

Customer agility positive effect on digital strategy

Research by Giacosa et al. (2022) proves the same result where customer agility has a positive effect on Digital Strategy, the essence is conveyed that customer agility must be seen by SMEs as a foundation for digital transformation, especially in implementing a good digital strategy. Furthermore, customer agility when viewed from a practical perspective, SMEs must be able to understand and analyze the digital journey of customers including the interactions shown, a fundamental understanding of the need for changes that occur digitally related to customers so that digital strategy can be relied upon (Cannavacciuolo et al., 2023; Maura & Darshana, 2013). Furthermore, Yawized et al. (2024) state that flexibility, adaptation, and also agility in this case the owners of SMEs who need to apply customer agility in integration with the digital strategy to be carried out. Furthermore, in the theory of sustainable development, through the economic aspect of sustainability, SMEs that apply customer agility can interact more closely with their customers so that the digital strategy in this case acts as a customer experience enhancer to increase customer satisfaction and retention. The results of this analysis provide an overview seen from the theory of sustainable development to SMEs managerial in reducing dependence on physical resources, which is in line with the concept of the theory that requires sustainability not only in terms of performance but also how sustainability with various parties involved in the business process is carried out. Customer agility integrated with digital strategies will greatly enable and open up great opportunities to implement environmentally friendly businesses with value activities to more precise and satisfying customer services based on AI-driven (Oraini, 2025).

Digital strategy positive effect on SMEs performance

The current technological era is very difficult, especially in transforming towards sustainable digital, this is due to the complexity of the digital transformation process itself so that it needs to involve the use of technology, have a clear vision, and also a digital strategy to complement it (Kujur & Singh, 2019). In response to this, it is necessary to integrate from top-level managerial executors to the preparation and implementation of digital strategies that can affect the performance of SMEs (AlNuaimi et al., 2022). In line with other studies that prove that digital strategy has a positive effect on SMES performance, according to Zheng (2024) digital strategy positively affects performance because this is a reflection of the company's commitment to integrating digital strategy with its business operations. Furthermore, when integrating digital strategy with SMEs business operations, the most obvious practice will

lead to the use of digital technology and facilities in operational activities and production processes, sales, and engagement with customers. As a result, the implementation of digital business strategies will undoubtedly contribute to the improvement of SMEs' performance. Digital strategy in the context of sustainable development theory will not only improve the performance of SMEs directly but it is also an input that the implementation of this strategy will also provide various benefits for SMEs that implement it. The concept of economic sustainability requires SMEs to improve business efficiency as well as digital-based product innovation, furthermore, the significant influence of digital strategy will help SMEs in achieving digital inclusion, especially those based on customers, communities, and social (Nyquist et al., 2025). Technology is a factor that can increase the competitiveness of SMEs, but it will also be a limitation if it does not prioritize approaches in a more creative digital strategy, as well as in the approach of sustainable development theory, namely with community empowerment practices so that there is a good sustainability (Masnita et al., 2018).

Conclusions

This research is carried out further based on literacy and previous research in analyzing the influence of digital transformation leadership, customer agility, digital strategy where this aspect looks more at the strengths and weaknesses of the SMEs themselves where the achievement of performance needs a strategy implemented in the current era of digitalization. SMEs in Riau Islands still have difficulties in utilizing their resources, limitations are also still felt closely with the conditions experienced by various SMEs in Riau Islands, especially for the F&B sector which continues to change. The results of this study provide a different view where to strengthen the position, continuous integration is needed. This of course must start from the very top, namely the owner to the managerial who must dare to transform in leadership and be aware of current technological developments, oriented and responsive to the needs, desires, to the most basic changes related to customers (customer agility). Of course, the digital strategy will then follow the preparation based on the previous three factors so that it does not seem to only change conventional to digital but there is a clear direction and what will be achieved is none other than the performance of the SMEs themselves, this achievement is then not only based on quantity but on quality that continues to make improvements.

From this research it provides input and also sees a different view in analyzing the use of Sustainable Development Theory proposed by Daly (1990) to improve the performance of SMEs. This research expands the scope of sustainable development theory by integrating the concepts of digitalization in leadership, customer-based agility actions (consumer agility), and the application of digital strategies that must be recognized as visibility for daily business operations. The contribution of this theory development in its application by SMEs provides input to the theory expressed by Daly (1990) that the increase and pursuit of economic value by SMEs is not easily explained or understood between economic and environmental achievements. This research reveals and provides input that with good digitalization and transformation from leadership, managerial in optimal resource allocation with attention to consumer approach will improve performance in accordance with sustainable development, this strategy will form an environmentally friendly SMEs image in the eyes of the community, and ultimately this optimization will make the community in this case potential consumers more aware and participate in the success of a sustainable business environment.

Finally, of course, this research has limitations in a general, no research is perfect considering the various obstacles experienced while carrying out the research. First, this research only focuses on testing the influence of 4 variables including digital transformation leadership, customer agility, digital strategies, and finally the effect on SMEs performance. Of course there is a scope that is not comprehensive in examining more deeply related to improving the performance of SMEs. Second, it is limited to the use of judgmental sampling techniques, where there is a determination that the SMEs studied must focus on the food and beverages industry, have implemented payment digitization, meaning that this does not include SMEs outside the categories set out in this research. The possibility of respondent bias is also inevitable in this study.

The limitations previously stated make this research have several recommendations for future research. First, other variables can be added to expand the understanding of SME performance in the context of digitalization and sustainability, including:

i. Environmental Dynamism, adding this variable will help explore how rapid changes in the external environment, such as government policies and market trends, impact the relationship between digital transformation leadership, customer agility, and SME performance. Also, it could moderate the relationship between digital transformation leadership and SME performance by amplifying the need for adaptive strategies.
ii. Employee Digital Competencies in functions of assessing the digital skills and competencies of employees within SMEs can enhance understanding of how human resources contribute to the implementation of digital strategies and, ultimately, business performance.
iii. Digital Marketing Strategy, extend this variable role as mediating variable in greater depth and how it can contribute to SMEs' success in facing digital competition.
iv. Sustainability Practices, including sustainability practices variable in the research will provide perspectives on how SMEs can integrate social and environmental considerations into their business strategies to achieve long-term outcomes.

Second, the use of other theories in supporting and analyzing holistically in addition to the use of sustainable development theory can also be considered for future research, so that the research results can provide views from different sides. Third, for the distribution of further questionnaires, to obtain a maximum response rate from various elements of the manager, starting from the

bottom to the top level managerial so that the results of the answers are more diverse and can be analyzed more deeply to get a good generalization. Fourth, given by the positive growth in the number of SMEs in various fields and more intensively challenging conditions, future research should consider the types of SMEs that are sampled to be distinguished based on their legal entity, then make distinctions such as SMEs that use their own trademarks or through franchising, because SMEs that obtain a clearer legal framework through franchising will be better managed and prepared for digitalization, in Indonesia franchising typically includes knowledge transfer that makes it easier to successfully implement digital initiatives strategy. Finally, results of this research provide input and answers regarding the application of sustainable development theory in SMEs. The role of digital strategy and the presence of digital transformation leadership in this context provide a perspective on allocation and scale, where digitalization will help the flow of resources owned by SMEs, thereby optimizing scale and also the connection with the environment in business operations. In normal economic conditions certainly can use the Pareto principle, but in this theory, the emphasis is more on optimal allocation, good resources, and of course, this is a role of digitalization itself in realizing it, especially for sustainability issues.

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