Technology Adaptation and CEO Characteristics: Enhancing Competitive Advantage in Indonesia's MSME of F&B in the Jabodetabek Region

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ABSTRACT

The food and beverage (F&B) industry significantly impacts Indonesia's economy, playing a crucial role in economic growth and welfare. Micro, small, and medium-sized enterprises (MSMEs) in the F&B sector, particularly in the Jabodetabek region, are essential contributors to Indonesia's global standing. This study explores the relationship between technology adaptation, CEO characteristics, and competitive advantage in Jabodetabek's F&B MSMEs. Challenges faced by these enterprises, such as limited resources and human capital, underscore the need for effective technology adoption and strong leadership. The research aims to enrich the literature on this subject and provide insights for policymakers to enhance MSME competitiveness.

Keywords:
Technology Adaptation; CEO Characteristics; Competitive Advantage; MSME; Food and Beverage

INTRODUCTION

The food and beverage industry has a significant impact on the Indonesian economy. This impact was supported by the birth and implementation of the industrial revolution in this sector which resulted in this sector succeeding in improving economic growth, export performance and welfare (Hermawan, 2021). The sustainability of this industry has also been discussed and stated to have a major influence on the Indonesian economy (Bui et al., 2022). Although on the other hand, this sector is the largest contributor of waste on a national scale, due to the production of packaging and other waste, sales growth in this sector is very convincing and capable of creating better environmental management innovations for sustainability (Widiatami et al., 2021).

The micro, small, and medium-sized enterprises (MSMEs) play a significant role in the food and beverage (F&B) industry in Indonesia. MSMEs in the Indonesian F&B sector can make Indonesia a major player in the global F&B industry by 2030 (Muda et al., 2020). Around 99% of businesses in Indonesia are categorized as MSMEs, all of them contributing significantly to the country's GDP (ILO, 2019). Existing and previously conducted studies (Antesty et al., 2023; Dewi, 2023; Kurniawan et al., 2023; Siregar & Pinagara, 2022) collectively underscore the pivotal role of MSMEs in the F&B industry in Indonesia and the various factors that influence their performance and sustainability.

Apart from its large impact on the economy and industry, MSMEs have serious challenges, especially in the context of technology and human resources. In terms of human resources, MSMEs face challenges such as a lack of training and skill development programs, which are essential to keep up with the rapidly changing technology (Andriyani et al., 2021). In terms of technology, MSMEs face challenges such as a lack of resources such as financing, qualified professionals, and infrastructure (Dambiski Gomes de Carvalho et al., 2021). The research about

technology and CEO characteristics is important for Micro, Small, and Medium Enterprises (MSMEs) due to its impact on competitiveness, productivity, and performance. Existing literature highlights the role of digital technologies in enhancing productivity and performance in MSMEs, especially in times of crisis, and the effectiveness of strategies taken by leaders based on the firm's capabilities (Papadopoulos et al., 2020). Additionally, technology adoption is believed to provide benefits for MSMEs to boost online sales and compete in the global market (Suminah et al., 2022). The adoption and effective utilization of technology, along with the leadership qualities of CEOs, play a significant role in the success and resilience of MSMEs.

This research aims to determine the impact of technological adaptation and CEO character on the competitive advantage of food and beverage MSMEs in the Jabodetabek area, which is the most populous and main industrial area in Indonesia. Apart from being able to enrich the literature related to this topic, this article can also be used as material and material for policy makers in the corporate, industrial and state sectors in formulating strategies for increasing the competitiveness of MSMEs not only in Jabodetabek but in general throughout Indonesia.

Literature Review And Hypothesis Development
a. Technology Adaptation

Technology adaptation refers to the process of modifying and changing work practices or user reactions in response to the installation of new technology in a given setting. It involves the adjustment and integration of new information technology changes into work settings, as well as the adoption of business process innovations that alter organizational practices and often involve the post-adoption invention of complementary business processes and adaptations (Forman et al., 2018; Kee & Rubel, 2021). he adaptation process for new technology is complex and not yet fully understood, and it involves the role of costs, benefits, communications channels, and dynamic considerations in the decision to adopt new technology (Forman et al., 2018; Iskandar et al., 2022). The adaptation process for new technology is complex and not yet fully understood, and it involves the role of costs, benefits, communications channels, and dynamic considerations in the decision to adopt new technology (Lahiri et al., 2018).

Several journal articles discuss the impact of technology adaptation on competitive advantage. According to a study, technology is a powerful tool for organizations to win or defeat rivals, and to compete, organizations must ensure their employees are up-to-date with the latest technology (Kee & Rubel, 2021). Another study identifies four independent clusters linked to the characteristics of technology that enable competitive advantages (Saura et al., 2022). A third study shows that firms investing in technology-driven proactive supply chain risk management can gain operational benefits in terms of uninterrupted information processing, reduced time disruption, and uninterrupted supply, leading to a competitive advantage (Jerome et al., 2023). A fourth study proposes a framework for predicting the expected duration of a competitive advantage due to the adoption of emerging technology (Stratopoulos, 2016). From this explanation, a hypothesis can be drawn as follows:

h1: Technology Adaptation have a positive and significant influence on the competitive advantage of Food and Beverage MSME in Indonesia.

b. CEO Characteristics

CEOs are responsible for making major corporate decisions, managing overall operations, and setting the company's strategic direction. They are accountable to the board of directors or stakeholders of the company and are often the public face of the organization. CEO characteristics are important factors that can influence firm performance (Shen, 2021). Observable CEO characteristics such as age, tenure, functional background, education, ownership, and origin have been used to explain the particular characteristics of small and medium-sized firms (Haas & Speckbacher, 2017). CEO firm tenure and educational level also are important characteristics that can influence firm performance and competitive advantage (Saidu, 2019). CEOs who have prior experience of the firm before their appointment as the chief executive officer can improve stock performance and directly to competitive advantage (Saidu, 2019). These findings suggest that CEO characteristics play a crucial role in shaping a firm's competitive advantage. Furthermore, the study conducted by (Rudy & Johnson, 2016) highlights that CEO characteristics not only influence a firm's performance in the nonmarket environment but also its overall competitive advantage.

h2: CEO Characteristics have a positive and significant influence on competitive advantage of Food and Beverage MSME in Indonesia.

c. Competitive Advantage

The idea of competitive advantage that is full of strength is to recognize competitive advantage as a tool to achieve goals (Hsu & Mykytyn, 2005). (Al-Rfou & Trawneh, 2010) explains that competitive advantage is the ability of an organization to further increase value for customers and compared to competitors who have a relatively advantageous position, the challenge is to maintain every advantage for an achievement. Competitive advantage also can be defined as obtained when implementing a strategy for creating value that is not carried out simultaneously by other players or potential players (Agha et al., 2012; Lesmana & Iskandar, 2022).

MSMEs in Indonesia should have a competitive advantage to thrive in the business environment. Competitive advantage is crucial for MSMEs to compete effectively and achieve better performance. Research indicates that competitive advantage can be achieved through digital transformation, innovation, and the adoption of digital technologies. For instance, a study on women-owned MSMEs in Indonesia found that competitive advantage mediates the effects of digital transformation and innovation on performance (Susanti et al., 2023). Another review emphasizes that MSMEs in Indonesia need to adapt to digital-based economic transformation to compete effectively (Anatan, 2021). Furthermore, it is highlighted that MSMEs must have a competitive advantage through innovation (Timotius, 2023). herefore, having a competitive advantage through innovation, digital transformation, and effective business strategies is essential for the success of MSMEs in Indonesia.

d. Conceptual Framework

Based on a review of existing literature, a conceptual framework can be formed and used as a reference in this research as in Figure 1 below.
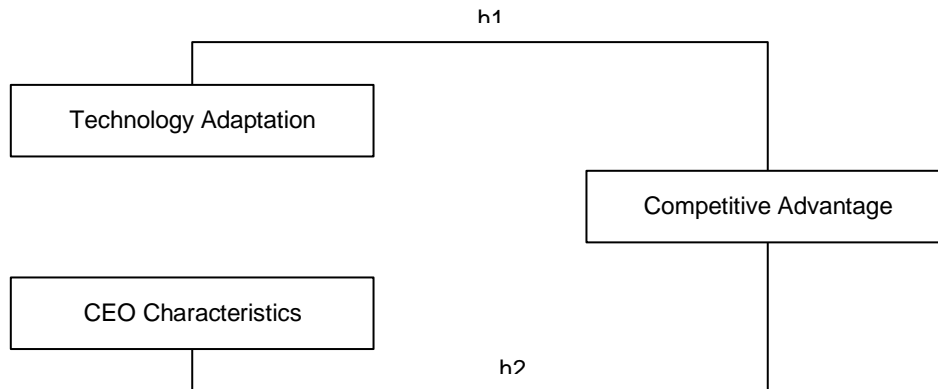
h1

Technology Adaptation

Competitive Advantage

CEO Characteristics

h2

Figure 1. Conceptual Framework
Source: Literature Review, 2023

METHOD

a. Design

This research employs a quantitative approach. Given the nature of the research topic, a quantitative approach would allow for the systematic collection and analysis of data related to technology adaptation, CEO characteristics, and competitive advantage in the context of MSMEs in the food and beverage industry in the Jabodetabek region. This approach would provide valuable insights into the specific factors influencing technology adoption and the competitive advantage of MSMEs in this region. Several previous studies also used this approach to conduct research such as research (Faqih et al., 2023) which made this method declared as an appropriate and commonly used method.

b. Sample Size and Sampling Technique

A total of 100 samples were selected to represent all food and beverage MSMEs in the Jabodetabek area. To produce a sample that is appropriate to the research, a purposive sampling technique was applied with several sample criteria as follows:
a) MSMEs located in the Jabodetabek area and engaged in the food and beverage industry.
b) MSMEs have been established and operating for a minimum of five years.
c) MSMEs have a systematic company organizational structure by having a CEO or top company leader.
d) MSMEs have adopted technology in their business processes such as computerization and digitization.

c. Data Collection

Data was collected using an offline survey method by directly visiting 100 previously targeted samples. Researchers try to deliver questionnaires to leaders, CEOs, managers or food and beverage business owners in order to obtain accurate data. Before visiting them directly, contacts and promises were made using social media such as WhatsApp, Facebook, Instagram and Email to ensure the respondents'

willingness. The questionnaire contains 20 statement points representing each indicator in each variable. These statements are closed statements with answers on a Likert scale of 1-5. Before filling in, respondents are first given an explanation regarding how to fill in the data so that the data obtained is truly in accordance with existing conditions and does not deviate.

d. Data Analysis

The data was analyzed using the Partial Least Square approach combined with Structural Equation Modeling or PLS SEM with the help of the SmartPLS application. This approach is deemed appropriate to this research because it allows for the examination of the relationships between various factors, such as technology adoption, CEO characteristics, and competitive advantage, in a comprehensive and interconnected manner. SEM can help identify the factors that influence innovation and competitiveness in Indonesian MSMEs, particularly in the food and beverage sector (Wiratama). SEM is particularly useful for this research as it can handle complex relationships between variables and provide insights into the underlying mechanisms that drive innovation and competitive advantage in Indonesian MSMEs. The study's findings will contribute to the understanding of how Indonesian MSMEs can better adapt to technology and improve their competitive position in the global market (Sijabat, 2022).
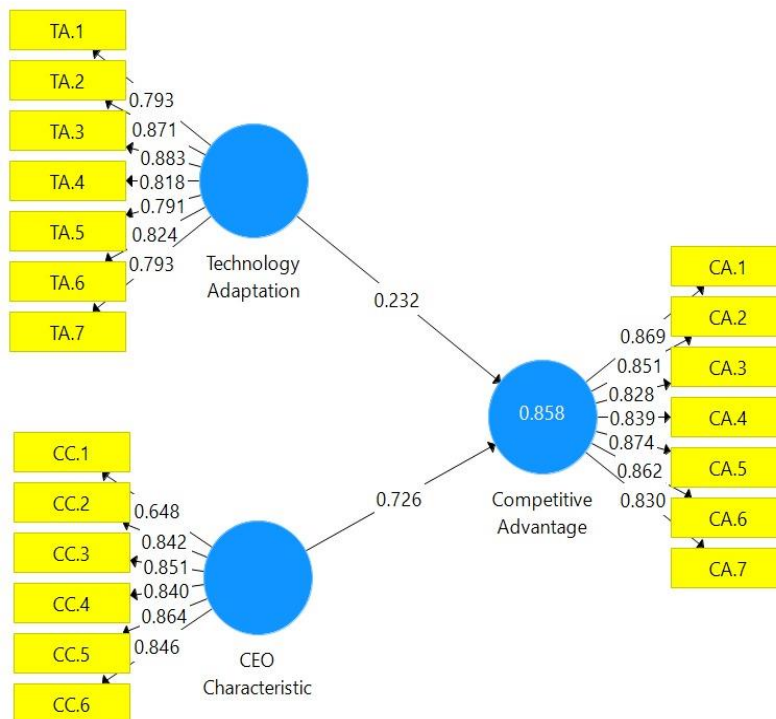

Figure 2. Research Model
Source: Data Analysis Result, 2023

RESULTS AND DISCUSSION
Result

a. Respondent Demographic

Table 1. Respondent Demographic

Gender	N	%
Women	32	32%
Men	68	68%
Age of CEO/Owners/Managers	N	%
18-25 Years	8	8%
25-30 Years	38	38%
30-35 Years	42	42%
35-40 Years	10	10%
>45 Years	2	2%
Education	N	%
Elementary School	1	1%
Junior High School	4	4%
Senior High School	25	25%
University	70	70%
Location	N	%
Jakarta	20	20%
Bogor	20	20%
Depok	20	20%
Tangerang	20	20%
Bekasi	20	20%

Source: Primary Data, 2023

The demographic profile of CEO/Owners/Managers reveals a gender distribution with 68% men and 32% women. In terms of age, the majority falls within the 25-35 age range, constituting 42%, followed by those aged 25-30 at 38%. Educationally, 70% have a university background, while 25% completed senior high school. A smaller percentage attended junior high school (4%), and only 1% have an elementary school education. Geographically, there is an even distribution across Jakarta, Bogor, Depok, Tangerang, and Bekasi, each representing 20% of the sample. This snapshot provides insights into the diverse characteristics of individuals occupying leadership roles in terms of gender, age, education, and regional distribution.

b. Validity and Reliability of Construct

Table 2. Validity and Reliability

Variabel	Item	Code	Loading Factor
Technology Adaptation	CA= 0,922 ,CR=0,937 ,AVE=0,682 1. The technology tools implemented in our business operations are aligned with our organizational needs.	TA.1	0,793
	2. I believe that the integration of technology has positively impacted the overall productivity of our business.	TA.2	0,871
	3. The training programs provided for technology adoption are sufficient	TA.3	0,883

Variabel	Item	Code	Loading Factor
	and helpful in enhancing employees' skills.		
	4. The implementation of technology has improved communication and collaboration within our business.	TA.4	0,818
	5. I feel confident in using the technology tools required for my job responsibilities.	TA.5	0,791
	6. The business leadership demonstrates a commitment to staying updated with emerging technologies.	TA.6	0,824
	7. The IT support provided in our business is effective in resolving technological issues in a timely manner.	TA.7	0,793
CEO Characteristics	CA=0,899 ,CR=0,924 , AVE= 0,670		
	1. I believe I, as the CEO, have a clear vision for the future direction of our organization.	CC.1	0,869
	2. I effectively communicate our company's values and mission to our employees.	CC.2	0,851
	3. I exhibit strong leadership qualities that inspire confidence among our employees.	CC.3	0,828
	4. I actively seek and value input from employees at all levels of the organization.	CC.4	0,839
	5. I demonstrate adaptability in navigating changes in the business environment.	CC.5	0,874
	6. I am committed to fostering a diverse and inclusive workplace culture.	CC.6	0,862
Competitive Advantage	CA=0,936 ,CR=0,948,AVE= 0,723		
	1. I believe our company possesses unique strengths that set us apart from competitors.	CA.1	0,748
	2. The strategies implemented by our company contribute significantly to our competitive edge.	CA.2	0,842
	3. Our company effectively leverages innovation to maintain a competitive advantage.	CA.3	0,851
	4. I am confident in our company's ability to adapt to changes in the market and maintain competitiveness.	CA.4	0,840
	5. Our company consistently delivers superior value to customers compared to competitors.	CA.5	0,864
	6. The quality of our products/services is a key factor contributing to our competitive advantage.		

Variabel	Item	Code	Loading Factor
	7. I believe our company's brand reputation is a significant asset in maintaining a competitive position.	CA.6	0,846
		CA.7	0,830

Source: Data Analysis Result, 2023

The assessment of three key constructs—Technology Adaptation (TA), CEO Characteristics (CC), and Competitive Advantage (CA)—reveals noteworthy findings. For Technology Adaptation, the construct displays commendable internal consistency with Cronbach's Alpha (CA) and Composite Reliability (CR) exceeding 0.9, indicating reliability. However, the Average Variance Extracted (AVE) falls slightly below the recommended threshold of 0.7. Nevertheless, all loading factors for individual items surpass the acceptable level of 0.7, indicating strong construct validity. Similarly, CEO Characteristics exhibit robust internal consistency, yet the AVE is marginally below the preferred threshold. The loading factors for CEO Characteristics items, however, are consistently above 0.8, demonstrating strong construct validity. In contrast, Competitive Advantage emerges as a robust construct, boasting excellent internal consistency and an AVE exceeding 0.7. All loading factors for Competitive Advantage items surpass the recommended threshold, signifying high construct validity. In summary, while Technology Adaptation and CEO Characteristics demonstrate robust reliability and validity, the former falls slightly short in AVE, underscoring the need for further examination. Competitive Advantage, on the other hand, stands out as a well-supported and reliable construct across all metrics. These statements are according to the suggestion of (Hair et al.,, 2017).

c. Inner VIF Result

Table 3. Inner VIF Values

	TA	CC	CA
TA			2,055
CC			2,055
CA			

Source: Data Analysis Result, 2023

Referring to (Hair et al.,, 2017), a good VIF value is a number smaller than 3. This provision shows that the VIF value resulting from the analysis as in the table above meets the criteria which is 2.055. Analysis can be continued to the next stage.

d. Model Fit Analysis

Table 4. Model Fit

	Saturated Model	Estimated Model
SRMR	0,078	0,078
d_ULS	1,275	1,275
d_G	-	-
Chi Square	-	-
NFI	-	-

Source: Data Analysis Result

The table appears to present fit indices for a structural equation model (SEM) or a similar statistical model. The fit indices are commonly used to assess how well the model fits the observed data. In your case, the focus is on the Standardized Root Mean Residual (SRMR) and the criteria for evaluating its value. According to (Hair et al.,, 2017), If SRMR is lower than 0.02, it is considered a good criterion for model fit. If SRMR is lower than 0.10, it is generally considered acceptable. If SRMR is lower than 0.08, it is considered a good criterion for model fit. In this case, the SRMR value for the estimated model is 0.078, which falls below the 0.08 threshold, suggesting that, based on the provided criteria, the model fit is considered good.

e. R Square

Table 5. R Square

	R Square	R Square Adjusted
CA	0,858	0,856

Source: Data Analysis Result

R-squared is a statistical measure that represents the proportion of the variance in the dependent variable that is explained by the independent variables in a regression model. An R-squared value of 0.858 means that approximately 85.8% of the variability in the dependent variable (CA) is explained by the independent variables in the model. In other words, the model is considered to be a good fit as it explains a high percentage of the variance in the dependent variable.

f. Hypothesis Test Result

Table 6. Hypothesis Test

	Original Sample	Sample Mean	STD DEV	T Statistics	P Values	Result
TA->CA	0,232	0,231	0,096	2,427	0,016	Support
CC->CA	0,726	0,729	0,089	8,202	0,000	Support

Source: Data Analysis Result, 2023

The table presents the results of a statistical analysis comparing two groups: Treatment A to Control A (TA->CA) and Comparison C to Control A (CC->CA). For the TA->CA group, the average value is 0.232 with a standard deviation of 0.096. The t-statistic of 2.427 and a p-value of 0.016 indicate a statistically significant difference, supporting the rejection of the null hypothesis. This suggests a significant effect in the treatment group compared to the control group. Similarly, in the CC->CA group, the average is 0.726 with a lower standard deviation of 0.089. The t-statistic is 8.202, and the p-value is 0.000, both strongly suggesting a significant difference and supporting the rejection of the null hypothesis. In summary, both comparisons show statistically significant differences, implying that the observed effects are unlikely due to random chance.

Discussion

Influence of Technology Adaptation on Competitive Advantage of MSME Food and Beverage in Indonesia

The research results show that the first hypothesis (h1) is acceptable. This indicates that there is a significant positive influence of technology adaptation on the competitive advantage of food and beverage MSMEs in Jabodetabek. These findings require MSMEs to be able to adapt to increasingly rapid technological developments in order to increase their competitive advantage over competitors. This finding supports several other findings both in Indonesia and around the world.

This influence can occur and apply in several more specific ways. Technological adaptation can have a significant impact on competitive advantage because of its ability to stimulate innovation. In other words, indirectly, through innovation competitive advantage can grow and originate from good technological adaptation. This causes MSME players to be able to consider both internal and external factors that influence their ability to adopt technological change (Chiu). This influence can also be seen from a business operational perspective. A study shows that entrepreneurs who invest in technology and analytical data find that with this, entrepreneurs are able to gain benefits from the operational side in the form of uninterrupted information processing, reduced time disruptions, and uninterrupted supply, which in turn gives them a competitive advantage (Jerome et al., 2023) . A study also discovered and succeeded in exploring the impact of four technology adaptation clusters on competitive advantage. The first cluster is related to specialization, integration, compatibility, cost and scalability, the second cluster is related to flexibility, applicability, demand and innovation, the third cluster is related to sustainability, productivity, energy and resources, and the last cluster is related to complexity, utility and connectivity (Saura et al., 2022). Technology adaptation is also related to the company's ability in terms of supply chain management in an effort to create competitive advantage (Carnahan et al., 2010).

technology adaptation influences competitive advantage through various mechanisms, such as bidirectional relationships between IT adoption and service innovation, technology-driven proactive supply chain risk management, technology enabler of competitive advantage, core technological competence, and technological capabilities in supply chain competitive advantage. These findings highlight the importance of considering both internal and external factors, as well as organizational flexibility, when analyzing the impact of technology adaptation on competitive advantage.

Influence of CEO Characteristics on Competitive Advantage of MSME Food and Beverage in Indonesia

In line with previous results, the second hypothesis (h2) which predicts a positive and significant relationship between CEO characteristics and competitive advantage can be accepted. These findings also require owners or leaders of MSMEs not only in the Jabodetabek area, but also throughout Indonesia to be able to have the appropriate characteristics in order to create a competitive advantage. Competitive advantages are not obtained from outside and are sought everywhere, but are competitive advantages that are naturally possessed by MSMEs themselves.

This finding is also supported by previous studies. The influence of CEO characteristics on competitive advantage can be observed through various factors. CEO characteristics such as age, education, nationality, and gender have been found to impact firm performance and value. For example, older CEOs may have a competitive advantage due to their experience and wider professional connections (Purwati et al., 2021). Furthermore, CEO attributes such as demographics, experience, and compensation have been shown to affect a firm's innovation and stock returns. The influence of CEO characteristics on competitive advantage is evident through their strategic choices and actions, which reflect their individual characteristics and can impact corporate reputation, financial performance, and sustainable growth (Dewi, 2023). Therefore, CEO characteristics play a significant role

in shaping a company's competitive advantage and overall performance. These studies provide valuable insights into the influence of CEO characteristics on competitive advantage and firm performance.

Research Implication

The study could provide valuable strategic insights for MSMEs in the F&B sector, guiding them on how technology adaptation and CEO characteristics can be leveraged to enhance their competitive advantage. Secondly, policymakers may use the findings to formulate targeted policies and support mechanisms that encourage MSMEs in the Jabodetabek region to adopt technology effectively. This could include financial incentives, training programs, or infrastructure development. The result also suggests to all stakeholders to make training programs that can be developed to nurture these traits among current and future CEOs in the MSMEs. This could include leadership development, technological acumen, and strategic decision-making skills. The study might lead to the development of guidelines or best practices for MSMEs in the F&B sector regarding the effective adoption and integration of technology into their operations. This could include recommendations for specific technologies, implementation strategies, and potential pitfalls to avoid.

Limitation and Future Study Suggestion

As with most scientific studies, no matter how well the study is prepared, the opportunity for limitations and errors still exists, with no exception in this research. This research is included in research that uses a small sample size (even though it has adopted 100 samples) when compared to the number of food and beverage MSMEs in Jabodetabek in general. This limitation is caused by limited time, funds and other resources. Thus, future research can be carried out using more samples or specifically discussing the condition of MSMEs in one area, for example in Jakarta alone or in Bogor alone. This will make the discussion more in-depth and comparisons can be made between each city because they each have their own characteristics. Apart from that, this research has not been able to examine what factors are able to make MSMEs able to adopt technological changes so this research is still limited to MSMEs that have been able to apply technology rather than those that are still conventional, which the author believes are more numerous. Future research can be directed there so that research can be broader.

CONCLUSION

In conclusion, a positive and significant relationship was found between technology adaptation and CEO characteristics on the competitive advantage of food and beverage MSMEs in the Jabodetabek area. These findings require MSME players, especially owners, leaders, managers or CEOs, to strive to be able to adopt technological developments and become CEOs who are able to disrupt business performance and competitive advantage. Several limitations still exist in this research, giving rise to future research opportunities that are no less interesting to explore.

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