
DIGITAL TRANSFORMATION IN MEDAN'S SMEs: ASSESING THE IMPACT ON OPERATIONAL EFFICIENCY AND CUSTOMER SATISFACTION

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Abstract: *The purpose of this study is to determine and analyze the extent to which business automation and artificial intelligence variables affect the satisfaction of MSMEs in Medan City through operational efficiency as an intervening variable. The subjects of this study were SMEs in Medan City, with independent variables in the form of business automation and the use of artificial intelligence, dependent variables in the form of customer satisfaction, and intervening variables in the form of operational efficiency. The results of the data analysis were obtained through SEM analysis using SMART PLS 4.0 software. The data collection techniques used were questionnaires, interviews, and observations. This study uses a quantitative descriptive method, with data analysis through a structural equation model (SEM), which is processed using the PLS 4.0 application. The results show that partially, the variables of business automation and the use of artificial intelligence affect the customer satisfaction of MSMEs in Medan City and contribute to the operational efficiency of MSMEs in Medan. Simultaneously, the variables of business automation and artificial intelligence implementation affect the customer satisfaction of MSMEs in Medan*

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City through operational efficiency as an intervening variable. Along with the increasing use of digitalization, MSMEs in Medan City will be able to improve business automation in operational activities and carry out operational efficiency to expedite service and enhance customer satisfaction.

Keywords: *Digital transformation, business automation, artificial intelligence, customer satisfaction*

Introduction

Digital transformation is often associated with the Fourth Industrial Revolution, which is characterized by the integration of physical, digital, and biological technologies. Technologies such as the Internet of Things (IoT), artificial intelligence (AI), and big data play an important role in this period (Khalil, Afef, Abdelli, Mohammed El Amine, and Mogaji, 2022). Advances in computing and information technology towards the end of the 20th century were the main catalysts for digital transformation. From mainframe computers to personal computers, and finally the internet, these technologies began to change the way organizations operated and communicated. The emergence of the internet in the 1990s and the development of the World Wide Web created new opportunities for businesses in e-commerce, digital marketing, and communication. It also enabled organizations to collect and analyze data in unprecedented ways (Amaral, Afonso, and Peças, 2021). With the increasing use of mobile devices and the adoption of cloud computing technology, organizations can access and share data in real time from any location. This accelerates business processes and allows for greater flexibility. The collection and analysis of big data enables companies to make smarter, data-driven decisions. Through advanced analytics, organizations can identify trends, understand consumer behavior, and optimize their operations (Costa, Alessandra, 2023). Artificial intelligence and machine learning empower organizations to automate complex tasks, improve efficiency, and deliver personalized customer experiences. Blockchain introduces innovation in data and transaction security. This technology has been implemented in various sectors, including finance, supply chain, and healthcare, to improve transparency and security (Gessa, Ana, Jiménez, Amor, & Sancha, 2023). The Covid-19 pandemic that has swept across the world has been a crucial factor in driving companies to implement technological transformation policies. This requires a massive revolution with the implementation of work from

home, enabling tasks to be completed without face-to-face interaction. Companies are automating work processes that were previously done offline in the office, increasing the efficiency of working from home. The work reporting process is carried out through digital transformation by utilizing artificial intelligence, making company operations more efficient and effective (Canhoto, Ana Isabel, 2021). Business process automation can be realized through creative revolutionary ideas and determination, which can create transformation in the digital world. This transformation is growing every day, with increasing technological sophistication that makes business operations more efficient and effective, thereby reducing operational costs and generating comprehensive cost savings (Priyono, Anjar, Moin & Putri, 2020). Business process automation also produces correction mechanisms for human error, which are necessary to prevent mistakes and errors that could harm the company or increase the cost of correcting those errors (Telukdarie, Arnesh, 2023). This can be a double-edged sword, not only for the company, but also for the company's image. The process of digitalization can have both positive and negative impacts. The positive impacts include correction of human error, as well as an impact on work acceleration and efficiency, which aims to improve cost efficiency and provide fast, accurate, effective, and efficient services (Ulas, 2019). The negative impact that arises is an increase in unemployment, so the government needs to find emergency solutions so that digital transformation does not harm the community and the workforce in these companies. Therefore, a win-win solution is needed that can prevent and provide concrete solutions to overcome these negative impacts (Radicic, Dragana and Petković, 2023). Artificial intelligence applied by every business entity, especially MSMEs, can improve the quality of a company's services. This artificial intelligence operates with human-like flexibility, resulting in effectiveness and reducing errors, thereby enabling it to serve and satisfy customers (Arranz, Carlos F.A., 2023). Artificial intelligence also benefits companies in handling complex tasks that are difficult for humans to perform, which in turn can have a significant impact on company performance. Thus, companies, especially MSMEs, can grow rapidly and improve their performance and work productivity. Artificial intelligence will create business connectivity, thereby improving overall performance (Gouveia, Fernando Diogo and Mamede, 2022). MSMEs need a digital transformation process, given their complex operations and customer service that is often suboptimal, which is detrimental to customers who feel

dissatisfied. Therefore, a revolution in the digital field is needed to accommodate customer complaints about poor service quality (Marzi, Giacomo, 2023). SMEs can increase cost efficiency through digital transformation, which requires maximum time and effort to serve customers quickly and effectively (Yilmaz, Gokcen, 2023).

MSMEs can manage their operations well, while creating efficiency in customer service, which will increase customer satisfaction with effective and efficient services. Therefore, maximum effort is needed in the transformation process towards digitalization, which requires time to switch from manual to digital services (Kim, Goo Young, 2023). MSMEs need a clear vision when transforming human-based manual technology to digital technology that utilizes artificial intelligence. This can have an impact on increasing unemployment rates, while on the other hand, MSMEs need significant business development. Therefore, a clear strategy is needed regarding the direction of MSME business development (Hoang et al., 2023). The city of Medan is a center for MSMEs, with 38,343 business units in 2023, down from 56,750 business units in 2022. This decline was caused by the large number of MSMEs that went bankrupt due to customer complaints about service, resulting in reduced customer loyalty. This was due to the lack of initiative among MSMEs to adopt the transformation from manual to automated work, where the existing quality of work was inadequate. The lack of artificial intelligence (digital technology) in operations tends to reduce efficiency, resulting in increased costs that are not proportional to the costs incurred from manual processes. As a result, effectiveness is reduced and efficiency declines, which impacts the ability to provide good service, leading to a decline in customer satisfaction.

Methodology

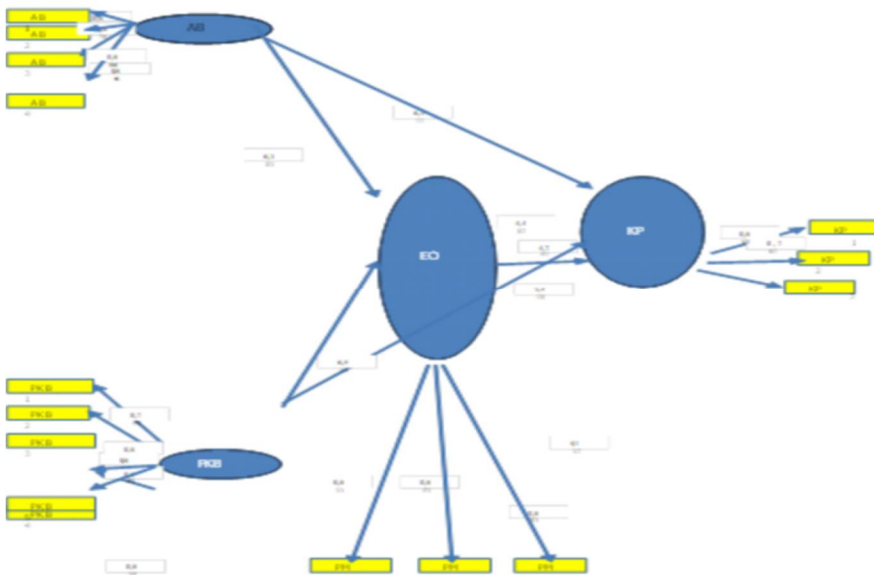
This study uses a quantitative descriptive method with analysis using structural equation modeling (SEM). According to Härting (2022), SEM analysis is a combination of factor analysis and regression analysis, which can be used to test hypotheses regarding the relationship between latent variables (not directly measured) and observable variables. The population in this study consisted of 38,343 MSMEs in Medan City in 2023, with a sampling method using accidental sampling, which according to Bhatti and Sabeen Hussain (2023) is a method in which samples are taken from the

research location. The number of samples taken can be determined using the Slovin formula as follows: $n = N / (1 + Ne^2) = 38,343 / (1 + 38,343 \times 0.1^2) = 99.73 = 100$ MSMEs in Medan City.

Results

The results of the SEM test can be explained through the following Bootstrapping diagram (Figure 1):

Figure 1. Bootstrapping Diagram



Source: own representation

Convergent Validity Analysis

Härting (2022) states that convergent validity analysis is a type of evaluation of the feasibility of existing construct variables. The results of the convergent validity test in this study are as follows:

Table 1 above shows that the data from each variable has been validated, so it can be used effectively for the next data analysis process.

Table 1. Convergent Validity Test

Variabel	Outer Loading
Business Automation (X1)	0,866
	0,876
	0,886
	0,856
Use of Artificial Intelligence (X2)	0,849
	0,759
	0,869
	0,849
	0,839
Customer Satisfaction (Y)	0,833
	0,843
	0,883
Operational Efficiency (Z)	0,881
	0,761
	0,811

Source: Data Processing Results Using PLS 3.0, 2024

Average Variance Extracted (AVE) Analysis

(Härting, Ralf Christian, 2022) states that the AVE test is one of the methods used to evaluate the validity of emerging construct variables. The results of the Average Variance Extracted (AVE) test are presented in the following table:

Table 2. AVE Test

Variabel	AVE
Business Automation (X1)	0,830
Use of Artificial Intelligence (X2)	0,872
Kepuasan Pelanggan (Y)	0,841
Operational Efficiency (Z)	0,861

Source: Data Analysis Results Using PLS 4.0, 2024

Table 2 above shows that the Average Variance Extracted (AVE) value exceeds 0.5, indicating that the construct equation model and data distribution are appropriate and valid.

Composite Reliability Analysis

According to Härting (2022), the Composite Reliability test is a method for evaluating whether the data meets the criteria for suitability and reliability. This can be seen in the following table:

Table 3. Composite Reliability Test

Variabel	Composite Reliability
Business Automation (X1)	0,882
Use of Artificial Intelligence (X2)	0,820
Customer Satisfaction (Y)	0,775
Operational Efficiency (Z)	0,851

Source: Data Processing Results Using PLS 4.0, 2024

Table 3 above shows that the composite reliability value is above 0.6, which indicates that the data is reliable and suitable for further testing.

Discriminant Validity Analysis

In confirmatory factor analysis (CFA) or structural equation modeling (SEM), discriminant validity analysis measures the extent to which constructs differ from one another (Härting, Ralf Christian, 2022). The results of the discriminant validity analysis can be seen in Table 4 below:

Table 4. Discriminant Validity Analysis

	Customer Satisfaction Moderating Effect 1	Customer Satisfaction Moderating Effect 2	Customer Satisfaction Moderating Effect 3	Customer Satisfaction Moderating Effect 4
Business Automation	.757	1.000	.756	.624
Use of Artificial Intelligence	.664	.737	1.000	.724
Customer Satisfaction	.756	.784	.837	1.000
Operational Efficiency	1.000	.746	.668	.636

Source: PLS Data Processing Results, 2023

According to Table 4 above, the AVE value from one equation to another construct equation has met the Discriminant Validity assumption.

Path Coefficient Test

The path coefficient test can be seen in the following table:

Table 5. R Square Test

Variabel	R Square
Business Automation (X1)	0,880
Use of Artificial Intelligence (X2)	0,841
Customer Satisfaction (Y)	0,872
Operational Efficiency (Z)	0,863

Source: Data Analysis Results Using PLS 3.0, 2023

From Table 5, the R Square for the customer satisfaction variable is explained by the variables of business automation, use of artificial intelligence, and operational efficiency by 87.2%, while the remaining 12.8% is explained by other variables not included in this study.

Hypothesis Testing

The results of the hypothesis testing can be seen in the following table:

Table 6. Hypothesis Testing

Hypothesis	Influence	T-Statistics	P-Value	Result
H1	Business automation for MSME customer satisfaction in Medan City	6,411	0,000	Accepted
H2	The use of artificial intelligence on the satisfaction of MSME customers in Medan City	5,132	0,001	Accepted
H3	Business automation for the operational efficiency of MSMEs in Medan City	6,303	0,001	Accepted
H4	The use of artificial intelligence for the operational efficiency of MSMEs in Medan City	6.513	0,000	Accepted
H5	Operational efficiency on customer satisfaction of Medan City MSMEs	4,251	0,000	Accepted
H9	Business automation on MSME customer satisfaction in Medan City through operational efficiency as an intervening variable	4,402	0,000	Accepted
H10	The use of artificial intelligence on the satisfaction of MSME customers in Medan City through operational efficiency as an intervening variable	3,510	0,000	Accepted

Source: Data Analysis Results Using PLS 3.0, 2023

According to the table above, it can be concluded that partially, the variables of business automation and the use of artificial intelligence affect the customer satisfaction of MSMEs in Medan City and the operational efficiency of MSMEs in Medan. Simultaneously, the variables of business automation and the application of artificial intelligence affect the customer satisfaction of MSMEs in Medan City through operational efficiency as an intervening variable.

Discussion

Business Automation Affects Customer Satisfaction of MSMEs in Medan City. Research shows that business automation affects customer satisfaction of MSMEs in Medan City. Research by Bhatti and Sabeen Hussain (2023) shows that business automation can reduce errors in service and improve service quality to create customer satisfaction.

The Use of Artificial Intelligence Affects Customer Satisfaction of MSMEs in Medan City. Research shows that the application of artificial intelligence affects customer satisfaction of MSMEs in Medan City. Research by Matarazzo and Michela (2021) shows that increased use of artificial intelligence contributes to operational efficiency, better service, and reduced human error, which in turn increases customer satisfaction.

Business Automation Affects the Operational Efficiency of MSMEs in Medan City. The results show that the business automation variable affects the operational efficiency of MSMEs in Medan City. Research by Denicolai et al. (2021) shows that increased business automation results in faster and more effective work completion, which in turn increases business operational efficiency.

The Use of Artificial Intelligence Affects the Operational Efficiency of MSMEs in Medan City. The results show that the variable of artificial intelligence use affects the operational efficiency of MSMEs in Medan City. Research by Gamache et al. (2020) shows that increased use of artificial intelligence has the potential to reduce unnecessary operational costs, thereby improving the efficiency of operational activities.

The Operational Efficiency of MSMEs in Medan City Affects Customer Satisfaction of MSMEs in Medan City. Research shows that the operational efficiency of MSMEs in Medan City affects the satisfaction of MSME customers in Medan City. Research by Gao, Xue, and Ren (2023)

shows that improvements in business operational efficiency tend to enable timely customer service, thereby increasing customer satisfaction with the product.

Business Automation Affects SME Customer Satisfaction in Medan City through Operational Efficiency as an Intervening Variable. Research shows that the business automation variable affects the growth of SME customer satisfaction in Medan City through operational efficiency as an intervening variable. Research by Liu and Zixu (2022) shows that increased automation and good service will improve the effectiveness of the company's work and operations, as well as increase customer satisfaction to continue using certain products.

The Use of Artificial Intelligence Affects Customer Satisfaction of MSMEs in Medan City through Operational Efficiency as an Intervening Variable. The results of the study show that the variable of artificial intelligence use affects the operational efficiency of MSME customers in Medan City through operational efficiency as an intervening variable. Research (Spaltini and Marco, 2022) shows that artificial intelligence, which plays a role in digital transformation, tends to increase operational efficiency and improve services, thereby increasing customer satisfaction

Conclusions

The results of the study indicate that, partially, the variables of business automation and the use of artificial intelligence affect the customer satisfaction of MSMEs in Medan City and contribute to the operational efficiency of MSMEs in Medan. Simultaneously, the variables of business automation and the application of artificial intelligence affect the customer satisfaction of MSMEs in Medan City through operational efficiency as an intervening variable. As the use of digitalization increases, MSMEs in Medan City will be able to improve business automation in their operations and achieve operational efficiency to accelerate service and increase customer satisfaction.

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Declaration of conflicting interests

The authors declare no conflicting interests.

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