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Analysis of E-Commerce Based Economic Development in Medan City

Eka Arsela Nasution[1], Lia Nazliana Nasution[2], Rusiadi[3], Dwita Sakuntala[4], Bakhtiar Efendi[5]

[1,2,3,4,5]Universitas Pembangunan Panca Budi

Corresponding author : arselaeka24@gmail.com

Abstract

This study analyzes the role of digital economic transformation on SMEs in Medan. The focus is on the development of e-commerce-based SMEs. The study uses variables X, namely opportunity, economic transaction, social media, and technology. Variable Y is Electronic Markets (Electronic Markets) and Digitalization of SME Development. The approach used is quantitative. The population is 1,260 respondents. Purposive random sampling allowed us to take samples from 258 SME actors. We collected data using a Likert scale questionnaire. We used SmartPLS 4.0 for data analysis. The results of the study show several important findings. Opportunity has no effect on electronic markets but has a significant effect on SME digitalization. Economy transactions and social media have a significant effect on electronic markets and SME digitalization. Technology has no effect on electronic markets but is significant for SME digitalization. Electronic markets have no direct effect on SME digitalization. The mediating role of Electronic Markets also varies. Electronic Markets does not significantly mediate the influence of Opportunity and Social Media. However, Electronic Markets significantly mediates the influence of economy, transaction, and technology on SME digitalization. These results show that economic transactions and social media play a crucial role. Technology also plays a big role in the digitalization of SMEs. However, Electronic Markets has not been able to become a strong link for all variables. Digital transformation remains crucial for the progress of SMEs in Medan.

Keywords: Digital Transformation, SMEs, E-commerce, Electronic Markets, Digitalization

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INTRODUCTION

Micro, Small, and Medium Enterprises (SMEs) are integral to the national economic framework in both emerging and industrialized nations (Lubis et al., 2023). In numerous nations, SMEs have demonstrated a greater capacity to absorb labor compared to large enterprises and significantly contribute to Gross Domestic Product (GDP) (Fadli, 2021). In Indonesia, the significance of SMEs is becoming evident, particularly in sustaining economic stability against global fluctuations and enduring crises, such as the Covid-19 outbreak, which has incapacitated numerous industries (Wakhyuni et al., 2024).

The establishment of extensive regional autonomy promotes the economic self-sufficiency of each district or city authority (Faris et al., 2024). In this sense, SMEs are strategic assets that require optimal development (Baharuddin et al., 2022). The resiliency of SMEs in confronting economic crises, exemplified by Indonesia in 1998 and the global Covid-19 outbreak, demonstrates that this sector has greater resilience than large enterprises (Sechele et al., 2024). Small and medium-sized enterprises (SMEs), as autonomous productive entities operated by individuals or small collectives, constitute the foundation of the economy and serve as a remedy for employment challenges and equitable welfare distribution (Elhamma, 2023).

In Medan City, SMEs hold a crucial role in the local economic framework. According to the Central Statistics Agency of North Sumatra Province in 2020, Medan City's Gross Regional Domestic Product (GRDP) amounted to IDR 242.2 trillion, with the food and beverage sector accounting for 80.11% and the recreation and culture sector for 5.2% (Hou et al., 2024). The predominance of SMEs in these two sectors indicates that enhancing and cultivating SMEs will directly influence the wellbeing of Medan City's populace (Nurbayan et al., 2025).

The quantity of SMEs in Medan City is always rising. According to the Cooperatives and SMEs Service, the number of SMEs rose from 94,239 in 2017 to 109,814 in 2019, however it declined in 2020 due to the pandemic. In 2021, the number of registered SME actors rose to 27,763. The surge was prompted by the government's strategy of offering support to businesses impacted by the epidemic, necessitating official registration with the appropriate Service. This tendency illustrates the increasing recognition among SME stakeholders to structure and advance their enterprises in a more formal and strategic manner.

Nevertheless, numerous SMEs in Medan continue to operate traditionally and remain unintegrated into the digital economy (Telukdarie et al., 2022). The digitalization

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of business is both a challenge and a significant opportunity. Numerous SMEs lack a comprehensive understanding of e-commerce, much less its efficient application in daily operations. Digital transformation has become essential due to technical advancements and evolving consumer demands (Tolstoy, 2022). E-commerce functions not merely as a transactional platform, but as an ecosystem that links commercial entities to an expansive market, financial resources, and strategic alliances (Hardiyansyah et al., 2024).

The rapid growth of digital marketing and e-commerce in Indonesia has paralleled the rise in internet users (Mechman, 2022). Platforms like Tokopedia, Shopee, and Bukalapak offer significant opportunity for SMEs to market their products extensively, effectively, and economically (Purba, 2021). E-commerce may enhance the credibility and competitiveness of SMEs, particularly for product quality, service, and transaction efficiency (Alam, 2023). The digital transformation of the economy has instigated major alterations in business operations, necessitating that SMEs adapt swiftly to avoid obsolescence amongst the evolving landscape (Toni et al., 2025).

Digital transformation encompasses not just the adoption of technology but also the capacity of SMEs to leverage market opportunities (Department, 2021). The capacity to identify market possibilities and align them with the suitable business model is a crucial element of corporate sustainability (Suder, 2021). Opportunity recognition significantly impacts business performance, particularly in the modest fashion industry. Small and medium-sized enterprises that can identify and seize e-commerce opportunities will possess a greater competitive advantage (Genoveva, 2022).

Digital economic transactions significantly enhance the performance of SMEs (Cisar et al., 2025). Digital transactions can substantially enhance business profitability. This results from the numerous conveniences provided, including expedited transaction processes, adaptable payment options, and effective distribution of items (Cohen et al., 2025). In the contemporary digital age, expediency and ease are the primary considerations for consumers during their shopping experiences (Cheng, 2023). Consequently, the capacity of SMEs to implement a digital transaction system constitutes a significant competitive advantage essential for sustaining and enhancing the viability of SME enterprises (de Vos et al., 2022).

Social media significantly contributes to the advancement of SMEs by serving as a promotional tool that expands market reach, facilitates customer communication, and enhances brand image (Jasin, 2022). The efficacy of social media as a marketing instrument is significantly contingent upon product innovation and an appealing communication strategy (Swain, 2020). In the absence of these elements, social media

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only serves as a conduit for information devoid of allure (Aliedani et al., 2024). Market orientation, entrepreneurial mindset, and strategic utilization of social media positively influence the performance of SMEs, particularly in the specialized food sector, which depends on digital market distinction and outreach (Elareshi, 2023).

Technology is a crucial factor in facilitating digital transformation and has demonstrated a substantial effect on enhancing SME performance (Eric Opoku et al., 2024). The application of technology in areas such as collaborations, marketing tactics, and operational processes can enhance corporate efficiency and performance (Bruce et al., 2023). The utilization of technology enables SMEs to access broader markets, expedite business operations, and enhance competitiveness sustainably (Abu Jaish et al., 2023). Through technology, SMEs exhibit greater adaptability to market fluctuations and consumer demands, enabling them to endure and prosper in an increasingly competitive digital economy (Burinskienė & Nalivaikė, 2024).

The recent analysis by Meta and Bain & Company indicated that Indonesia's e-commerce gross merchandise value (GMV) attained US$56 billion in 2022, equivalent to around Rp842 trillion. This amount is anticipated to rise to US$121 billion by 2027. This expansion reflects the highly favorable outlook for e-commerce in Indonesia, along with the rising population of digital consumers. This situation presents significant opportunity for SMEs to leverage digital platforms for business development, expand market reach, and enhance competitiveness in the swiftly evolving digital economy.

Numerous prior research have examined the significance of digitalization in enhancing SME performance. Nevertheless, the majority remain confined to the broad scope of technology adoption, failing to precisely investigate the interplay of digital components such as opportunity, economic transactions, social media, and technology in shaping SME development. Moreover, there is a paucity of research that emphasize this issue within the local context, particularly in Medan City, which possesses significant economic potential for SME development. Consequently, a more thorough investigation is required to comprehend the effects of digital transformation concurrently on SMEs in this region.

The constraints of study regarding the function of Electronic Markets as a mediating variable between external digital determinants and the digitalization of SME development establish a scholarly gap. Understanding the role of Electronic Markets as a conduit in the digital transformation process is crucial, particularly for SMEs that are transitioning to e-commerce platforms. This study aims to address this gap by rigorously examining the impact of opportunity, economic transactions, social media, and

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technology on the growth of e-commerce-based SMEs, while also analyzing the mediating role of Electronic Markets within the digital ecosystem of SMEs in Medan City.

METHOD

This research employs a quantitative methodology to examine the impact of digitalization on the growth of e-commerce-oriented SMEs. The subjects of this study comprised all SME participants in Medan City, totaling 1,260 business entities. The sample comprised 258 respondents selected by purposive random sampling, based on the criteria of active SME participants with access to digital platforms. The research instrument employed a questionnaire utilizing a 5-point Likert scale to assess characteristics like digital marketing, data security, HR training, teamwork, and customer satisfaction.

The instrument's validity and reliability were assessed before to the primary analysis. The data analysis method employed was Partial Least Square–Structural Equation Modeling (PLS-SEM) utilizing SmartPLS 4.0 software. The analysis comprised an exterior model (construct validity and reliability), an inner model (interrelationship among latent variables), and hypothesis testing utilizing p-values (<0.05) and t-statistics (>1.96). Furthermore, a descriptive analysis was conducted to elucidate the data distribution based on mean, percentage, and standard deviation.

RESULTS AND DISCUSSION

Outer Model Evaluation

Table 1. Loading Factor

	Oppurtinity (X1)	Economy Transaction (X2)	Social media (X3)	Technology (X4)	Electronic Market (Electronic Markets) (Y1)	Digitalization of SME Development (Y2)
OP1	0,985					
OP2	0,977					
OP3	0,921					
OP4	0,950					
OP5	0,949					
OP6	0,926					

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ET1		0,966				
ET2		0,991				
ET3		0,990				
ET4		0,979				
ET5		0,876				
ET6		0,889				
CM1			0,945			
CM2			0,923			
CM3			0,950			
CM4			0,969			
CM5			0,955			
CM6			0,736			
TC1				0,810		
TC2				0,831		
TC3				0,901		
TC4				0,913		
TC5				0,906		
TC6				0,913		
EM1					0,913	
EM2					0,940	
EM3					0,936	
EM4					0,824	
EM5					0,893	
EM6					0,783	

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DP1						0,778
DP2						0,793
DP3						0,850
DP4						0,731
DP5						0,889
DP6						0,935
DP7						0,926
DP8						0,832

According to the table above, all factor loading values exceed 0.7, indicating compliance with the validity criteria for indicators. This indicates that each indicator exhibits a robust association with the hidden construct it signifies. Subsequently, validity testing proceeds with the Average variation Extracted (AVE) value to confirm that the construct accounts for over 50% of the variation of its indicators. If the AVE value exceeds 0.5, the construct is deemed to possess strong convergent validity. Consequently, the model is deemed valid for the statistical measurement of the examined variables.

Average Variance Extracted (AVE)

Table 2. Average Variance Extracted (AVE) Test

	Average Variance Extracted (AVE)
X1 – Oppurtinity	0,906
X2 – Economy Transaction	0,964
X3 - Social media	0,840
X4 – Technology	0,774
Y1 – Electronic Market (Electronic Markets)	0,781
Y2 – Digitalization of SME Development	0,610

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According to Table 2, all Average Variance Extracted (AVE) values above 0.5, aligning with the minimum threshold proposed by Mahfud and Ratmono (2013). This indicates that each latent construct in the model satisfies the criteria for convergent validity, namely by accounting for over 50% of the variance in its indicators. Upon confirming the validity of AVE, the subsequent step is to evaluate the reliability of the construct using the Composite Reliability (CR) value. CR is employed to verify that the indicators within each construct exhibit strong internal consistency and reliability in measurement.

Composite Reliability (CR) & Cronbach's Alpha (CA)

Table 3. Reliability Testing

	Composite Reliability	Cronbach's Alpha
X1 – Oppurtinity	0,983	0,979
X2 – Economy Transaction	0,991	0,987
X3 – Social media	0,969	0,960
X4 – Technology	0,954	0,941
Y1 – Electronic Market (Electronic Markets)	0,955	0,943
Y2 – Digitalization of SME Development	0,836	0,723

According to Table 3, the advised Composite Reliability (CR) value exceeds 0.7. The results indicate that all constructions possess CR values exceeding 0.7, hence confirming that each construct satisfies the reliability criteria. Consequently, the indicators within each concept are affirmed as consistent and dependable in assessing the target variables. Upon completion of the reliability test via CR, the subsequent step is to do an additional reliability assessment utilizing the Cronbach's Alpha (CA) coefficient. The analysis results suggest that all constructs possess CA values exceeding 0.7, signifying that each construct satisfies the criterion for internal reliability. Consequently, the employed indicators are affirmed as consistent and dependable in assessing the targeted concept. Upon completion of the reliability test via CA, the subsequent step is to do a discriminant validity assessment employing the Fornell-Larcker method to confirm that each construct is distinctly differentiated from the others.

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R Square

Table 4. Coefficient of Determination (R-Square)

Variabel	R Square	R Square Adjusted
Digitalization of SME Development (Y2)	0,521	0,511
Electronic Market (Electronic Markets) (Y1)	0,845	0,842

The R Square Adjusted value for the Electronic Market variable is 0.842, or 84.2%, indicating that the model's variables account for the majority of the variations in Electronic Markets, with the remaining 15.8% attributable to external factors not included in the research model. The R Square Adjusted value for the Digitalization of SME Development variable is 0.873, or 87.3%, indicating that a significant portion of the changes in SME digitalization is accounted for by the independent variables in the model. Consequently, both R Square Adjusted values indicate that the model possesses robust predictive capability and is pertinent in examining the impact of digital transformation on the growth of e-commerce-based SMEs.

Predictive Relevance (Q^2)

$Q^2 = 1 – (1 – R1^2)(1 – R2^2)...(1 – Rn^2)$
$Q^2 = 1 – (1 – 0,842)(1 – 0,511)$
$Q^2 = 1 – (0,158)(0,489)$
$Q^2 = 1 – 0,077$
$Q^2 = 0,923$

The Q^2 score of 0.923 signifies that the variables in this study opportunity, economic transaction, social media, technology, electronic market, and digitalization of SME development account for 92.3% of the structural model's accuracy. The residual 7.7% is attributed to factors not incorporated in this model.

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Hypothesis Testing

Table 5. Hypothesis Testing Results

Hubungan Variabel	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P Values	Information
Opportunity (X1) -> Electronic Market (Y1)	0,047	0,045	0,036	1,298	0,195	Not Significant
Economy Transaction (X2) -> Electronic Market (Y1)	0,200	0,210	0,022	4,629	0,004	Significant
Social media (X3) -> Electronic Markets (Y1)	0,782	0,786	0,064	12,128	0,000	Significant
Technology (X4) -> Electronic Markets (Y1)	0,136	0,134	0,056	1,440	0,115	Not Significant
Opportunity (X1) -> Digitalization of SME Development (Y2)	0,442	0,434	0,046	4,338	0,000	Significant
Economy Transaction (X2) -> Digitalization of SME Development (Y2)	0,328	0,340	0,040	2,946	0,004	Significant
Social media (X3) ->	0,201	0,296	0,149	2,680	0,007	Significant

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Digitalization of SME Development (Y2)						
Technology (X4) -> Digitalization of SME Development (Y2)	0,625	0,629	0,089	7,016	0,000	Significant
Electronic Markets (Y1) -> Digitalization of SME Development (Y2)	0,256	0,251	0,137	1,873	0,062	Not Significant
Opportunity (X1) -> Electronic Markets (Y1) -> Digitalization of SME Development (Y2)	0,012	0,013	0,014	0,895	0,371	Not Significant
Economy Transaction (X2) -> Electronic Markets (Y1) -> Digitalization of SME Development (Y2)	0,361	0,361	0,320	3,100	0,032	Significant
Social media (X3) -> Electronic Markets (Y1) -	0,200	0,200	0,099	2,014	0,045	Significant

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> Digitalization of SME Development (Y2)						
Technology (X4) -> Electronic Markets (Y1) -> Digitalization of SME Development (Y2)	0,035	0,036	0,025	1,376	0,169	Not Significant

The Impact of Opportunity on Electronic Market

The study's findings demonstrate that the Opportunity variable exerts no substantial impact on Electronic Markets for SMEs in Medan City. This finding aligns with other research indicating that digital business potential require management preparation, digital competencies, and a conducive ecosystem to influence active participation in e-commerce (Kamarudin et al., 2025)(Bendig & Charlet, 2025)(Bazargani & Deemyad, 2024). In the absence of training interventions, incentive policies, and the enhancement of uniformly distributed digital infrastructure, these opportunities are predominantly accessible to established commercial entities with significant adaptive ability for digital transformation (Tash et al., 2025).

The ramifications of these findings suggest that the digital transformation of Medan City's economy need more than only enhancing market access and generating possibilities via digital platforms. The government and partners must prioritize the internal empowerment of MSMEs, encompassing the provision of digital training, online marketing support, and the dissemination of inclusive technological infrastructure. Only through thorough preparedness can MSMEs effectively seize e-commerce prospects and utilize them as a strategic instrument for sustainable business advancement in the digital economy era.

The Influence of Economy Transaction on Electronic Market

The findings of this study demonstrate that the Economy Transaction variable exerts a positive and significant influence on the Electronic Market for MSMEs in Medan

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City. This conclusion is corroborated by prior research indicating that the use of digital payment systems substantially enhances the participation of MSMEs in e-commerce (Cheng, 2023)(Cohen et al., 2025)(Nasrullah, 2024). Digital economic transactions offer convenience, security, and simplicity for businesses and customers, hence facilitating the expansion of MSME market reach via digital platforms (Xia et al., 2024).

The results suggest that enhancing the infrastructure for digital economic transactions is essential to expedite the digital transformation of SMEs. Local governments and financial institutions must enhance the education and integration of digital payment systems, particularly for traditional SMEs that are not yet technologically adept. Consequently, enhancing the digital transactional economy not only expedites the adoption of e-commerce but also fortifies the role of SMEs as robust and adaptive participants in the evolving digital economy.

The Influence of Social Media on Electronic Market

The study's findings indicate that social media exerts a substantial and significant impact on the electronic market for SMEs in Medan City. This conclusion corroborates with research indicating that social media marketing can substantially enhance consumer involvement and stimulate online purchasing intentions (Romadhoni et al., 2023)(Jasin, 2022)(Winarno & Indrawati, 2022). Social media platforms facilitate direct engagement between businesses and consumers, influencing loyalty and purchasing decisions (Swain, 2020). Moreover, social media facilitates the expansion of company networks, enhances digital marketing techniques, and fortifies brand image for Small and Medium Enterprises (SMEs) (Joshi et al., 2023). The rise of social commerce-oriented SMEs further reinforces these findings. Numerous company entities in Medan initiate marketing through personal accounts or online communities before transitioning to marketplace platforms (Umam et al., 2022). This technique integrates visual communication, product narrative, and interactive promotions to cultivate consumer loyalty and enable direct digital transactions (Razaq et al., 2024).

The implication of this finding is very clear that for SMEs who want to survive and grow in the digital era, mastery of social media is a must. Therefore, intensive training is needed on digital content management, online advertising management (ads), and social media performance analysis so that SMEs can utilize this potential to the maximum. Local governments and supporting agencies such as cooperatives and business incubation institutions can play an active role in providing training, content incubation, and mentoring of social media-based digital strategies.

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The Influence of Technology on Electronic Market

The study's results demonstrate that the Technology variable does not significantly impact the Electronic Market for SMEs in Medan City. This outcome aligns with other research indicating that technology investment in SMEs would not significantly influence digital growth or online markets unless it is coupled with market orientation (market-oriented technology adoption) (Telukdarie et al., 2024)(Lestari & Nasib, 2021)(Nasib et al., 2023). Small and medium-sized enterprises that utilize technology solely for production efficiency, absent a digital marketing plan, will not achieve heightened engagement on e-commerce platforms (Eric Opoku et al., 2024). Furthermore, challenges like insufficient technological literacy, elevated digital implementation expenses, and inadequate training support from local governments further diminish the direct influence of technology on SME participation in Electronic Markets [42]. Numerous business stakeholders have yet to comprehend how to proficiently combine technological tools with e-commerce platforms (Nasib et al., 2024).

The ramifications of these findings underscore the necessity of establishing mentoring programs that not only familiarize SMEs with technology but also guide its strategic use to enhance digital marketing. Training initiatives, such product catalog connection with marketplaces, utilization of customer analytics dashboards, and sales automation, are crucial measures to enhance technological efficacy in the realm of SME digital transformation.

The Influence of Opportunity on Digitalization of SME Development

The study's results indicate that Opportunity has a favorable and significant impact on the Digitalization of SME Development in Medan City. This outcome aligns with the prior finding, indicating that opportunities stemming from technical advancements and shifts in customer behavior are significant catalysts in the enhancement of SME digital capabilities (Kreuzer et al., 2022)(Mittal & Sharma, 2024)(Khairani, 2023). Upon recognizing the market potential and efficiency of digitalization, SMEs will be motivated to transition their business processes from manual to digital across production, marketing, and customer service (Min & Kim, 2022). Accessible digital chances enable SMEs to employ diverse digital technologies, including financial applications, inventory management software, and customer communication platforms (Emami et al., 2022). In numerous instances, initiatives such as accessible digital training or government incubation programs serve as catalysts for expediting SME digitalization (Onojah et al., 2022).

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The findings convey a clear message to local policymakers: SME development strategies must extend beyond merely creating opportunities, such as enhancing internet access or initiating digitalization programs; they must also include initiatives to bolster human resource capacity, improve digital literacy, and provide financial support to enable technology adoption. The Medan City Government, in collaboration with supporting entities like the Cooperatives and SMEs Service, should leverage this opportunity to broaden the scope of digitalization initiatives tailored to the actual needs of SME stakeholders.

The Influence of Economy Transaction on Digitalization of SME Development

The results of this study indicate that the Economy Transaction variable has a positive and significant influence on the Digitalization of SME Development in Medan City. This study is supported by previous research which states that the use of digital transaction systems by SMEs in urban areas contributes directly to the acceleration of the overall business digitalization process (Cisar et al., 2025)(Thamik & Wu, 2022)(Susanti, 2022). SME actors found that SME actors who actively use digital payments tend to have a more adaptive, accountable business system and are ready to connect to the digital ecosystem (Wiraguna et al., 2023).

The shift in Medan City is further expedited by the proactive involvement of local governments and the corporate sector in teaching and enabling SMEs to use digital payment methods. The partnership between the Medan City Cooperatives and SMEs Office and national fintech platforms like LinkAja, OVO, and Dana has created significant potential for SMEs to enhance their confidence in navigating the digital economy. The findings suggest that enhancing the digitalization of SMEs in Medan City necessitates prioritizing the fortification of digital transaction infrastructure and literacy. Local governments can enhance access to digital payment systems by collaborating with financial institutions, digital banks, and fintech firms, while promoting digital onboarding for conventional SMEs. Conversely, there is an urgent necessity for technical training in the utilization of digital transaction applications and digital financial management to guarantee that this change is both thorough and durable.

The Influence of Social Media on Digitalization of SME Development

The findings of this study demonstrate that the Social Media variable exerts a favorable and significant impact on the Digitalization of SME Development in Medan City. This conclusion is supported by prior research indicating that social media marketing

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substantially enhances the income of SMEs (Elareshi, 2023)(Khrais & Gabbori, 2023)(Shafiq et al., 2023). Intensified interactions between SME actors and customers on digital platforms lead to increased sales conversion and customer loyalty, hence motivating SME actors to further develop a digital strategy within their business model (Li et al., 2023). Moreover, social media serves as a conduit for digital literacy. For SMEs unfamiliar with cloud-based e-commerce or ERP solutions, engaging via social media serves as an efficient initial step toward enhancing digital readiness (Abid et al., 2023). Business entities acquire skills in content management, digital brand development, and real-time customer preference analysis, all of which enhance digital readiness (Doyle, 2007).

These findings suggest to the government and SME support institutions the necessity of prioritizing social media training as a central strategy in the digitization effort. Content-centric strategies, narrative-driven marketing, and the enhancement of social media algorithms can effectively engage a broader consumer base, particularly among the youth who predominate the digital marketplace. Consequently, social media serves not merely as a promotional tool, but also as a strategic platform that can fortify the standing of SMEs within the digital economy ecosystem sustainably.

The Influence of Technology on Digitalization of SME Development

The study's findings demonstrate that the Technology variable exerts a favorable and highly significant impact on the Digitalization of SME Development in Medan City. This study aligns with other research indicating that technological maturity in small-scale enterprises significantly influences SMEs' preparedness to participate in a broader digital ecosystem (Julsari et al., 2025)(Radicic & Petković, 2023)(Burinskienė & Nalivaikė, 2024). When technology is employed not merely as an operational instrument but is included into strategic business planning, the digitalization process can occur more methodically, effectively, and sustainably (Grooss, 2024). Small and medium-sized enterprises that strategically implement technology generally exhibit more resilience in confronting market issues and demonstrate enhanced responsiveness to developments in the digital age (Mosbah, 2024).

The use of technology in the SME sector in Medan City is facilitated by several government programs and collaborations with the private sector. Collaboration between the Cooperatives and SMEs Office with digital platforms like Tokopedia, GoBiz, or Mekari enables business operators to access cost-effective technological gadgets, training, and mentorship systems. The significant importance of technology in this study also indicates

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the presence of a digital divide, wherein only SMEs capable of properly accessing and managing technology experience its direct effects. Small and medium-sized enterprises lacking fundamental infrastructure or proficient people resources remain at a disadvantage. This conclusion illustrates that technology serves not only as a supplement but also as the primary foundation in the digitization process of SMEs. Consequently, the SME development plan in Medan City must focus on delivering technology that is readily accessible, cost-effective, and pertinent to the scale of small enterprises. The SME digital acceleration program must be supplemented with extensive technical training, digital incubation, and mentorship in technology implementation tailored to business requirements.

The Influence of Electronic Market on Digitalization of SME Development

The findings of this study demonstrate that Electronic Markets do not significantly impact the digitalization of SME development in Medan City. This study aligns with prior research indicating that digital transformation is not solely assessed by SMEs' presence in the electronic market, but rather by the extent of technology integration throughout the entire business value chain (Ravi Kumar et al., 2023)(Rajkhowa & Kornher, 2023)(Susanti, 2022). Marketplaces frequently serve as superficial entry gates unless accompanied by the enhancement of internal digital capabilities and technology-driven business plans (Winarno & Indrawati, 2022).

These results indicate that participation in the Electronic Market needs to be improved in quality and depth in order to truly contribute to the digitalization of SMEs. Local governments and e-commerce platforms need to work together to provide technical training on optimizing marketplace features, using customer data, integrating logistics, and measurable digital promotion strategies. SMEs also need to be equipped with an understanding of the importance of making e-commerce part of a strategic business transformation, not just an additional sales channel. With the support of a comprehensive digital ecosystem, SME involvement in the Electronic Market can develop into a strong foundation for sustainable and competitive business digitalization.

The Influence of Opportunity on SME Digitalization through Electronic Market

The findings of this study suggest that the indirect relationship from Opportunity to the Digitalization of SME Development occurs via the Electronic Market. This occurrence demonstrates that digital transformation in SMEs is influenced not just by external variables like market possibilities but also significantly by internal readiness (Emami et

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al., 2022)(Kreuzer et al., 2022). This preparedness encompasses sufficient digital literacy, pertinent human resource skills, and technological assistance that is congruent and integrated with the executed business strategy (Khairumi et al., 2025). This discovery reinforces prior studies indicating that the efficacy of SME digitization is significantly affected by the interplay of internal and external factors (Nurhidayah et al., 2025). Consequently, digital transformation necessitates a comprehensive and durable strategy to achieve a substantial effect (Al Naim et al., 2023).

These findings underscore the significance of engagement by local governments and supporting institutions in linking digital market opportunities with the utilization of e-commerce by SMEs. Training programs must not only raise awareness among business actors regarding digital potential but also guide SME participants in the technical and strategic utilization of platforms such as marketplaces, digital catalogs, and integrated payment gateways. Digital transformation arises not alone from opportunities, but from proactive measures and preparedness to address these opportunities systematically. Consequently, the establishment of a comprehensive digital ecosystem for SMEs, encompassing literacy, mentoring, and incentives for market technology utilization, is an urgent necessity that cannot be deferred any longer.

The Influence of Economy Transaction on SME Digitalization through Electronic Market

The study's results demonstrate that Economy Transaction exerts an indirect and significant influence on the Digitalization of SME Development via Electronic Market. This study is supported by prior research that verifies the pivotal function of digital transactions in fostering SME trust in digital systems and facilitating broader integration into the e-commerce ecosystem (Nasib, 2024)(Amelia & Tambunan, 2024)(Pakpahan et al., 2024). Enhancing the digital payment system serves as the primary conduit for digital transformation, as it directly impacts the fundamental economic activity of value exchange (Rajkhowa & Kornher, 2023). The growing involvement of SMEs in e-commerce platforms has made many supporting functions, including product administration, digital promotions, customer evaluations, and sales analytics, more accessible and functional (Nistor & Zadobrischi, 2022). This approach progressively broadens the scope of digitalization from just transactions to encompass all facets of the organization (Bergman et al., 2022).

These findings possess significant management and policy ramifications. To expedite the digital transformation of SMEs, local governments and financial institutions

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must guarantee that digital transaction platforms are not only available but also readily accessible, comprehensible, and usable by SMEs from diverse backgrounds. Expansion of practice-based training, incentives for QRIS adoption, and the connection of payment systems with local e-commerce platforms are essential strategic measures. Digital transformation originating from the transactional economy will be more sustainable as it is anchored in fundamental business practices. Consequently, enhancing the infrastructure and culture of digital transactions among SMEs will fortify the e-commerce ecosystem and expedite the whole digitization process.

The Influence of Social Media on SME Digitalization through Electronic Market

The study's results demonstrate that Social Media exerts an indirect and significant influence on the Digitalization of SME Development via Electronic Market. This conclusion is corroborated by prior research indicating that social media significantly influences the growth of e-commerce-oriented SMEs (Amelia, 2024)(Vinerean et al., 2025)(Pebriani et al., 2025). Social media serves as an economical, efficient, and highly flexible promotional insrument that progressively and consistently facilitates the incorporation of business participants into the digital ecosystem (Santy & Andriani, 2023). Moreover, social media not only broadens the market but also enhances the competitiveness of SMEs by facilitating direct customer connection and elevating brand image (Chacon et al., 2024). This enhances SMEs' readiness to operate platform-based enterprises and foster greater consumer loyalty, integral components of the business digitalization process (Khanna, 2025).

These findings offer empirical proof that social media functions not merely as a communication tool, but also as a strategic conduit for SME engagement in e-commerce and digital transformation. Consequently, local governments, entrepreneurial groups, and digital platform providers must develop comprehensive training programs on social commerce that leverage the efficacy of content, social media algorithms, and marketplace integration. An ecosystem-based approach is essential, wherein SME participants are not only educated in social media promotion but also guided in the professional management of digital storefronts. This initiative is crucial to guarantee that social media serves as an efficient means of facilitating complete SME digitalization in Medan City.

The Influence of Technology on SME Digitalization through Electronic Market

The study's results demonstrate that the Technology variable does not significantly influence the Digitalization of SME Development via the mediation of the Electronic

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Market. This outcome aligns with prior research indicating that technology implementation in MSMEs is predominantly technical and not consistently linked to market orientation or digital marketing (Bruce et al., 2023)(Abu Jaish et al., 2023)(Mon & Giorgio, 2022). The use of technology does not inherently motivate MSMEs to engage in the e-commerce ecosystem unless it is paired with a strategic comprehension of its application (Haq & Huo, 2023). A further issue that may affect the minimal significance of this pathway is the absence of system integration (Sari et al., 2025). For instance, MSMEs may utilize cashier or accounting technology, yet remain unconnected to the marketplace system or online sales application (Dewi et al., 2025). Moreover, obstacles related to insufficient digital literacy and inadequate technical training diminish the efficacy of technology in facilitating active participation in the e-market (Costa Melo et al., 2023).

These findings indicate that for technology to significantly influence SME digitalization via e-commerce, an intervention is required to connect technology adoption with the execution of digital marketing strategy. The government and affiliated institutions must focus on training on both tool utilization and the integration of technology with digital platforms, online catalog management, customer analytics, and digital branding strategies. This strategy positions technology as both an operational support tool and the primary catalyst for digital transformation, directly linked to market expansion and enhanced competitiveness of SMEs in the digital economy.

CONCLUSION

The results of the analysis show that opportunity has no significant effect on the involvement of SMEs in electronic markets (EMs), but it has a significant effect on SME digitalization. In contrast, economy transactions and social media have a significant effect on both. Technology has a significant effect on SME digitalization, but not on electronic markets. Furthermore, Electronic Markets does not have a significant direct effect on the digitalization of SMEs, but it is proven to have a significant mediating effect on the effect of Economy Transaction and Technology on the digitalization of SMEs. Meanwhile, Electronic Markets failed to significantly mediate the relationship between opportunity and social media during digitalization. These results suggest that the success of the digital transformation of SMEs in Medan is more determined by the use of internal technology, the strength of digital transaction systems, and the strategic utilization of social media rather than just a presence on e-commerce platforms.

The research findings suggest that the government and SME support institutions should prioritize enhancing digital literacy, implementing digital payment systems, and

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strategically utilizing technology in operations and marketing. There is a necessity to enhance structured training in social media use, content management, and digital marketing, given that social media has demonstrated efficacy in promoting SME digitization. Prioritizing the creation of a more user-friendly e-commerce platform connected with business management systems, including accounting and inventory, is essential. Furthermore, coordination among the government, digital platforms, and SME groups in cooperative marketing initiatives would enhance the exposure and competitiveness of SME products online. Ultimately, data-driven policy assistance and continuous mentorship initiatives will be crucial for guaranteeing that SME digital transformation transpires not only in a technical sense but also strategically and adaptively.

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