The Effect of Technology-Organization-Environment (TOE) on E-Commerce Adoption among SMEs at Magelang Regency

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Abstract

The purpose of this study is to investigate and analyze the influence of Technology-Organization-Environment (TOE) factors on the adoption of E-Commerce among Small and Medium-sized Enterprises (SMEs) in Magelang Regency. The research employs regression analysis as the primary method to evaluate the relationships between the independent variables—Technology, Organization, and Environment—and the dependent variable, E-Commerce Adoption. To gather primary data, a questionnaire was utilized as the data collection instrument. The population of interest consisted of 1080 SMEs within Magelang Regency, from which a representative sample of 100 SMEs was selected using the Slovin formula. Subsequently, the collected data was processed using SPSS version 23. The findings of the study demonstrated a positive and significant effect of the TOE factors on E-Commerce Adoption among SMEs in Magelang Regency. This research contributes to a deeper understanding of the dynamics and determinants of E-Commerce adoption in the specific context of SMEs within the mentioned region, highlighting the crucial role of Technology, Organization, and Environment in shaping adoption patterns.

Keywords: Technology, Organization, Environment, E-Commerce, SMEs

INTRODUCTION

The Micro, Small and Medium Enterprises (MSMEs) significantly influence a nation's economic landscape, both quantitatively in terms of business proliferation and qualitatively in job generation (Cahyadi et al., 2022). In the context of Indonesia, MSMEs constitute a substantial share of the country's Gross Domestic Product (GDP) (Wahyuni et al., 2021). The advent of the Covid-19 pandemic profoundly impacted nearly all MSMEs within the Indonesian economic sphere. According to a survey conducted by the Upgrade MSME Community and reported by Okezone.com in March 2021, approximately 5.4% or 3.5 million MSME entities succumbed to bankruptcy, underscoring the vulnerability of these enterprises. Additionally, a substantial 34.8% of MSMEs remained at risk of facing bankruptcy. Therefore, it is imperative for MSMEs to fortify their presence in the business landscape, particularly during crises such as a pandemic. MSME owners must strategically position themselves in the market through intensified marketing endeavors, thereby optimizing their revenue streams.

Currently, MSMEs demonstrate a heightened proclivity towards engaging in marketing endeavors, notably through the process of digitization (Mahirah et al., 2022). According to the research conducted by Katadata Insight Center in the year 2020, it was observed that 34.6% of MSME practitioners opted to transition from conventional business modalities to digital business frameworks. In line with this trend, the government is persistently endeavoring to augment the digitalization of MSMEs. As reported by detikfinance.com, the government has set an ambitious objective of achieving a digitalization rate encompassing a cohort of 30 million MSMEs.

Digitalization plays a crucial role for business particularly MSME. First, digitalization manifests a profound impact on business operations through the automation of labor-intensive

processes, optimization of workflows, and reduction of temporal investments in diverse tasks (Waworuntu et al., 2022). This paradigm shift towards automation and optimization fundamentally amplifies operational efficiency and amplifies production capacity. The consequential escalation in productivity stems from a strategic reallocation of employee focus towards high-value tasks, culminating in an enhancement of the collective organizational output and, thereby, contribute to overall performance (Polii dkk, 2023). Therefore, the government of the Magelang district demonstrates a steadfast commitment to bolstering the growth of MSMEs. At present, digitalization stands as a pivotal catalyst in revitalizing these enterprises. The government avidly advocates for MSME stakeholders to embrace digital technologies (Sondakh et al., 2022). By initiating a digital transformation, MSMEs will be able to advance their marketing endeavors, enabling enhanced customer outreach and competitive positioning (Warbung et al., 2023).

The prevailing tendency among MSMEs is to necessitate physical visits from potential buyers to their establishments for product acquisition. This approach consistently restricts market penetration, compelling MSMEs to broaden their market scope by embracing e-commerce platforms as a strategic marketing medium (Maulana et al., 2023; Toding & Mandagi, 2022). In effecting this transition towards e-commerce integration, MSMEs encounter several impediments, including limited technological proficiency, preparedness of personnel and staff in e-commerce utilization, resource constraints, and a deficit in comprehensive understanding of e-commerce practices (Rayo & Rantung, 2020; Rantung et al., 2023).

The Magelang District is recognized for its proliferation of MSMEs actively participating in the domains of creative industries and trade, exhibiting considerable developmental potential. The Regional Secretary of Magelang District expounded that the onset of the pandemic precipitated a pronounced downturn within the economic sector, manifesting as a substantial decline in consumption, hindered investment activities, reduced levels of both exports and imports, and an overall contraction in economic growth. Consequently, revitalizing the economy necessitates a strategic focus on bolstering MSMEs, given their pivotal role in the recovery process.

This research was initiated in response to identified challenges, seeking to discern the impact of the Technology-Organization-Environment (TOE) framework on the adoption of E-Commerce within MSMEs situated in Magelang Regency. The overarching objective of this study is to contribute invaluable insights to both scholars and practitioners within the domains of TOE and E-Commerce, particularly concerning MSMEs. By undertaking a comprehensive analysis, this research endeavors to facilitate an enhanced understanding of the complex interplay between technology, organizational structure, environmental influences, and the adoption of E-Commerce. Ultimately, it is anticipated that these findings will empower MSMEs to refine their strategic approaches in harnessing burgeoning technological advancements to augment their marketing endeavors.

LITERATURE REVIEW

The swift evolution of technology, driven by societal needs, is prominently shaping various sectors, particularly the realm of commerce. One notable illustration of this transformation is the paradigm of E-commerce, a manifestation of technological growth. E-commerce encompasses a broad spectrum of digital transactions, facilitated by the pervasive accessibility of the internet, allowing consumers to conveniently purchase goods and services online (Maulana dkk., 2023). Technological progress is rapidly evolving in alignment with societal demands. This progression spans across various sectors, prominently manifesting in

the realm of trade and commerce (Banjarnahor dkk., 2023). E-commerce, as a prominent exemplar, stands as a testament to this swift technological growth. Notably, a burgeoning populace within Indonesia has embraced the internet for conducting commercial transactions and engaging in e-commerce activities (Cahyadi et al., 2022).

E-commerce represents a promising market sector for enterprises, particularly MSMEs. Embracing e-commerce enables MSMEs to effectively tap into a broader market, thereby exerting a significant influence on their operational efficacy (Ausat et al., 2022; Rayo & Rantung, 2020). However, the digitization journey poses a formidable challenge for MSMEs, primarily stemming from technological complexities. MSMEs are required to discern the most appropriate technological solutions tailored to their specific business models and implement corresponding marketing strategies judiciously to optimize profitability (Pangesti et al., 2021). The successful integration of technology is contingent upon MSMEs' aptitude in choosing and utilizing technology that aligns with their operational needs. This introduces a critical concern regarding the proficiency of certain MSMEs in effectively leveraging advanced technologies to their advantage (Banjarnahor dkk., 2023).

Technological advancements exhibit discernible attributes such as perceived usefulness, relative advantage, compatibility, and complexity (Ausat et al., 2022). Within organizational contexts, challenges arise that shape the preparedness of internal organizational scopes in response to the process of digitalization. Moreover, the dimensions of a company, particularly its size, wield significant influence over the decisions pertaining to the adoption of E-commerce (Sijabat et al., 2022).

Notably, diminutive business entities demonstrate a proclivity toward limited enthusiasm for amplifying the advantages offered by information technology. Consequently, these modest enterprises grapple with considerable impediments in the acquisition of requisite systems due to resource constraints. However, such enterprises may embrace E-commerce adoption primarily to augment competitiveness and enhance cost-effectiveness. Thus, a critical imperative for MSMEs is to thoroughly comprehend the readiness of their organizational structures concerning the integration of E-commerce into their business processes (Sulaiman et al., 2021). In this regard, the organizational structure of MSMEs, particularly when characterized as organic or decentralized, significantly modulates the trajectory of digitalization adoption within their operational framework. Notably, this organizational dimension is evaluated through the prism of indicators such as top management support and employee knowledge (Cahyadi et al., 2022).

The forthcoming obstacle pertains to the organizational milieu, specifically within the realm of MSMEs. Environmental determinants that may sway MSMEs towards the adoption of e-commerce encompass competitive and customer-driven influences, as highlighted in the study by Lina & Suwarni (2022). MSMEs risk lagging behind if they fail to digitize their operations in line with advancements undertaken by their industry counterparts. Additionally, contemporary consumer preferences gravitate towards e-commerce platforms for purchase transactions due to perceived ease and heightened efficiency, as posited by Pangesti et al. (2022).

This undoubtedly prompts MSMEs to engage with consumers to disseminate information about their products and effectively market them through digital means, particularly the adoption of e-commerce. Moreover, within the context of the environmental domain, significant indicators encompass customer pressure and competitor pressure, as outlined by Lina & Suwarni (2022). The utilization of technology, notably E-Commerce, yields numerous advantages and benefits. One notable advantage is the enhancement of MSMEs' business performance (Fahrezi & Rizaldi, 2023).

Nevertheless, not all MSMEs possess the requisite capacity to optimize their utilization of e-commerce (Putranto et al., 2022). The proficiency and acumen of MSME stakeholders

constitute a notable factor influencing their efficacy in engaging with e-commerce operations. This observation aligns with extant research affirming the beneficial impact of e-commerce on MSME performance (Putranto et al., 2022). E-commerce adoption, functioning as a mediating variable, encompasses several indicators, notably inclusive of internet usage, human resource (HR) preparedness, and overall MSME readiness (Febrian & Kristianti, 2020).

Organizational performance encompasses the manner in which an entity responds, adjusts, and comprehends specific alterations within its external environment. Moreover, organizational performance is intimately tied to the organization's competence in augmenting financial metrics (Polii et al., 2023; Fahrezi & Rizaldi, 2023). Key yardsticks utilized to evaluate the performance of MSMEs encompass escalated revenue generation, enhanced operational efficacy, and elevated levels of client contentment, as elucidated by Ausat et al. (2022).
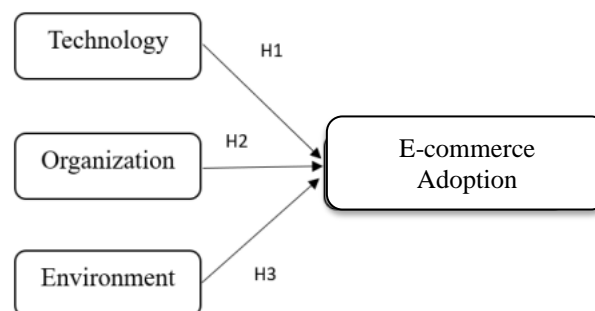
Figure 1
Research Conceptual Framework

In contemporary corporate environments, the prominent integration of technology stands as a crucial determinant for the progression and fortitude of organizations, notably within the realm of E-commerce (Maulana et al., 2023). In light of this evolving paradigm, it is postulated that technology, owing to its expansive potential to revolutionize business methodologies and broaden market reach, wields a beneficial impact on the uptake of e-commerce by MSMEs within the Kabupaten Magelang region. With this conceptual framework in mind, the ensuing hypotheses have been formulated:

H1: Technology has a positive effect on E-Commerce Adoption in MSMEs in Magelang Regency.
H2: Organization has a positive effect on E-Commerce Adoption in Magelang Regency MSMEs.
H3: Environment has a positive effect on the adoption of E-Commerce in MSMEs of Magelang district.

RESEARCH METHOD

This study employs a quantitative methodology, utilizing primary data gathered through the administration of questionnaires to (MSMEs) practitioners in Magelang Regency. The research population comprises the comprehensive count of MSME actors within Magelang Regency, totaling 1080 establishments. Employing a non-probability sampling technique known as convenience sampling, the sample size of 100 MSME actors was determined using the Slovin formula.

The present study encompasses three categories of variables, namely independent variables, mediating variables, and dependent variables. The independent variables encompass

technology, organization, and environment. The role of E-commerce adoption serves as a mediating variable, whereas MSME performance is designated as the dependent variable within this research framework. The primary research tool employed is a structured questionnaire, meticulously crafted through the operational definition of each variable. Subsequently, a comprehensive set of indicators for each variable will be established. The chosen measurement scale is the Likert scale, featuring a numerical range from 1 to 5. Rigorous testing of the instrument's reliability and validity will be conducted utilizing the Statistical Package for the Social Sciences (SPSS) application, following the distribution of the aforementioned questionnaire to 30 carefully selected respondents.

Data collection is carried out after ensuring that the instruments to be used are valid and reliable. Data collection is done by distributing questionnaires to all respondents. The questionnaire will be made in two forms, namely in the form of Ms. Word files and google formulars, so that the questionnaire allows respondents to fill in online. However, if conditions permit, the questionnaire will be distributed directly to respondents. Data testing is in the form of description analysis, classical assumption test, hypothesis testing and regression analysis. For data processing, the research will use the latest version of the SPSS application.

For data analysis in this study, multiple linear regression analysis is an analysis used to determine the effect of the independent variable on the dependent variable, where the number of independent variables is more than one. This study has three independent variables namely Technology, Organization, and Environment. As well as one dependent variable, namely E-Commerce Adoption. The equation in multiple linear regression analysis is as follows:

$$Y = a + b1X1 + b2X2 + b3X3$$

Where:

Y	:	Dependent variable (i.e., Ecommerce adoption)
a	:	Intercept or constant term
b_1, b_2, b_3	:	the regression coefficients
X_1	:	Independent variable (i.e., Technology)
X_2	:	Independent variable (i.e., Organization)
X_3	:	Independent variable (i.e., Environment)

RESULTS AND DISCUSSIONS

Based on the tabulated data derived from the questionnaires disseminated among the respondents, a subsequent regression analysis was conducted, yielding results as summarized in Table 1.

Tabel 1
Regression Analysis Results

Variables	Unstandardized Coeffiecients (Beta)	Sign Value
Constant	3.650	
Technology	.229	.022
Organization	.405	.008
Environment	.253	.047

Dependent Variable: E-Commerce Adoption

Based on the tabulated outcomes derived from a comprehensive multiple linear regression analysis, a discernible equation can be formulated. The equation encapsulates the

relationship between the independent variables and the dependent variable, providing a structured and quantifiable representation of the underlying statistical relationships.

$$Y = 3.650 + 0.229\ X1 + 0.405\ X2 + 0.253\ X3$$

The provided equation elucidates that the constant value of 3,650, manifesting a positive magnitude, underscores a unidirectional influence between the independent and dependent variables. This numerical representation signifies that the variables Technology, Organization, and Environment, assumed to be either 0 or held constant, render the E-Commerce Adoption value as 3,650.

Moreover, the regression coefficients for the Technology, Organization, and Environment variables, quantified at 0.229, 0.405, and 0.253 respectively, denote their respective positive effects on E-Commerce Adoption. In the context of a 1% increase in each variable, while holding the other factors constant, E-Commerce Adoption is anticipated to increase by 0.229 for Technology, 0.405 for Organization, and 0.253 for Environment. These coefficients illuminate the incremental impact each variable has on the adoption of E-Commerce within the studied framework.

Coefficient of Determination Analysis

The coefficient of determination, denoted as R^2, stands as a pivotal metric in statistical analysis, particularly within the realm of regression analysis. Its utility lies in quantifying the extent to which the independent variable exerts influence over the dependent variable, encapsulating the proportion of variance in the dependent variable that can be elucidated by the independent variable(s). R^2 assumes values within the range of 0 to 1, where a value closer to 1 signifies a stronger explanatory power of the independent variable(s) on the variability observed in the dependent variable.

In the context of the present study, the coefficient of determination test was applied to ascertain the extent of influence exerted by the independent variable(s) under investigation on the dependent variable. The ensuing section presents the specific outcomes yielded by the coefficient of determination test, shedding light on the discerned relationships and explicating the proportion of variance elucidated by the independent variable(s) in the dependent variable.

Tabel 2
Determinant Coefficient Results

Model	R	R Square
1	.596	.355

Based on the findings presented in Table 2, it is discernible that the variables denoted as Technology, Organization, and Environment possess an R Square value of 0.355. This numerical representation signifies the proportion of variance in the E-Commerce Adoption variable that can be elucidated by these specified independent variables. Specifically, the R Square value of 0.355 implies that approximately 35.5% of the variance observed in the E-Commerce Adoption variable is directly attributable to the influence of the variables. Consequently, it is posited that the residual proportion of variance, approximately 64.5%, is contingent upon the interplay of other unexamined factors within the research context.

Hypothesis Test

In this study, the researchers employed hypothesis testing to investigate the impact of specific variables on E-Commerce Adoption within Micro, Small, and Medium Enterprises (MSMEs) located in Magelang Regency. The chosen methodology involved evaluating the significance of these variables against a predetermined critical value of 0.05. Hypotheses were considered accepted if the computed significance value was less than this threshold.

The first hypothesis postulated that Technology has a positive impact on E-Commerce Adoption in MSMEs within Magelang Regency. The conducted tests validated this hypothesis, demonstrating a significant effect of Technology, with a calculated significance value of 0.022, falling below the critical threshold of 0.05. Therefore, H1 was accepted.

The second hypothesis examined the influence of Organization on E-Commerce Adoption in MSMEs within the same region. The empirical testing confirmed a positive effect of Organization on E-Commerce Adoption, as evidenced by a significance value of 0.008, lower than the predetermined significance threshold of 0.05. Consequently, H2 was supported.

Similarly, the third hypothesis explored the effect of Environment on E-Commerce Adoption in MSMEs within Magelang Regency. The conducted tests established a positive relationship, with the Environment variable yielding a significance value of 0.047, below the critical threshold of 0.05. Thus, H3 was validated.

These findings contribute valuable insights into understanding the dynamics of E-Commerce Adoption among MSMEs in Magelang Regency, emphasizing the critical roles of Technology, Organization, and Environment. The acceptance of these hypotheses highlights the statistical significance of these variables in shaping E-commerce adoption, warranting further exploration and strategic considerations within the MSME sector.

CONCLUSIONS

This research investigates the impact of Technology, Organization, and Environment on the adoption of E-commerce within the context of MSMEs in Magelang Regency. The study sheds light on the pivotal role played by these factors in facilitating the integration of E-commerce platforms among MSMEs in the region. These findings corroborate and extend upon the works of previous scholars, including Rahmawati et al. (2021), Ausat et al. (2022), and Mahirah et al. (2022). The preceding investigations have consistently underscored the favorable influence of technological, organizational, and environmental considerations on the adoption of E-market, E-commerce, and social media platforms (e.g., Poluan et al., 2022; Kainde & Mandagi, 2023; Tatemba & Rantung, 2021).

The findings derived from the conducted analysis reveal that organizational factors exert the preeminent influence on the adoption of E-Commerce. Consequently, it is incumbent upon the proprietors and personnel of Micro, Small, and Medium-sized Enterprises (MSMEs) to acquire the requisite knowledge pertaining to E-Commerce technology. This imperative underscore the indispensability of equipping MSME stakeholders with the requisite technological acumen, particularly as it pertains to E-Commerce platforms.

Nonetheless, it is imperative to acknowledge that this research is not devoid of certain limitations in the scope of its analysis. The current study represents a significant step towards unraveling the intricacies of E-commerce adoption within the MSME sector. Nevertheless, it is important to acknowledge that the complex and multifaceted nature of this phenomenon necessitates further inquiry and exploration. Future research endeavors should endeavor to delve deeper into the intricacies of E-commerce implementation within the MSME landscape, employing diverse methodological approaches to unearth nuanced insights and address any remaining gaps in the existing body of knowledge.

In conclusion, the ramifications of this research extend beyond the immediate context, holding salient implications for multiple stakeholders. First and foremost, MSME practitioners and personnel stand to benefit from the elucidation of the paramount role played by organizational factors in E-Commerce adoption. These insights should inform their strategic considerations and investments in technology. Concurrently, this research contributes to the broader academic discourse surrounding E-Commerce within the MSME domain, affording researchers a foundational platform upon which to build. Moreover, policymakers, industry practitioners, and technology providers can glean valuable insights to inform their respective

roles in facilitating the seamless integration of E-Commerce technology within the MSME sector, thereby fostering economic growth and innovation.

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