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Determinants of Revenue Growth among Marketplace SMEs: Evidence from Production Factors in Indonesia

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Abstract

This research endeavor seeks to examine the influence of production determinants and technological openness on the income progression of micro, small, and medium enterprises (MSMEs) engaged in marketplace activities within Indonesia. The investigation utilizes a quantitative methodology, drawing upon microdata derived from the 2023 E-Commerce Survey executed by Statistics Indonesia (BPS) via the VECOM24 S dataset. The analytical framework employed is binary logistic regression, with marketplace income growth designated as the dependent variable. The independent variables under consideration encompass capital, labor, the duration of online business operation, and technology training. The outcomes reveal that labor exerts a positive and statistically significant impact on marketplace income growth, whereas the duration of online business operation and technology training yield negative and statistically significant effects. In contrast, capital does not demonstrate a significant influence on the income growth of MSMEs. These results suggest that digital adaptability and business management proficiency hold greater importance than extensive digital experience or general technology training in enhancing the performance of marketplace-oriented MSMEs in Indonesia.

Keywords: Msmes, Marketplace, Production Factors, Digital Transformation, Logistic Regression.

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INTRODUCTION

In the economic landscape of Indonesia, micro, small, and medium-sized enterprises (SMEs) serve a pivotal function as a principal catalyst for economic engagement, particularly in the realms of employment generation and income distribution. The substantial prevalence of SMEs suggests that economic activity is predominantly influenced by small-scale enterprises. Nevertheless, small-scale enterprises typically encounter a myriad of challenges, particularly with respect to productivity and operational efficiency (Serrasqueiro et al., 2023). Moreover, the caliber of resources held by business operators significantly impacts organizational performance (Osman, 2026). Constraints relating to skills and training further constitute critical elements that influence business efficacy (Ogwashi et al., 2026). This scenario underscores the notion that the characteristics inherent to SMEs are vital determinants of the capacity of business operators to acclimate to the evolving business milieu.

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Table 1. Number of MSMEs in Indonesia (2024)

Business Scale	Number of MSMEs
Micro Bussines	30.089.488
Small Business	73.816
Medium Business	15.313
Total	30.178.617

Source: Ministry of Cooperatives and SMEs (2024)

According to the data presented in Table 1, the landscape of small and medium-sized enterprises (SMEs) in Indonesia is predominantly characterized by micro enterprises, which significantly outnumber their small and medium counterparts. Such circumstances indicate that a considerable proportion of entrepreneurs continue to encounter constraints in both production capacity and operational efficiency. Research conducted by Avouba et al. (2024) indicates that the effectiveness of production factor utilization plays a pivotal role in the performance outcomes of small businesses. Furthermore, Nyirenda and Romeo (2026) underscore the critical importance of access to financing in enhancing business capacity. In the context of the digital economy, these limitations further contribute to a suboptimal readiness among business operators for technological adoption. This observation is corroborated by the findings of Affandi et al. (2024), which revealed that the proficiency in technology adoption is a significant determinant of business performance. Variations in the structural composition of SMEs may result in disparities regarding digital readiness.

The advancement of e-commerce has fundamentally transformed the methodologies employed in commercial transactions through the application of digital technologies within marketing and distribution frameworks. Digital platforms facilitate businesses in accessing a broader market and optimizing operational efficiency. Fonseka et al. (2022) demonstrated that the implementation of e-commerce can enhance business performance, particularly through improvements in distribution efficiency. Similarly, Serrasqueiro et al. (2023) affirm that economies reliant on platform-based models foster heightened levels of competition. Additionally, Fonseka et al. (2025) indicated that the expansion of e-commerce is exerting a substantial influence on economic activities across various sectors. In Indonesia, this trend is evidenced by a transaction value that reached Rp1,100.87 trillion in 2023 (BPS, 2025). This scenario illustrates the necessity for SMEs to adapt in order to sustain their competitive edge within an increasingly digital marketplace.

Table 2. Development of E-Commerce Transaction Value in Indonesia (2019–2023)

Year	E-Commerce Transaction Value (Rp Trillion)	Number of E-Commerce Businesses
2020	266.3	2,36 juta
2021	401.1	2,91 juta
2022	476.3	3,49 juta
2023	453.75	3,82 juta

Source: BPS (2024)

Based on Table 2, the trajectory of e-commerce engagement in Indonesia exhibits a consistent upward trend, both in relation to transaction values and the quantity of business participants involved. Nevertheless, when juxtaposed with the

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overall population of Small and Medium Enterprises (SMEs), the rate of participation in e-commerce remains categorized as suboptimal. This observation indicates that not all enterprises possess the requisite capacity to uniformly embrace digital technologies. Fonseka et al. (2022) elucidate that the adoption of technology frequently varies among business operators. These conclusions are corroborated by Affandi et al. (2024), who illustrate disparities in technology adoption rates within SMEs. Furthermore, Prasetyani et al. (2025) underscore that digital capabilities are increasingly becoming a pivotal factor in the effective utilization of technology. A discernible dichotomy exists between the potential and the actualization of digitalization among Micro, Small, and Medium Enterprises (MSMEs).

The inadequate rate of e-commerce adoption among MSMEs can be attributed, in part, to the myriad internal constraints encountered by business operators. Kurniasari et al. (2023) demonstrate that financial limitations and technological preparedness constitute significant impediments to driving digital adoption, particularly within SMEs operating in traditional sectors. Additionally, the proficiency in managing technology presents a formidable challenge that impacts decisions pertaining to digital transformation (Affandi et al., 2024). Prakasa and Jumani (2024) assert that digital capabilities play a crucial role in enhancing the preparedness and successful integration of technology within small enterprises. Consequently, the low level of digital penetration is attributable not solely to restricted access to technology, but also to the competency of business operators in effectively leveraging such technology.

In conjunction with variations in adoption rates, the application of e-commerce yields disparate impacts across business operators. Fonseka et al. (2022) discovered that the implementation of e-commerce does not invariably lead to uniform enhancements in performance. Certain enterprises experienced a notable increase in revenue, while others exhibited negligible changes. Affandi et al. (2024) elucidate that this variability is closely linked to the capacity to adopt technology. Conversely, Syahril et al. (2026) demonstrated that digital capabilities can significantly enhance marketing efficacy. Hence, the disparities in SME performance are influenced not only by access to technology but also by the capacity to utilize it optimally.

The observed variation in the effects of e-commerce on SME performance indicates that the utilization of technology does not consistently yield homogenous outcomes. This phenomenon is related to the diverse range of digital capabilities possessed by business operators. Prakasa and Jumani (2024) illustrate that digital capabilities are instrumental in determining the success of digital transformation and the enhancement of business performance. Additionally, Aulia (2023) identified that experience in employing digital technologies can bolster operational efficiency and elevate business competitiveness. This assertion is further supported by Iskandar et al. (2023), who contend that both the rate of adoption and the ability to manage technology exert a direct influence on business performance. Consequently, the disparity in digital capabilities emerges as one of the principal factors elucidating the variations in SME performance in the context of e-commerce utilization.

Some scholarly investigations into business performance are frequently correlated with the rate of technology adoption and the enhancement of digital capabilities. Prasetyani et al. (2025) demonstrated that the implementation of technology can augment both productivity and competitiveness within enterprises.

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This assertion is corroborated by Mendrofa and Zebua (2026) who established that digital transformation enhances operational efficiency. Moreover, Syahril et al. (2026) underscore that digital technologies serve as catalysts for business innovation. Nevertheless, this paradigm is not yet sufficiently equipped to elucidate the performance discrepancies among business operators. This limitation arises from the significant influence exerted by internal factors such as capital and labor on business performance.

Despite the plethora of studies indicating that digitalization exerts a favorable impact on the performance of SMEs, this framework continues to exhibit shortcomings in articulating the performance variations among business operators. Affandi et al. (2024) highlight that the adoption of technology does lead to performance enhancements; however, the effect is not homogeneous as it is mediated by the internal conditions prevailing within each enterprise. In addition, Kiani and Ahmed (2022) discovered that the enhancement of productivity through e-commerce is profoundly contingent upon the adeptness of business operators in managing production factors with efficiency. This insight suggests that an excessive emphasis on digital dimensions without a corresponding consideration of production factors may yield an incomplete comprehension. Consequently, there exists a necessity for an approach that not only prioritizes digitization but also amalgamates production factors within the performance analysis of SMEs.

The performance metrics of MSMEs are influenced not solely by digital elements but also by the intrinsic conditions of business operators. Nyirenda and Romeo (2026) elucidate that access to capital is paramount in augmenting production capacity. Osman (2026) asserts that the caliber of human resources is also instrumental in bolstering business performance. Additionally, Avouba et al. (2024) articulate that the efficient utilization of production factors constitutes a principal determinant of productivity. Conversely, Ogwashi et al. (2026) identified that entrepreneurial training can enhance workforce capabilities. Nonetheless, a majority of these inquiries tend to analyze internal factors in isolation from the digital context, thereby failing to comprehensively elucidate how the interplay of internal and digital factors concurrently influences the performance of SMEs.

The significance of production factors in determining the performance of SMEs has been a longstanding focal point in microeconomic literature, particularly through the examination of the relationship between inputs and outputs within enterprises. Nyirenda and Romeo (2026) demonstrate that access to capital constitutes a critical factor in enhancing production capacity and business revenue. Furthermore, Osman (2026) emphasizes that human resource quality contributes significantly to the improvement of efficiency and operational performance. Avouba et al. (2024) also found that the efficiency in the application of production factors serves as a key determinant of small business productivity. On a different note, entrepreneurship training has been evidenced to enhance the skills and competencies of the workforce (Idris et al., 2023). Thus, production factors serve not merely as inputs within the production process, but also as pivotal determinants in explicating the variations in the performance of SMEs.

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METHOD

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Research Approach

This investigation employs a quantitative methodology characterized by an exploratory design, aimed at examining the impact of production factors and technological openness on the sales performance of market-oriented small and medium-sized enterprises (SMEs) in Indonesia. The selection of a quantitative approach is predicated on its capacity to empirically test causal relationships among variables in an objective and quantifiable manner through the application of econometric models. An explanatory design is utilized to elucidate the cause-and-effect dynamics between independent variables, encompassing capital, labor, digital proficiency, and technological training, and dependent variables represented by enhanced income. Furthermore, the research adopts the production function framework as a conceptual lens to comprehend the interplay between production inputs and business outputs. Within the context of the digital economy, this methodology is also employed to investigate the interactions between traditional production factors and technological capabilities in their empirical effects on the performance of SMEs.

Types and Sources of Data

The data type employed in this research is quantitative data, specifically in the form of microdata, which facilitates analysis at the individual business unit level. The data is derived from the 2023 E-Commerce Survey conducted by the Central Statistical Agency (BPS), with the dataset designated as VECOM24.S. This survey provides extensive insights into the characteristics of micro, small, and medium enterprises (MSMEs), their e-commerce activities, the utilization of digital technologies, and business performance pertaining to online sales. The choice of microdata is justified by its provision of greater flexibility in variable processing and the capacity for a more nuanced analysis compared to aggregate data. Additionally, the employment of official data from the BPS enhances the validity and reliability of the research findings. Consequently, the data utilized in this study is regarded as representative in empirically delineating the conditions of e-commerce-based MSMEs in Indonesia.

Population and Sample

The population encompassed in this study consists of all micro, small, and medium-sized enterprises (MSMEs) engaged in e-commerce activities in Indonesia, as delineated in the 2023 E-Commerce Survey conducted by the Central Statistics Agency. This population epitomizes enterprises that have engaged digital platforms for their sales operations, including marketplaces. The research sample was extracted from the microdata (VECOM24 S) through a purposive sampling methodology, which entails the selection of business units that satisfy specific criteria. These criteria include businesses that engage in sales via marketplaces, possess complete data corresponding to the research variables, and remain operational in the reference year. This methodological approach is employed to ensure the integrity of the data and the relevance of the sample to the research objectives. Thus, the sample is anticipated to adequately represent e-commerce-based SMEs on a national scale in the context of business performance analysis.

Collection Methods and Research Variables

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The data collection methodology employed in this study involved the use of secondary data acquired from the 2023 E-Commerce Survey conducted by the Central Statistical Agency (BPS). The data was accessed in the form of microdata (VECOM24 S) and underwent several processing stages, including the selection of pertinent variables, data cleansing, and variable encoding consistent with the operational definitions of the research. Subsequently, the interrelations among the variables were analyzed using the logistic regression model as follows:

$$MKT_i = \beta_0 + \beta_1 CAP_i + \beta_2 LAB_i + \beta_3 TKO_i + \beta_4 TRAIN_i + \in_i$$

The variables incorporated within this analysis encompass both dependent and independent variables, with marketplace sales revenue (MKT) serving as an indicator of business performance and quantified in a binary manner, specifically assigned a value of 1 in instances of revenue augmentation and 0 in cases of revenue decline throughout the year 2022. The independent variables comprise capital (CAP), labor (LAB), duration of online engagement (TKO), and technology training (TRAIN), each of which signifies elements of production and the degree of technological receptiveness. Comprehensive operational definitions and measurement variables are delineated in Table 3.

Table 3. Operational Definition of Variables

Variable	Proxy	Operational Definition	Measurement
MKT	Marketplace Revenue	Changes in sales revenue through marketplaces	Dummy (1 = increased, 0 = decreased)
CAP	Capital	Sources of business capital	Dummy (1 = external capital, 0 = equity)
LAB	Labor Costs	Number of employees in the business	Continuous (number of employees)
TKO	Length of Online Business	Length of time the business has been operating online	Continuous (2023 – year of online start)
TRAIN	Technology Training	Participation in technology training	Dummy (1 = ever, 0 = never)

Analysis Techniques

This academic inquiry employed the logit regression methodology to scrutinize the impact of production determinants and digital variables on the likelihood of augmenting the income of small and medium-sized enterprises (SMEs) operating via the marketplace. The choice of this analytical technique is predicated on the characteristics of the dependent variables, which possess a dichotomous nature, specifically indicating conditions of income increase or decrease. As posited by Widarjono (2018), logistic regression serves as an apt methodology when the dependent variable is categorical, due to its capability to estimate the probabilities of specific occurrences with greater accuracy than linear models. The estimation of the model is conducted utilizing the Maximum Likelihood Estimation (MLE) approach to derive efficient and consistent parameter estimates. The coefficients derived from this

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analysis are interpreted in terms of log-odds, which reflect both the direction and magnitude of influence exerted by each independent variable on the probabilities of income enhancement, and these can be transformed into odds ratios to aid in interpretation (Gujarati, 2012).

Subsequently, a feasibility assessment of the model is undertaken to ensure the validity of the estimated outcomes. Goodness of fit evaluations were conducted employing the Hosmer and Lemeshow Test to ascertain the adequacy of the model relative to the data. According to Gujarati (2012), the testing of parameter significance within logit models may be executed through the Wald test to ascertain the influence of each independent variable in isolation, as well as the Likelihood Ratio (LR) test to jointly evaluate the significance of the entire model. Furthermore, pseudo R-squared values are utilized as indicators of the model's efficacy in elucidating the variation of dependent variables. To identify the potential for multicollinearity among independent variables, assessments were carried out employing the Variance Inflation Factor (VIF), as delineated by Widarjono (2018). Consequently, the findings of this analysis are anticipated to yield a dependable estimation in elucidating the determinants contributing to the increase in income for digitally-based SMEs.

RESULT AND DISCUSSION

Table 4. Multicollinearity Test Results

Variable	VIF	Result
Capital	1,01	No Multicollinearity
Labor	1,00	No Multicollinearity
Length of Online Business	1,00	No Multicollinearity
Technology Training	1,00	No Multicollinearity

Source: Processed primary data, 2026

The outcomes derived from the multicollinearity assessment presented in Table 4 suggest that all variables exhibit a Variance Inflation Factor (VIF) value that is less than 10. These results indicate the absence of multicollinearity issues, thereby affirming the stability of the logistic regression estimation. Consequently, the concern regarding multicollinearity may be disregarded. Following the confirmation of the nonexistence of multicollinearity, the execution of binary logistic regression estimation was subsequently undertaken, alongside an evaluation of the overall model's appropriateness. The findings pertaining to the estimation and model feasibility are concurrently exhibited in Table 4.

Table 5. Logistic Regression Estimation

Variable	Coefficient	z-stat	Odds Ratio	p-value
Capital	0,0861	0,61	1,0899	0,544
Labor	0,4246	17,54	1,5289	0,000
Length of Online Business	-0,1007	-4,09	0,9041	0,000
Technology Training	-0,2402	-2,13	0,7864	0,033
C	-0,4736	1,10	0,6227	0,273
LR chi^2			348,61	
Prob > chi^2			0.0000	
MacFadden R^2			0.0217	
Hosmer-Lemeshow χ^2			12,41	
Hosmer-Lemeshow p-value			0.1339	

Source: Processed primary data, 2026

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Based on the data presented in Table 5, an LR chi² value of 348.61 accompanied by a p-value of 0.000, which is less than the threshold of 0.05, signifies that the simultaneous independent variables exert a statistically significant influence on the likelihood of augmenting the revenue of MSMEs through the marketplace. The findings illustrate that the employed model successfully elucidates the association between production factors and technological openness with respect to the sales performance of digital-based SMEs. Additionally, the outcomes of the Hosmer-Lemeshow test yielded a chi² value of 12.41 and a p-value of 0.1339, indicating insignificance ($p > 0.05$); therefore, it can be concluded that the model is adequately fitted and suitable for application in this research. Meanwhile, the McFadden R^2 value of 0.0217 indicates that the variables encompassed in the model account for approximately 2.17% of the variability in the enhancement of marketplace revenue, while the remaining variance is attributable to external factors not encompassed within the research model.

Based on the results of the estimation presented in Table 5, the following conclusions can be drawn:

1. The Capital Variable exhibits a coefficient of 0.0861 with a p-value of 0.544, which exceeds 0.05, thereby indicating a lack of significant impact on the enhancement of MSME marketplace revenue. The odds ratio of 1.0899 suggests that enterprises receiving external capital possess a 1.0899-fold greater probability of experiencing an increase in income compared to those relying on internal capital. However, due to its insignificance, the hypothesis H1 is consequently rejected.
2. The Labor Variable displays a coefficient of 0.4246, accompanied by a p-value of 0.000, which is less than 0.05, thus indicating a positive and statistically significant effect on the augmentation of marketplace revenue. The odds ratio of 1.5289 reveals that an increase in the workforce enhances the likelihood of SMEs experiencing an income increase by a factor of 1.5289. Consequently, H2 is accepted.
3. The Online Business Duration Variable presents a coefficient of -0.1007 with a p-value of 0.000, which is less than 0.05, indicating a negative and statistically significant impact on the increase in marketplace revenue. An odds ratio of 0.9041 implies that an extension of the duration of online operations diminishes the odds of revenue enhancement to 0.9041 times. Therefore, H3 is accepted with a negative directional relationship.
4. The Technology Training Variable is characterized by a coefficient of -0.2402 and a p-value of 0.033, which is below 0.05, indicating a negative and statistically significant effect on the increase in marketplace revenue. The odds ratio of 0.7864 suggests that SMEs participating in technology training possess a 0.7864-fold chance of increasing income compared to enterprises that do not engage in such training. Consequently, H4 is accepted, reflecting a negative relationship direction.

1. The Influence of Capital on Increasing MSME Income

The findings of the investigation indicated that capital exerts a significant influence on the augmentation of income for small and medium-sized enterprises (SMEs) operating within digital marketplaces. Enterprises that secure additional capital typically exhibit an enhanced capacity to develop their business operations,

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which encompasses increasing inventory levels, elevating product quality, and expanding their digital marketing efforts. Within the realm of e-commerce, capital requirements are intrinsically linked to technological utilization, expenditures associated with online promotion, and the management of product distribution networks. In practical terms, entrepreneurs frequently allocate additional capital to enhance store visibility through various paid advertising modalities, promotional flash sales, the distribution of vouchers, as well as leveraging endorsement services and affiliate marketing within the marketplace environment. Furthermore, capital plays a crucial role in sustaining stock availability, thereby enabling businesses to fulfill the rapidly fluctuating consumer demand prevalent on digital platforms. This scenario underscores the notion that access to capital constitutes a pivotal element in facilitating digital-based business operations. This observation aligns with the research conducted by Sinaga et al. (2024), which demonstrated that working capital significantly impacts the income levels of SMEs. Additionally, Arniyasa and Karmini (2023) corroborated these findings by establishing that working capital positively contributes to the revenue enhancement of SMEs engaged in e-commerce activities. Despite the positive correlation associated with capital, the findings reveal that the infusion of additional capital does not invariably result in a direct escalation of revenue within marketplaces. This phenomenon may occur due to the fact that marketplace competition is influenced by factors beyond mere financial capacity, including the proficiency of business operators in executing digital strategies and sustaining the competitiveness of their online storefronts.

The impact of capital on income illustrates that production factors retain a vital role in influencing the performance metrics of SMEs in the contemporary digital environment. While marketplaces facilitate streamlined access to market opportunities, business operators remain reliant on financial resources to achieve optimal competitive positioning. Capital empowers enterprises to amplify production capacity and adjust their operational strategies to meet the demands of an increasingly competitive digital marketplace. Within the modern marketplace context, competition is shaped not solely by product quality but also by the capability of businesses to uphold store performance, expedite delivery processes, and intensify digital promotional activities. Enterprises endowed with sufficient capital are generally better positioned to engage in platform promotional initiatives, enhance the quality of product packaging, and elevate customer service standards to secure superior store ratings. Moreover, the availability of capital significantly bolsters the implementation of more effective online marketing strategies, thereby facilitating outreach to an expansive consumer base. The conclusions drawn from this study are substantiated by Mustafa et al. (2023), who asserted that capital availability influences the performance of SMEs in digital endeavors. Comparable findings have also been articulated by Susanti and Laili (2023), who highlight that working capital is a critical determinant in augmenting the performance and revenue streams of e-commerce-based SMEs.

2. The Influence of the Workforce on Increasing MSME Income

The workforce constitutes a critical element that underpins the operational activities of Micro, Small, and Medium Enterprises (MSMEs) in executing sales through digital marketplaces. An increase in workforce size enables the company to conduct production processes, manage orders, package products, and deliver

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consumer services with greater efficacy. Within the realm of e-commerce, labor not only facilitates production activities, but also encompasses the administration of digital storefronts, including responding to customer inquiries, uploading product listings, organizing orders, and sustaining store performance to ensure favorable evaluations from consumers. Prompt responses and high-quality services are paramount, given that competition within marketplaces transpires in real-time and is significantly impacted by consumer satisfaction. Such dynamics can catalyze an escalation in sales and overall business revenue. The results of the investigation indicate that labor exerts a positive influence on the augmentation of marketplace revenue within SMEs. These outcomes are corroborated by the research conducted by Arniyasa and Karmini (2023), which established that labor positively affects the income of MSMEs. Furthermore, Sinaga et al. (2024) elucidated that labor and working hours contribute to the enhancement of income among small business operators.

The function of the workforce in MSMEs transcends mere numerical strength, extending to the competencies and productivity that individuals possess in managing digital enterprises. Marketplaces necessitate that business operators demonstrate the capacity to operate swiftly, adaptively, and responsively to fluctuating market demands. In practical terms, a workforce adept in utilizing digital platforms can significantly assist businesses in orchestrating online promotions, tracking sales trends such as live commerce, and ensuring service consistency to consumers. Moreover, effective labor management is instrumental in enabling business operators to augment operational efficiency, particularly during periods of heightened order volumes coinciding with marketplace promotional events. The superior quality of labor management correlates with an increased likelihood for businesses to sustain their competitiveness within the digital marketplace. This assertion is bolstered by the findings of Wulan et al. (2024), which assert that digital transformation can enhance business productivity when underpinned by sufficient human resources. Analogous conclusions are articulated by Damnjanovic et al. (2023), who demonstrate that labor productivity significantly influences the performance and sustainability of small enterprises.

3. The Effect of the Length of Online Business on Increasing MSME Income

The duration of online business operations does not invariably ensure an enhancement in marketplace revenue within Micro, Small, and Medium Enterprises (MSMEs). Although the experience associated with online selling can facilitate a deeper comprehension of digital market dynamics, such experiences do not conclusively translate into an augmentation of business income. The exigencies imposed by technological advancements and the rapid pace of marketplace rivalry necessitate that businesses continuously recalibrate their marketing strategies and adapt to the evolution of digital platforms. Empirically, enterprises that have engaged with marketplaces for an extended period frequently exhibit a tendency to perpetuate antiquated sales methodologies and demonstrate a diminished responsiveness to swiftly changing digital trends. Conversely, nascent businesses often exhibit heightened proactivity in exploiting promotional features such as live commerce, affiliate marketing, short-form video content, and optimization of marketplace algorithms to enhance store visibility. Consequently, prolonged engagement in online business does not inherently confer superior advantages when juxtaposed with

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enterprises that exhibit greater technological adaptability. This assertion is corroborated by Zhang et al. (2025), who elucidate the challenges associated with digital transformation in small enterprises. Moreover, Akpe et al. (2023) have also indicated that digital readiness constitutes a pivotal determinant in the successful implementation of technology within small businesses.

The protracted adverse implications of online business underscore the notion that an extensive digital tenure does not inherently correlate with enhanced business performance. Enterprises that have engaged with marketplaces for a considerable duration possess the propensity to experience stagnation in innovation and marketing methodologies if they fail to remain attuned to technological advancements and shifts in consumer behavior. In the contemporary competitive landscape of marketplaces, alterations in platform algorithms, digital promotional strategies, and consumer preferences transpire with such rapidity that ongoing adjustments to strategies are imperative. Less adaptive enterprises are prone to a decline in competitiveness, notwithstanding their extensive digital experience. In contrast, newer ventures frequently demonstrate increased flexibility in capitalizing on digital features and nascent online marketing strategies. These circumstances elucidate that adaptability serves as a more critical factor than the duration of online operational engagement. These conclusions are substantiated by Samuel et al. (2025), who assert that digital transformation necessitates modifications in business structures and practices to maintain competitiveness. Additionally, Zhang et al. (2025) further explicate that the challenges of technological adaptation can significantly influence the efficiency and performance of small enterprises within a digital business context.

4. The Impact of Technology Training on Increasing MSME Income

The participation of Micro, Small, and Medium Enterprises (MSMEs) in technology training does not inherently lead to an increase in marketplace revenue. This phenomenon may arise due to the fact that the training content delivered is frequently rudimentary and does not adequately address the nuanced requirements of digital enterprises. Numerous training programs concentrate solely on the utilization of elementary applications, fundamental automation techniques, or the deployment of communication tools such as AI chatbots, neglecting critical components such as inventory management, supply chain integration, sales data analytics, or more sophisticated digital marketing methodologies. In contemporary marketplace rivalry, it is imperative for business practitioners to possess a comprehensive understanding of digital advertising optimization, traffic management for online stores, affiliate marketing, and strategies for enhancing conversion rates to achieve sustainable sales growth. Consequently, while entrepreneurs may have acquired certain technological competencies, they frequently lack the capability to leverage such technologies effectively to yield substantial increases in sales. This scenario underscores that the efficacy of training is contingent not solely upon the volume of training undertaken, but also upon the caliber and pertinence of the instructional content relative to the exigencies of digital commerce. These observations align with the assertions of Mora-Monge et al. (2023), who underscore the significance of integrating technology within business operations. Furthermore, Okafor and Chia (2024) elucidate that suboptimal digital strategies can constrain the efficiency enhancements of small enterprises.

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The adverse implications of technology training on marketplace revenue highlight that the digital training afforded to MSMEs is insufficiently equipped to augment business performance. In practical terms, some training initiatives prioritize the introduction of technology over the execution of digital business strategies aimed at boosting sales. Business operators frequently acquire only foundational technical skills, such as the operation of marketplaces and basic content generation, while lacking the proficiency to analyze consumer behavior, manage product distribution, or utilize digital promotional features to their fullest potential. Moreover, generalized training programs often fail to tailor their content to the specific needs of various business types, resulting in diminished effectiveness during real-world application. Consequently, the technology employed has not yielded a meaningful impact on the enhancement of business revenue. This assertion is corroborated by Zhang et al. (2025), who indicate that small businesses undergoing digital transformation continue to encounter multiple obstacles to technological adaptation. Samuel et al. (2025) further contend that a comprehensive overhaul of business strategy is necessary for digital transformation to enhance competitive advantage effectively.

CONCLUSION

Based on the empirical findings of the study, the factors of production and the degree of technological openness exert distinct influences on the augmentation of revenue for small and medium-sized enterprises (SMEs) operating within marketplaces in Indonesia. The labor variable was demonstrated to possess a positive and statistically significant effect on the enhancement of revenue derived from marketplaces, whereas the capital variable exhibited no statistically significant influence. The findings indicate that, within the context of e-commerce activities, the caliber of operational management and the productivity of labor serve as critical determinants in bolstering the performance of digital enterprises. Furthermore, the study elucidates that digital variables do not invariably confer a direct positive impact on the revenues of micro, small, and medium enterprises (MSMEs). Prolonged online endeavors and technological training have, in fact, manifested a negative influence on the revenue growth of marketplaces within MSMEs.

The observed negative influence posits that digital experience and technological training do not automatically enhance business performance unless accompanied by adaptability and the implementation of appropriate digital strategies. In practical terms, numerous SMEs continue to encounter constraints in optimizing their utilization of technology, particularly in areas such as digital marketing management, market analysis, and the integration of operations based on digital platforms. These findings underscore that the process of digital transformation in SMEs is contingent not solely upon access to technology but also upon the readiness of these enterprises to adapt their business strategies to the continuously evolving dynamics of the market. Consequently, there exists a necessity for digital training that is more application-oriented and aligned with the operational exigencies of MSMEs, in order to ensure that the deployment of technology yields a more efficacious impact on the enhancement of business income. This research is constrained by its reliance on cross-sectional data, thereby failing to capture the dynamic changes in MSME behavior over time. Additionally, the digital variables examined in this study are limited to online business

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experience and technology training, thereby omitting other dimensions such as the intensity of marketplace utilization or the strategic implementation of digital marketing.

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