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Determinants of MSME Income in Padang City: An Economic Perspective

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ABSTRACT

This study aims to examine the factors influencing the income of Micro, Small, and Medium Enterprises (MSMEs) in Padang City from an economic perspective. The variables analyzed include business capital, education level, and digital technology as the main determinants of income. In addition, digital technology is also positioned as a mediating variable that links the effects of business capital and education on income. This research employs a quantitative approach using multiple linear regression analysis and mediation testing through the Sobel test. Data were collected from 200 MSME actors in Padang City using questionnaires. The results show that business capital and education have a positive and significant effect on income. Digital technology is also proven to have a significant influence and acts as a mediator in the relationship.
The findings indicate that the increase in MSME income is not only determined by traditional economic factors but also by the level of digital technology utilization. Therefore, improving digital literacy and access to technology is an important aspect in strengthening MSME competitiveness.

Keywords: Income, Business Capital, Education, Digital Technology.

INTRODUCTION

Research on the determinants of Micro, Small, and Medium Enterprises (MSME) income has significantly developed over the past decade. From a classical economic perspective, business income is influenced by key production factors such as capital, labor, and the quality of human resources. Early studies suggest that access to capital plays a central role in enhancing production capacity and business scale, which subsequently leads to higher income (Tambunan, 2019; Beck et al., 2015). In addition, labor contributes importantly to productivity improvement, particularly within small-scale and informal economic sectors (Todaro & Smith, 2020).

Along with global economic development, research attention has increasingly shifted toward integrating internal factors with external dynamics, especially digital technology. Digital transformation has reshaped MSME operations, particularly in marketing, distribution, and operational efficiency. Studies by OECD (2021) and World Bank (2020) indicate that the adoption of digital technologies, such as e-commerce and digital marketing, enhances market access and competitiveness. Empirical findings also reveal that digital technology utilization is positively associated with business performance and income growth (Suryani & Hendryadi, 2020; Bharadwaj et al., 2016).

More recent literature emphasizes an integrative approach that combines traditional production factors with digital transformation within a unified analytical framework. The OECD (2024) highlights that digitalization has become a strategic component in strengthening MSME competitiveness in the global economy. Furthermore, methodological advancements in economic research have led to greater use of statistical power analysis and modern econometric techniques to produce more accurate and unbiased estimates (Jenkins & Quintana-Ascencio, 2020; Dhiman et al., 2023; Kline, 2021).

However, several research gaps remain. First, many previous studies focus on direct relationships between independent variables and MSME income without considering mediating variables that could better explain the underlying mechanisms. Second, the integration of classical production factors with digital variables in a single analytical model is still limited, particularly in regional economic contexts with unique characteristics. Third, from a methodological perspective, many studies still rely on conventional sample size determination methods, which may lead to less optimal estimation results. The application of modern econometric approaches based on power analysis is still relatively rare in MSME research in Indonesia. Fourth, empirical studies focusing specifically on MSMEs in West Sumatra remain limited, despite the region's distinctive economic characteristics dominated by trade, family-based entrepreneurship, and strong local business culture.

Based on these gaps, this study aims to develop an analytical model that integrates production factors namely business capital and labor—with intervening variables in the context of the digital economy. In addition, this research employs a modern econometric quantitative approach to ensure the validity and reliability of the estimation results. Therefore, this study is expected to contribute both empirically and theoretically to the MSME literature, particularly in providing a more comprehensive, contextual, and relevant understanding of income determinants in the era of digital economic transformation.

LITERATUR REVIEW

This literature review examines key theories and empirical studies on the determinants of MSME income, focusing on business capital, education, and digital technology. It draws on classical economic, human capital, and production theories, which highlight the role of capital and human resources in shaping business performance. Recent research further emphasizes the growing importance of digital technology in improving productivity, expanding market access, and enhancing competitiveness.

Empirical evidence shows that business capital and education significantly influence MSME income, while digital technology not only supports business activities but also acts as a mediating variable that strengthens these relationships. Overall, this review provides a theoretical basis for understanding how traditional factors and digital transformation jointly affect MSME income.

Income

In economic theory, income is the outcome of a production process that involves the combination of various input factors such as capital, labor, and technology. Classical production theory emphasizes that an increase in the utilization of these production factors leads to higher output, which in turn contributes to greater income (Mankiw, 2018; Todaro & Smith, 2020). In modern economic thought, the relationship between inputs and outputs is not solely determined by the quantity of production factors, but also by efficiency and innovation. Technology plays a crucial role in enhancing productivity by improving production efficiency and expanding market access (Bharadwaj et al., 2016). Furthermore, endogenous growth theory highlights that knowledge accumulation and innovation are key drivers of long-term income growth (Romer, 2018).

Business Capital

Business capital is one of the primary determinants in increasing production capacity and business scale. The availability of capital enables MSME actors to enhance investment, expand operations, and adopt more efficient technologies. Empirical studies indicate that access to financing has a positive and significant relationship with MSME performance and income (Beck et al., 2015; Tambunan, 2019). In developing countries, limited access to capital remains a major constraint on small business growth (World Bank, 2020). Recent studies further suggest that financial inclusion and digital credit access can

strengthen MSMEs' ability to develop their businesses and achieve sustainable income growth (OECD, 2021; Asian Development Bank, 2022).

Education

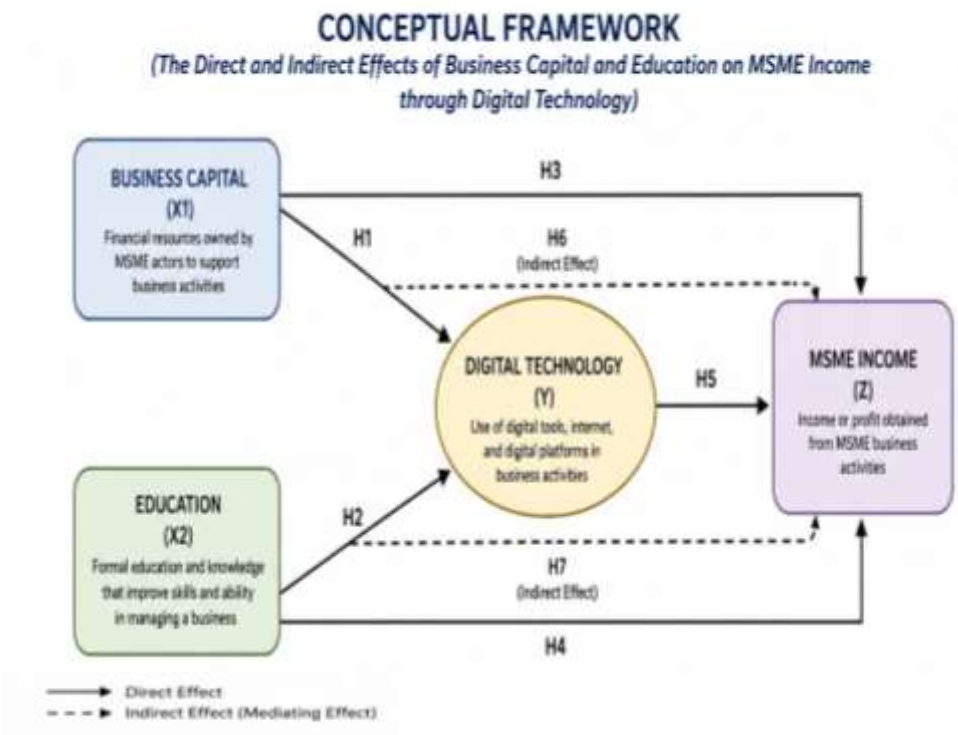
The educational level of business owners is closely related to managerial ability, decision-making skills, and adaptability to changing business environments. Human capital theory explains that investment in education enhances individual productivity, which ultimately leads to higher income (Becker, 2015). In the MSME context, entrepreneurs with higher educational attainment tend to manage resources more efficiently and respond more effectively to market opportunities and innovation (Suryani & Hendryadi, 2020). Recent studies also show that financial literacy and digital literacy, as components of educational capacity, significantly influence small business success (OECD, 2021; World Bank, 2022).

Digital Technology

The rapid development of digital technology has significantly transformed the MSME business landscape. Digitalization enables business actors to improve operational efficiency, expand market reach, and enhance competitiveness. The use of e-commerce platforms, digital marketing, and digital payment systems has become an important strategy for increasing MSME income (OECD, 2021). Research indicates that the adoption of digital technology is positively associated with business performance and income growth (Bharadwaj et al., 2016; Suryani & Hendryadi, 2020). More recent developments suggest that digital transformation is not merely a supporting tool but a strategic factor in building competitive advantage (OECD, 2024). Moreover, the integration of technology into MSME business models has been proven to improve business resilience in facing global economic changes (World Bank, 2022).

CONCEPTUAL FRAMEWORK

The conceptual framework of this study explains how business capital (X_1) and education (X_2), as independent variables, affect MSME income (Z), both directly and indirectly through digital technology (Y) as an intervening variable. The model is theoretically grounded in a combination of production theory and the digital economy perspective, emphasizing that income growth is influenced not only by traditional production factors but also by the ability of entrepreneurs to adopt and effectively use technology.



Hypotheses

H1: Business capital (X1) has a positive and significant effect on digital technology (Y).
H2: Education (X2) has a positive and significant effect on digital technology (Y).
H3: Business capital (X1) has a positive and significant effect on income (Z).
H4: Education (X2) has a positive and significant effect on income (Z).
H5: Digital technology (Y) has a positive and significant effect on income (Z).
H6: Business capital (X1) has a positive and significant effect on income (Z) through digital technology (Y) as a mediating variable.
H7: Education (X2) has a positive and significant effect on income (Z) through digital technology (Y) as a mediating variable.

METHOD

This study employs a quantitative approach using multiple linear regression analysis to examine the relationships among independent variables, an intervening variable, and a dependent variable. The population consists of all MSMEs in Padang City in 2024, totaling 47,692 business units. A sample of 200 respondents was determined using a statistical power approach ($\alpha = 0.05$; power = 0.80). The sampling technique applied is purposive sampling, with criteria that MSMEs must have been operating for at least two years and maintain income records. The data used are primary data collected through questionnaires. Data analysis includes classical assumption tests, t-tests, and F-tests, as well as mediation analysis conducted through regression stages.

The Sobel test is used to assess the significance of the indirect effect of independent variables on the dependent variable through the intervening variable. The calculation is based on regression coefficients and their standard errors obtained from the analysis. If the Z-value exceeds 1.96 ($\alpha = 0.05$), the intervening variable is considered to have a significant mediating effect. In this study, the Sobel test is applied to evaluate the role of digital technology as an intervening variable in the relationship between business capital and education on MSME income.

RESULT AND DISCUSSION

1. Classical Assumption Tests

The classical assumption tests were conducted to ensure that the regression model meets the requirements of a valid and reliable estimation. These tests include normality, multicollinearity, and heteroskedasticity assessments.The normality test results indicate that the residuals are normally distributed, as evidenced by the Kolmogorov–Smirnov significance value of 0.432, which exceeds the threshold of 0.05. This confirms that the normality assumption is satisfied.

Table 1. Classical Assumption Tests

No.	Test	Indicator	Criteria	Result	Conclusion
1	Normality Test	Kolmogorov-Smirnov Sig. (2-tailed)	Sig. > 0.05	0.432	Normally distributed
2	Multicollinearity Test	Tolerance	> 0.10	0.742	No multicollinearity
		VIF	< 10	1.348	No multicollinearity
3	Heteroskedasticity Test	Sig. (Glejser)	Sig. > 0.05	0.278	No heteroskedasticity
a. Dependent Variabel Digital Technologi					

In terms of multicollinearity, the findings show that all independent variables have tolerance values above 0.10 (0.742) and Variance Inflation Factor (VIF) values below 10 (1.348). These results suggest that there is no strong correlation among the independent variables, indicating the absence of multicollinearity in the model.

Furthermore, the heteroskedasticity test using the Glejser method reveals a significance value of 0.278, which is greater than 0.05. This implies that the variance of the residuals remains constant, meaning that the model does not suffer from heteroskedasticity.

Overall, the results of these tests confirm that the regression model satisfies all classical assumptions and is therefore appropriate and reliable for further analysis.

2. Regression Results

The first regression analysis reveals that business capital (X_1) and education (X3) have a positive and statistically significant effect on digital technology (Y). The coefficients for both variables are 0.356 and 0.421, respectively, with a significance level of 0.000 (< 0.05). This indicates that increases in business capital and the education level of MSME actors significantly encourage greater adoption of digital technology. The coefficient of determination (R^2) of 0.412 suggests that 41.2% of the variation in digital technology can be explained by these two variables, while the remaining portion is influenced by other factors outside the model. Furthermore, the F-value of 63.912 with a significance level of 0.000 confirms that the regression model is statistically appropriate and reliable for analysis.

1. Regression Results: Business Capital And Education On Digital Technology

The regression results presented in Table 1 indicate that both business capital (X_1) and education (X_2) have a positive and significant effect on digital technology (Y). The regression coefficient for business capital is 0.356 with a significance value of 0.000 ($p < 0.05$), meaning that an increase in business capital is associated with a corresponding rise in digital technology adoption. The t-statistic value of 4.944 further confirms that this relationship is statistically significant. Similarly, the education variable (X_2) shows a regression coefficient of 0.421 with a significance value of 0.000 ($p < 0.05$) and a t-statistic of 5.198. This indicates that education has a stronger influence on digital technology adoption compared to business capital. This is also reflected in the standardized beta coefficient of 0.358, which is higher than that of business capital (0.312).

The constant value of 5.214 represents the level of digital technology when the independent variables are held constant, suggesting that MSMEs already possess a baseline level of technology use even without improvements in capital and education. Overall, these findings suggest that both business

capital and education are important determinants in enhancing digital technology adoption among MSMEs. Business capital provides the financial resources needed to access technology, while education improves entrepreneurs' ability to understand and effectively utilize it. Therefore, the combination of both factors plays a crucial role in driving MSME digital transformation.

Table 2. Coefficients (Regression Results)

Model	Unstandardized B	Std. Error	Standardized Beta	t	Sig.
(Constant)	5.214	1.102	–	4.731	0.000
Business Capital (X_1)	0.356	0.072	0.312	4.944	0.000
Education (X_2)	0.421	0.081	0.358	5.198	0.000

Source: SPSS data processing, 2026.

Table 3 presents the results of the regression model summary. The coefficient of determination (R^2) is 0.412, indicating that 41.2% of the variation in digital technology adoption can be explained jointly by the independent variables included in the model. The remaining 58.8% is attributed to other factors not examined in this study. The correlation coefficient (R) of 0.642 suggests a moderately strong relationship between the independent variables and digital technology. This indicates that the variables included in the model have a meaningful association with the dependent variable.

Table 3. Model Summary

R	R Square	Adjusted R Square	Std. Error
0.642	0.412	0.406	2.134

Source: SPSS data processing, 2026

Furthermore, the R Square value of 0.412 confirms the explanatory power of the model, while the Adjusted R Square of 0.406 shows only a slight reduction after adjusting for the number of predictors. This suggests that the model is relatively stable and not significantly affected by overfitting. In addition, the standard error of the estimate is 2.134, which reflects the average deviation of the observed values from the regression line. This relatively low value indicates that the model provides a reasonably accurate prediction of digital technology adoption among MSMEs.

Table 4 presents the results of the ANOVA test for the regression model. The computed F-statistic is 63.912 with a significance level of 0.000 ($p < 0.05$), indicating that the model is statistically significant. This finding suggests that the independent variables—business capital and education collectively exert a significant influence on digital technology adoption.

Table 4. ANOVA

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	582.314	2	291.157	63.912	0.000
Residual	830.562	197	4.217		
Total	1412.876	199			

Source: SPSS data processing, 2026

The regression Sum of Squares amounts to 582.314, reflecting the portion of total variation in digital technology that is explained by the model. In contrast, the residual Sum of Squares of 830.562 represents the unexplained variation attributable to factors not included in the analysis. This implies that, although the model demonstrates satisfactory explanatory power, there remain additional determinants outside the model that contribute to variations in digital technology adoption among MSMEs. Overall, the ANOVA results in Table 4 confirm that the regression model is both statistically valid and reliable for analytical purposes. Consequently, the model is appropriate for hypothesis testing and for drawing empirically grounded conclusions regarding the relationships among the variables.

2. Regression Results: Business Capital (X_1), Education (X_2), Digital Technology (Y) on Income (Z)

The second regression model examines the simultaneous effects of business capital (X_1), education (X_2), and digital technology (Y) on MSME income (Z). The results indicate that all three independent variables have a positive and statistically significant influence on income, confirming that improvements in these factors are associated with higher levels of MSME earnings. The regression coefficient for business capital (X_1) is 0.298 with a significance value of 0.000, suggesting that greater access to capital enables MSMEs to expand production capacity and business operations, which ultimately increases income. Similarly, education (X_2) shows a positive coefficient of 0.215 with a significance level of 0.005, indicating that higher educational attainment enhances managerial ability, decision-making, and business efficiency, thereby contributing to improved income performance.

Among all variables, digital technology (Y) demonstrates the strongest effect on MSME income, with a coefficient of 0.407 and a significance value of 0.000. This finding highlights that the adoption of digital tools and platforms plays a crucial role in driving business growth by improving operational efficiency, expanding market access, and strengthening customer engagement. In addition, the standardized beta coefficients further confirm the relative importance of each variable. Digital technology has the highest beta value ($\beta = 0.421$), followed by business capital ($\beta = 0.276$) and education ($\beta = 0.201$). This indicates that, although all variables contribute positively, digital technology is the most dominant determinant of MSME income in the model.

The constant value of 3.876 represents the baseline income level when all independent variables are held constant, reflecting the minimum income condition of MSMEs without the influence of capital, education, and digital technology. Overall, these findings suggest that MSME income is shaped by a combination of traditional economic factors and modern digital transformation. However, digital technology plays a central and more influential role in enhancing business performance, making it a key driver of income growth in the digital economy era.

Table 4. Coefficients

Model	Unstandardized B	Std. Error	Standardized Beta	t	Sig.
(Constant)	3.876	1.254	–	3.091	0.002
Business Capital (X_1)	0.298	0.069	0.276	4.319	0.000
Education (X_2)	0.215	0.075	0.201	2.867	0.005
Digital Technology (Y)	0.407	0.062	0.421	6.565	0.000*

Source: SPSS data processing, 2026.

Table 5 presents the summary of the regression model estimating the determinants of MSME income. The coefficient of determination (R^2) is 0.534, indicating that 53.4% of the variation in MSME income can be explained collectively by business capital, education, and digital technology. This suggests that the model demonstrates a moderate to strong level of explanatory power in capturing income differences among MSMEs. The correlation coefficient (R) of 0.731 signifies a strong positive relationship between the independent variables and MSME income, implying that the predictors included in the model are closely associated with income performance.

Table 5. Model Summary

R	R Square	Adjusted R Square	Std. Error
0.731	0.534	0.527	2.487

Source: SPSS data processing, 2026.

Furthermore, the Adjusted R Square value of 0.527 shows that, after accounting for the number of explanatory variables, approximately 52.7% of the variation in income remains explained by the model. This indicates that the model is relatively stable and does not suffer from substantial overfitting. In addition, the standard error of the estimate is 2.487, representing the average deviation between the observed and predicted values of MSME income. This moderately low value suggests that the model provides a reasonably accurate estimation of income levels, although some variation is still influenced by factors outside the scope of the model.Overall, the results presented in Table 5 confirm that the regression model is reliable and sufficiently robust for further analysis and hypothesis testing.

Table 6 presents the results of the F-test used to evaluate the overall significance of the regression model. The calculated F-statistic of 48.021, with a significance level of 0.000 ($p < 0.05$), indicates that the model is statistically significant. This demonstrates that the independent variables business capital, education, and digital technology—jointly exert a significant effect on MSME income. These findings suggest that the model is capable of explaining variations in income when all predictors are considered simultaneously. In addition to conventional production inputs such as capital and education, digital technology emerges as a critical factor in improving business outcomes. The inclusion of digital technology in the model highlights its important role in supporting productivity, efficiency, and income generation among MSMEs.

Table 6. ANOVA

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	892.145	3	297.382	48.021	0.000
Residual	778.654	196	3.973		
Total	1670.799	199			

Source: SPSS data processing, 2026.

Moreover, the results imply that the ability of entrepreneurs to adopt and effectively utilize digital tools substantially enhances their business performance. Compared to relying solely on traditional factors, the integration of digital technology provides a more substantial contribution to income growth. Overall, the F-test results confirm that the regression model is robust and appropriate for analysis. They also emphasize the importance of incorporating digital technology into business operations, as it enables MSMEs to improve operational efficiency, expand market access, and achieve better financial performance.

Mediation Test Using the Sobel Test

To examine the significance of the indirect effects within the research model, the Sobel test was employed as a statistical approach for mediation analysis. This test is used to determine whether the intervening variable, namely digital technology (Y), significantly mediates the relationship between the independent variables (business capital (X_1) and education (X_2) and the dependent variable (MSME income/Z). In this context, the Sobel test provides an assessment of whether the influence of the independent variables on income occurs not only directly, but also indirectly through the mediation mechanism. The general formula of the Sobel test is expressed as follows:

$$Z = \frac{a \times b}{\sqrt{b^2 S_a^2 + a^2 S_b^2}}$$

Through these parameters, the Sobel test calculates the significance of the indirect effect by considering both the strength of the relationships and their respective standard errors. This allows for a more rigorous evaluation of whether digital technology functions as a meaningful mediating mechanism in influencing MSME income.

Where:

a = coefficient of the path from the independent variable to the mediator
b = coefficient of the path from the mediator to the dependent variable
S^2a = standard error of coefficient a
S^2b = standard error of coefficient b

1. Mediation of Business Capital (X1) on Income (Z) through Digital Technology (Y)

Based on the regression analysis, the path coefficient from business capital (X1) to digital technology (Y) is 0.356 with a standard error of 0.072. Meanwhile, the path coefficient from digital technology (Y) to MSME income (Z) is 0.407 with a standard error of 0.062. These values indicate that both relationships are positive and contribute to the mediating mechanism within the model. To test the significance of the indirect effect, a Sobel test was conducted using the given coefficients and standard errors. The results of the Sobel calculation yield a Z-value of 3.96. This value exceeds the critical Z-value of 1.96 at the 5% significance level, indicating that the mediating effect is statistically significant.

This finding confirms that digital technology plays an important mediating role in the relationship between business capital and MSME income. In other words, business capital not only has a direct effect on income but also indirectly influences income through its impact on the adoption and utilization of digital technology. This suggests that MSMEs with higher levels of capital are more likely to invest in digital tools and technologies, which enhance business efficiency, market expansion, and operational performance, ultimately leading to higher income levels.

Given:

a ($X_1 \rightarrow Y$) = 0.356
Sa = 0.072
b ($Y \rightarrow Z$) = 0.407
Sb = 0.062

Sobel Calculation:

$$Z = \frac{0.356 \times 0.407}{\sqrt{(0.407^2 \times 0.072^2) + (0.356^2 \times 0.062^2)}}$$

$$Z = \frac{0.145}{\sqrt{0.000858 + 0.000487}}$$

$$Z = \frac{0.145}{\sqrt{0.001345}} = \frac{0.145}{0.0366} = 3.96$$

Given that the coefficient for the relationship between business capital (X1) and digital technology (Y) is a = 0.356 with a standard error of Sa = 0.072, and the coefficient for the relationship between digital technology (Y) and income (Z) is b = 0.407 with a standard error of Sb = 0.062, the Sobel test was conducted to examine the significance of the indirect effect. The Sobel calculation produces a Z-value of 3.96. This value is substantially higher than the critical Z-value of 1.96 at the 5% significance level, indicating that the indirect effect is statistically significant. Therefore, it can be

concluded that digital technology (Y) significantly mediates the relationship between business capital (X1) and MSME income (Z).

This result implies that business capital does not only influence income directly, but also plays an important indirect role by encouraging MSME actors to adopt and utilize digital technology. In other words, greater access to capital enables businesses to invest in digital tools, platforms, and systems, which in turn improve operational efficiency, expand market reach, and ultimately increase income.

Furthermore, this finding highlights that digital technology acts as a reinforcing mechanism in the relationship between capital and income. The presence of this mediating effect suggests that MSMEs with stronger capital are more likely to experience higher income growth when they effectively integrate digital technology into their business activities.

2. Mediation of Education (X2) on Income (Z) through Digital Technology (Y)

To examine the mediating role of variables in the research model, a Sobel test was conducted. This analysis aims to determine whether digital technology (Y) functions as a mediator in the relationship between education (X2) and MSME income (Z). In other words, the test evaluates whether the effect of education on income occurs not only directly but also indirectly through increased adoption and utilization of digital technology by MSME actors. The parameters used in the Sobel calculation are as follows: the coefficient of education on digital technology (a) is 0.421 with a standard error (Sa) of 0.081, while the coefficient of digital technology on income (b) is 0.407 with a standard error (Sb) of 0.062. These values are used to compute the Sobel test statistic in order to assess the significance of the indirect effect.

Based on the Sobel calculation, the resulting Z-value is greater than the critical value of 1.96 at the 5% significance level, indicating that the indirect effect is statistically significant. This finding confirms that digital technology effectively mediates the relationship between education and MSME income. This result implies that higher levels of education enhance the ability of MSME actors to understand, adopt, and utilize digital technology more effectively, which in turn contributes to increased income. Therefore, the role of education in improving income is not only direct but also strengthened through its influence on digital technology adoption.

$$Z = \frac{0.421 \times 0.407}{\sqrt{(0.407^2 \times 0.081^2) + (0.421^2 \times 0.062^2)}}$$

$$Z = \frac{0.171}{\sqrt{0.001086 + 0.000680}}$$

$$Z = \frac{0.171}{\sqrt{0.001766}} = \frac{0.171}{0.0420} = 4.07$$

The results of the Sobel test indicate that digital technology serves as a mediating variable in the relationship between business capital and education on MSME income. The Sobel Z-value for the effect of business capital on income through digital technology is 3.96, while the Z-value for the effect of education on income through digital technology is 4.07. Both values exceed the critical threshold of 1.96 at a 5% significance level, confirming that the mediating effects are statistically significant.

These findings suggest that digital technology plays an important intervening role in strengthening the influence of production factors on income. In other words, increases in business capital and education not only have a direct impact on income but also contribute indirectly by enhancing MSME actors' ability to adopt and utilize digital technology.

However, since the direct effects of the independent variables on income remain significant even after including the mediating variable, the mediation identified in this study is classified as partial mediation. This indicates that digital technology acts as a reinforcing factor rather than the sole pathway through which business capital and education influence MSME income.

CONCLUSION

Based on the empirical findings of this study, it can be concluded that MSME income in Padang City is significantly determined by a combination of traditional economic factors namely business capital and education and the contemporary factor of digital technology utilization. Each of these variables contributes both independently and interactively in shaping MSME performance within the evolving digital economy context.

First, business capital plays a fundamental role in enhancing MSME income. Adequate capital enables entrepreneurs to expand production capacity, improve operational efficiency, and increase business scale. This finding is consistent with production theory, which emphasizes capital as a core input in generating output and income. However, the results of this study further indicate that capital does not only function as a direct driver of income, but also indirectly strengthens income generation through its role in facilitating access to digital technology.

Second, education is proven to have a significant positive effect on MSME income. Higher levels of education improve entrepreneurs' cognitive abilities, managerial competence, and decision-making skills. Educated business owners are more capable of adapting to market changes, identifying business opportunities, and managing resources efficiently. Moreover, education also enhances digital literacy, which is increasingly essential in the current business environment. This allows MSME actors to better understand and utilize digital platforms, thereby increasing their business performance.

Third, digital technology emerges as the most dominant factor influencing MSME income in this study. The adoption of digital tools such as e-commerce platforms, digital marketing, and electronic payment systems significantly enhances market access, operational efficiency, and customer engagement. Digital technology not only directly increases income but also acts as a strategic enabler that strengthens the impact of both business capital and education. In other words, MSMEs that effectively integrate digital technology into their operations tend to achieve higher levels of competitiveness and income growth compared to those relying solely on conventional business practices.

Furthermore, the mediation analysis using the Sobel test confirms that digital technology plays a significant partial mediating role in the relationship between business capital and education on MSME income. This indicates that the influence of capital and education on income is not only direct but also occurs indirectly through the adoption of digital technology. MSMEs with higher capital and better educational backgrounds are more likely to adopt digital innovations, which in turn enhance productivity and profitability.

However, since the direct effects of business capital and education remain significant even after including the mediating variable, the mediation effect is classified as partial mediation. This suggests that digital technology functions as a reinforcing mechanism rather than a full substitution of traditional economic factors. Overall, this study highlights a fundamental shift in MSME development patterns. In the era of digital transformation, traditional production factors such as capital and education are no longer sufficient on their own to ensure optimal income growth. Instead, their effectiveness is significantly enhanced when combined with the adoption of digital technology. Therefore, MSME development strategies should adopt an integrated approach that simultaneously strengthens financial capacity, human capital, and digital capability.

In conclusion, the synergy between business capital, education, and digital technology forms a comprehensive framework for improving MSME income. Strengthening these three elements is essential for achieving sustainable business growth, enhancing competitiveness, and ensuring long-term resilience of MSMEs in the digital economy era.

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RECOMMENDATIONS

Based on the findings of this study, several recommendations can be proposed to enhance MSME income in Padang City. First, MSME actors are encouraged to optimize the use of digital technology in

their business operations. Utilizing digital platforms such as marketplaces, social media, and digital payment systems can help expand market reach, improve operational efficiency, and strengthen business competitiveness. In addition, entrepreneurs should continuously improve their digital literacy to keep up with evolving technologies and market trends.

Second, the government is expected to provide stronger and more consistent support in promoting MSME digital transformation. This support may include training programs and technical assistance in the use of digital tools, the development of digital infrastructure, and easier access to financing for MSMEs. Integrated programs that combine human resource development with technological support will significantly accelerate the digitalization process.

Third, educational institutions and related organizations should play an active role in improving human resource quality through technology-based entrepreneurship education and training. Curricula that integrate digital skills with entrepreneurial knowledge can help produce business actors who are adaptive, innovative, and competitive in the digital economy.

Finally, future researchers are recommended to expand this study by incorporating additional variables that may influence MSME income, such as innovation, market access, product quality, and the broader business environment. Further research could also be conducted in different regions or apply more advanced analytical methods to generate more comprehensive insights. Through strong collaboration among MSME actors, government, and educational institutions, efforts to increase MSME income are expected to become more effective and sustainable in the rapidly evolving digital economy.

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