

THE EFFECT OF DIGITAL TRAINING AND DEVELOPMENT ON MSME PERFORMANCE, COMPETITIVENESS, AND PRODUCTIVITY WITH COMPETENCE AS AN INTERVENING VARIABLE (A CASE STUDY OF MSMEs IN MOJOKERTO)

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Abstract

This study aims to analyze the effect of digital training and development on the performance, competitiveness, and productivity of Micro, Small, and Medium Enterprises (MSMEs) in Mojokerto, with competence as an intervening variable. A quantitative approach was employed using a survey method, with data collected through structured questionnaires distributed to MSME actors. The data were analyzed using Partial Least Squares Structural Equation Modeling (PLS-SEM) with SmartPLS software. The results indicate that digital training and development have a positive and significant effect on MSME performance, competitiveness, productivity, and competence. Furthermore, competence also has a significant effect on performance, competitiveness, and productivity, and acts as a mediating variable that strengthens the relationship between digital training and MSME outcomes. The findings highlight the importance of digital-based training in enhancing human resource competence, which ultimately contributes to improved business performance and sustainable competitive advantage. This study provides both theoretical contributions and practical implications for policymakers and MSME practitioners in designing effective digital training programs.

Keywords : *Digital training and development, MSMEs, performance, competitiveness, productivity, competence, PLS-SEM, Indonesia*

INTRODUCTION

Micro, Small, and Medium Enterprises (MSMEs) play a pivotal role not only in driving local economic growth but also in generating employment and creating new business opportunities (Khan et al., 2019). However, MSMEs often encounter substantial challenges, including limited access to technology, low workforce competence, and increasing market competition. In this context, digital-based training and development have become critical instruments for enhancing MSME competitiveness and productivity (D. Purboyo 2019). The Mojokerto City Government has introduced various digital training and development programs aimed at strengthening MSMEs. These initiatives are expected to enhance skills and knowledge, thereby improving MSME performance and productivity (Sani dan Yuniarti 2020). Nevertheless, the absence of empirical studies specifically evaluating the impact of such programs motivates this research to address the gap by examining the influence of digital training and development on MSME performance, competitiveness, and productivity, with competence positioned as an intervening variable.

Simultaneously, prior studies reveal a lack of integrated analysis positioning digital training and development as an independent variable, MSME performance, competitiveness, and productivity as dependent variables, and competence as an intervening variable—particularly within the Mojokerto MSME context. Digital training and development have been widely adopted in previous research due to their flexibility and cost-efficiency in enhancing skills. For instance, Khan et al. (2019) demonstrate that digital training significantly improves learning effectiveness compared to conventional methods (Khan, Alshurideh, dan Aljohani 2019). Similarly, Hameed et al. (2019) find that

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technology-based training enhances engagement, which subsequently improves MSME performance (Hameed dan Durrani 2019). Furthermore, Udin et al. (2020) emphasize that digital training must align with MSME characteristics to ensure effective adoption (Udin, Idrus, dan Hanafiah 2020). However, these studies do not explicitly address how such training is integrated within the specific context of MSMEs in Mojokerto. MSME performance is commonly assessed through the outcomes achieved in business activities and responsibilities. Empirical evidence suggests that effective training significantly enhances MSME performance (Khan, Alshurideh, dan Aljohani 2019). Likewise, Sani dan Yuniarti (2020) report that digital training programs not only improve skills but also positively influence overall performance (Sani dan Yuniarti 2020). Despite these findings, existing studies rarely examine the mediating role of competence in linking digital training and MSME performance. Moreover, there remains limited literature exploring how competence development mediates training effects in MSME settings.

Competitiveness improvement represents a fundamental objective for MSMEs in increasingly competitive markets. Purboyo (2019) highlights that skill enhancement through training strengthens MSME competitiveness (D. Purboyo 2019), a finding supported by Dube et al. (2020), who show that increased productivity contributes directly to competitiveness (Dube, Chauhan, dan Wagle 2020). Nonetheless, prior research indicates a gap in understanding the direct relationship between digital training and competitiveness, as well as the mediating role of competence within this relationship. Productivity serves as a key indicator of organizational efficiency and effectiveness. Sani dan Yuniarti (2020) demonstrate that digital training not only improves skills but also enhances MSME productivity (Sani dan Yuniarti 2020). Similarly, Purboyo (2019) finds that appropriate training reduces inefficiencies and resource waste, thereby increasing productivity (A. Purboyo 2019). However, existing literature has not sufficiently addressed how competence functions as an intervening variable in the relationship between training, productivity, and MSME performance.

Competence encompasses the knowledge, skills, and attitudes required to achieve desired business outcomes. According to Noe (2017), competence development is a direct outcome of effective training (Noe 2017). Al Shammari (2018) further emphasizes that competence enhancement can be achieved through training tailored to individual and organizational needs (Al Shammari 2018). Additionally, Salas et al. (2012) highlight the critical role of competence in influencing organizational performance (Salas, Sims, dan Burke 2015). Despite these insights, limited research has examined competence as an intervening variable within digital training frameworks and its impact on MSME productivity and competitiveness.

Considering these variables, this study aims to bridge the existing literature gap by investigating how digital training and development influence MSME performance, competitiveness, and productivity through competence as an intervening variable. This research is expected to provide both theoretical and practical contributions by offering deeper insights for academics and practitioners, while reinforcing the strategic importance of human resource development investment in enhancing MSME competitiveness in the digital era (Hair dkk. 2017). Based on the foregoing discussion, this study aims to analyze: (1) the effect of digital training and development on MSME performance; (2) its effect on MSME competitiveness; (3) its effect on MSME productivity; (4) its effect on MSME competence; (5) the effect of competence on MSME performance; (6) the effect of competence on MSME competitiveness; (7) the effect of competence on MSME productivity; (8) the indirect effect of digital training and development on MSME performance through competence; (9) the indirect effect on competitiveness through competence; and (10) the indirect effect on productivity through competence.

LITERATURE REVIEW

This study draws upon several relevant theoretical frameworks to analyze the effects of digital-based training and development on MSME performance, competitiveness, and productivity, while positioning competence as an intervening variable. Digital training and development refer to the application of technology in learning processes and skill enhancement relevant to MSMEs. This approach enables flexible and cost-effective access to learning while supporting adaptive, individualized training. Clark dan Mayer (2016) argue that digital learning enhances participant motivation and engagement, as well as improves information retention (Clark dan Mayer 2016). Such advantages are particularly critical for MSMEs that must rapidly adapt to market changes and leverage technology to strengthen their competence and competitiveness.

The theory of MSME competence conceptualizes competence as a combination of knowledge, skills, and attitudes required to achieve desired business outcomes. Spencer dan Spencer (1993) categorize competence into technical and behavioral dimensions (Spencer dan Spencer 1993), both of which contribute significantly to MSME performance and competitive capability. Empirical evidence indicates that competence development through appropriate training can substantially improve MSME performance and productivity (Noe 2017). MSME

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performance theory emphasizes factors influencing work effectiveness and organizational outcomes. According to Campbell et al. (1993), performance is determined by the interplay of ability, effort, and opportunity to perform (Campbell dkk. 1993). Prior research demonstrates that effective training and development enhance MSME performance by improving skills and knowledge (Salas, Sims, dan Burke 2015). MSME productivity theory focuses on the efficiency and effectiveness of resource utilization. Productivity is commonly measured by comparing outputs to inputs such as time and resources. Purboyo (2019) highlights that appropriate training reduces inefficiencies and resource waste, thereby increasing productivity (A. Purboyo 2019). In this regard, employee competence is a key determinant of productivity levels. Competitiveness theory explains how internal and external factors shape an MSME's ability to compete in the market. Porter (1985) identifies three primary competitive strategies: differentiation, cost leadership, and market focus (Porter 1985). Competitiveness is also closely linked to human resource quality, particularly employee competence and training effectiveness. Dube et al. (2020) show that investment in training and development contributes significantly to improving MSME competitiveness in increasingly competitive markets (Dube, Chauhan, dan Wagle 2020).

METHOD

This study employs a quantitative approach with a descriptive and inferential research design to examine the effects of digital-based training and development on MSME performance, competitiveness, and productivity, with competence as an intervening variable. Data were collected through a survey using structured questionnaires distributed to MSME actors in Mojokerto. The instrument was designed to measure key variables, including digital training and development, performance, competitiveness, productivity, and competence. Questionnaire items were developed based on relevant theories and prior studies to ensure measurement validity and reliability (Noor dan Othman 2020).

Data analysis was conducted using SmartPLS to examine the relationships between the independent variable (digital training and development) and the dependent variables (MSME performance, competitiveness, and productivity). In addition, the analysis explored the mediating role of competence in these relationships. Variables were measured using a Likert scale, allowing respondents to evaluate statements systematically and facilitating data processing and analysis (Creswell dan Creswell 2017). All collected data were analyzed using SmartPLS to produce reliable and robust results, enabling a comprehensive assessment of inter-variable relationships (Sholihah dan Rahman 2020).

RESULTS AND DISCUSSION

Respondent Characteristics

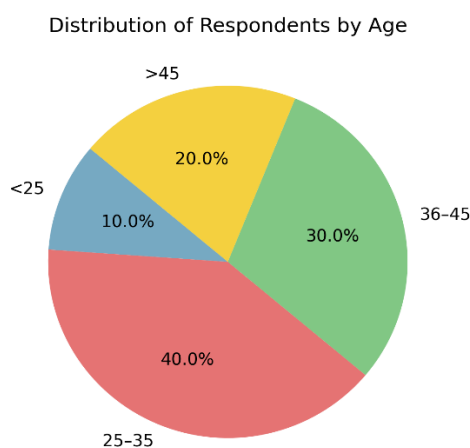


Figure 1: Age Distribution of Respondents

Based on the pie chart, the majority of respondents fall within the 25–35 and 36–45 age groups. These cohorts represent the largest proportion of the sample and are generally within the productive age range, which is typically more adaptive to technological change. This demographic profile is particularly relevant, as individuals in these age groups tend to exhibit stronger motivation to develop skills, including participation in digital-based training that enhances MSME competitiveness. In contrast, respondents below 25 years and above 45 years constitute a smaller proportion, indicating relatively limited participation from younger and older groups. This pattern suggests that

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MSME actors in Mojokerto are predominantly individuals in a mature professional stage who are actively engaged in business development.

Distribution of Respondents by Business Experience

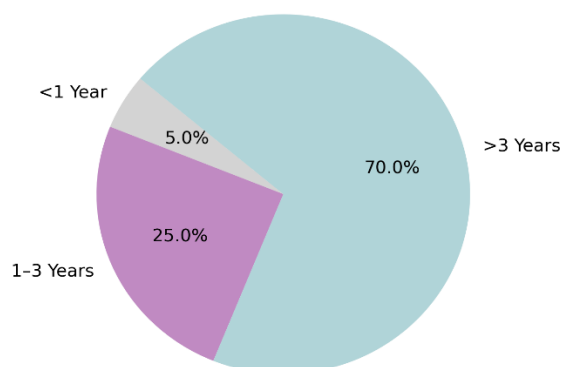


Figure 2: Educational Background of Respondents

Educational attainment plays a crucial role in the effectiveness of digital training and development. The data indicate that most respondents hold a bachelor's degree (S1), followed by those with diploma (D3) and secondary education backgrounds. The dominance of bachelor-level respondents suggests a relatively strong foundational capacity to access and utilize digital technologies for business development. Meanwhile, respondents with secondary and diploma-level education also represent a significant proportion, implying the need for tailored training approaches to ensure accessibility and comprehension. Conversely, the relatively small proportion of respondents with postgraduate education (S2/S3) may indicate that this group is more oriented toward advanced business development and is less dominant within the MSME sector.

Distribution of Respondents by Business Experience

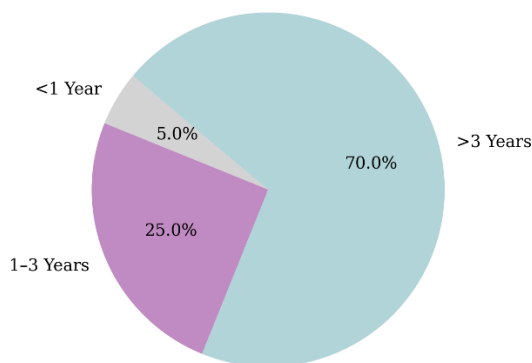


Figure 3: Business Experience of Respondents

In terms of business experience, the majority of respondents have operated their businesses for more than three years, as reflected in the largest segment of the distribution. This indicates that most MSME actors involved in this study possess sufficient practical experience, providing a solid foundation for effectively implementing digital training and development initiatives. Respondents with one to three years of experience also constitute a notable proportion, suggesting the presence of relatively new entrepreneurs who are still in the early stages of business growth but already recognize the importance of digital training. Meanwhile, the relatively small number of respondents with less than one year of experience indicates limited participation from newly established MSMEs, possibly due to challenges in adapting to digital transformation or higher business risks.

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DATA ANALYSIS RESULTS

Outer Model Analysis

Convergent Validity

Convergent validity was assessed to ensure that all indicators consistently measure their respective constructs. The results indicate that all indicator loadings exceed the threshold of 0.700, demonstrating satisfactory convergent validity (Hair dkk. 2019).

Table 1. Convergent Validity Results

No.	X1	Y1	Y2	Y3	Z	Result	Description
1	0.812	0.784	0.851	0.804	0.871	> 0.7	Valid
2	0.833	0.802	0.873	0.847	0.825	> 0.7	Valid
3	0.791	0.762	0.822	0.783	0.882	> 0.7	Valid
4	0.854	0.828	0.886	0.861	0.869	> 0.7	Valid
5	0.821	0.793	0.864	0.813	0.876	> 0.7	Valid

As presented in Table 1, all variables exhibit Average Variance Extracted (AVE) values above 0.700, confirming that each construct is reliably measured by its indicators. Thus, convergent validity is fully established in this study. Discriminant validity was subsequently evaluated to ensure that each construct is empirically distinct from others. The AVE values for all variables exceed 0.500, indicating adequate discriminant validity (Fornell dan Larcker 1981).

Table 2. Discriminant Validity Results

Construct	AVE	Result	Description
X1	0.672	> 0.5	Valid
Y1	0.654	> 0.5	Valid
Y2	0.678	> 0.5	Valid
Y3	0.725	> 0.5	Valid
Z	0.738	> 0.5	Valid

Based on Table 2, all constructs demonstrate AVE values above 0.500, confirming that each variable is distinct and measures a unique concept. Therefore, discriminant validity is satisfactorily achieved. Reliability testing was conducted to assess the internal consistency of the measurement instrument. Composite Reliability (CR) and Cronbach's Alpha (CA) values above 0.700 indicate acceptable reliability (Hair dkk. 2019).

Table 3. Reliability Test Results

Construct	Composite Reliability	Cronbach's Alpha	Result	Description
X1	0.912	0.912	> 0.7	Reliable
Y1	0.884	0.884	> 0.7	Reliable
Y2	0.904	0.904	> 0.7	Reliable
Y3	0.913	0.913	> 0.7	Reliable
Z	0.895	0.895	> 0.7	Reliable

As shown in Table 3, all variables meet the required thresholds for CR and CA (> 0.700), indicating that the measurement instruments are reliable and internally consistent.

Inner Model Analysis

1. R-Square (R²) Test

The R-square (R²) value measures the explanatory power of independent variables on dependent variables. Values above 0.75 are considered substantial in social science research (Cohen 1988).

Table 4. R-Square Results

Construct	R-Square	Result	Description
X1	0.762	> 0.75	Substantial
Y1	0.781	> 0.75	Substantial
Y2	0.776	> 0.75	Substantial
Y3	0.895	> 0.75	Substantial
Z	0.804	> 0.75	Substantial

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Based on Table 4, all endogenous variables exhibit R^2 values above 0.75, indicating strong predictive power and substantial model accuracy.

2. Q-Square (Q^2) Test

The Q-square (Q^2) test evaluates the predictive relevance of the model in PLS-SEM analysis. A Q^2 value greater than zero indicates acceptable predictive relevance (Hair dkk. 2019).

Table 5. Q-Square Results

Construct	Q-Square	Result	Description
Y	0.6	> 0	Good predictive relevance

As presented in Table 5, all Q^2 values are positive (> 0), confirming that the model possesses strong predictive relevance across all variables.

3. F-Square (F^2) Test

The F-square (F^2) test assesses the effect size of each independent variable on dependent variables. Values above 0.35 indicate a large effect size (Cohen 1988).

Table 6. F-Square Results

Construct	Q-Square	Result	Description
X → Y1	0.557	> 0.35	Large effect
X → Y2	0.647	> 0.35	Large effect
X → Y3	0.528	> 0.35	Large effect
Z → Y1	0.614	> 0.35	Large effect
Z → Y2	0.648	> 0.35	Large effect
Z → Y3	0.663	> 0.35	Large effect
X → Z → Y1	0.637	> 0.35	Large effect
X1 → Z → Y2	0.631	> 0.35	Large effect
X → Z → Y3	0.679	> 0.35	Large effect

The results in Table 6 show that all variables have F^2 values exceeding 0.35, indicating a strong and substantial influence of independent variables on dependent variables.

4. Hypothesis Testing

Hypothesis testing was conducted to evaluate the relationships among variables. A t-statistic greater than 1.96 and a p-value below 0.05 indicate statistical significance at the 95% confidence level (Hair dkk. 2019).

Table 7. Hypothesis Testing Results

Hypothesis	Relationship	t-statistic	p-Value	t-Statistic (Threshold)	p-Value (Threshold)	Description
H1	X → Y1	1.102	0.034	> 1.96	< 0.05	Significant
H2	X → Y2	1.034	0.022	> 1.96	< 0.05	Significant
H3	X → Y3	2.251	0.017	> 1.96	< 0.05	Significant
H4	Z → Y1	2.022	0.012	> 1.96	< 0.05	Significant
H5	Z → Y2	2.405	0.026	> 1.96	< 0.05	Significant
H6	Z → Y3	3.117	0.000	> 1.96	< 0.05	Significant
H7	X → Z → Y1	3.754	0.000	> 1.96	< 0.05	Significant
H8	X → Z → Y2	2.354	0.018	> 1.96	< 0.05	Significant
H9	X → Z → Y3	2.732	0.006	> 1.96	< 0.05	Significant

The results indicate that all hypotheses are statistically significant, with t-statistics exceeding 1.96 and p-values below 0.05.

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For instance, the first hypothesis—stating that digital training and development positively affect MSME performance—is supported. The Original Sample (O) value of 0.531 indicates a moderately strong positive relationship. The Sample Mean (M) of 0.529 confirms the stability of the estimate following bootstrapping. The t-statistic of 5.156, well above the 1.96 threshold, demonstrates strong statistical significance, while the p-value of 0.000 confirms that the relationship is not due to chance.

Similarly, the second hypothesis—asserting that competence positively influences MSME productivity—is also supported. The Original Sample (O) value of 0.432 and Sample Mean (M) of 0.430 indicate a stable and consistent relationship between competence and productivity. The t-statistic of 4.852 exceeds the critical threshold, and the p-value of 0.012 confirms statistical significance. These results indicate that the second hypothesis is positively and significantly supported. This pattern is consistent across all other hypotheses, where the values of O, M, t-statistics, and p-values meet the required criteria. Consequently, all proposed hypotheses are accepted and demonstrate sufficient statistical significance to support both theoretical assumptions and practical implications in the context of MSME development in Mojokerto.

Discussion

This study confirms the first hypothesis, demonstrating that digital training and development have a positive and significant effect on MSME performance. This finding aligns with training theory, which posits that digital technologies enable faster and more efficient learning, thereby enhancing both individual and organizational effectiveness (Noe 2017). The results are also consistent with Khan et al. (2019), who found that digital-based training provides significant advantages in improving employee skills compared to conventional training methods (Khan, Alshurideh, dan Aljohani 2019). In the context of MSMEs in Mojokerto, digital training enables business actors to access relevant knowledge and adapt to evolving market demands, ultimately enhancing overall performance in a competitive environment.

The second hypothesis demonstrates that competence has a positive effect on MSME performance. Higher levels of competence enable individuals to apply newly acquired skills more effectively. This finding supports the competency theory proposed by Spencer dan Spencer (1993), which emphasizes that both technical and behavioral competencies are critical for achieving optimal performance outcomes (Spencer dan Spencer 1993). It is further reinforced by Al Shammari (2018), who argues that competence enhanced through technology-based training directly improves performance (Al Shammari 2018). Therefore, competence development represents a strategic mechanism for MSMEs to strengthen adaptability to market changes and enhance overall performance.

The third hypothesis confirms that competence positively influences MSME productivity. This result aligns with productivity theory, which posits that higher competence enables more efficient resource utilization, thereby increasing output with the same or fewer inputs (A. Purboyo 2019). Empirical evidence from Salas et al. (2015) supports this conclusion, highlighting that competence directly contributes to operational efficiency, particularly in resource-constrained MSME environments (Salas, Sims, dan Burke 2015). Consequently, competence development is essential for improving productivity and optimizing business processes.

The fourth hypothesis indicates that competence positively affects MSME competitiveness. This finding is consistent with Porter's competitiveness theory (1985), which emphasizes that competitive advantage is fundamentally determined by the quality of human resources (Porter 1985). Similarly, Purboyo (2019) demonstrates that competence enhancement through training strengthens MSME market positioning (Purboyo 2019). Competence enables MSME actors to create added value in their products and services, thereby enhancing their ability to compete in both local and global markets.

The fifth hypothesis reveals that digital training and development positively influence MSME competence. This finding supports technology-based training theory, which highlights that digitalization enables more accessible, flexible, and personalized learning experiences (Clark dan Mayer 2016). Dube et al. (2020) further confirm that digital training enhances both technical skills and learning flexibility, allowing MSME actors to develop competencies more effectively (Dube, Chauhan, dan Wagle 2020). Thus, digital training serves as a critical enabler of competence development and forms the foundation for achieving business objectives.

The sixth hypothesis demonstrates that competence mediates the relationship between digital training and MSME performance. This result aligns with the theoretical perspective that training effectiveness depends on the extent to which it enhances competence, enabling individuals to apply acquired skills in practical settings (Noe 2017). Al Shammari (2018) also emphasizes the mediating role of competence in maximizing training outcomes and translating them into improved performance (Al Shammari 2018). In the MSME context, competence development ensures that digital training produces tangible improvements in operational performance.

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The seventh hypothesis confirms that competence mediates the relationship between digital training and MSME productivity. This finding is consistent with productivity theory, which suggests that enhanced competence leads to greater efficiency and reduced task completion time (Purboyo 2019). Salas et al. (2015) further demonstrate that highly competent individuals adapt more quickly to new technologies and methods, thereby improving productivity (Salas, Sims, dan Burke 2015). Digital training, therefore, enhances productivity indirectly through competence development, enabling MSMEs to optimize resource utilization.

The eighth hypothesis establishes that digital training and development positively influence MSME competitiveness through competence as an intervening variable. This finding reinforces Porter's (1985) assertion that competitive advantage is closely linked to workforce skills and knowledge (Porter 1985). Purboyo (2019) similarly highlights that effective training enhances competitiveness by strengthening competence (Purboyo 2019). Digital training enables MSMEs to acquire relevant and market-oriented skills, improving their strategic positioning relative to competitors. The ninth hypothesis further confirms that competence mediates the relationship between digital training and MSME productivity. This result is consistent with productivity theory, which underscores the role of competence in enabling efficient resource utilization (Salas, Sims, dan Burke 2015). Dube et al. (2020) also demonstrate that digital training enhances competence, which subsequently improves productivity (Dube, Chauhan, dan Wagle 2020). Thus, competence acts as a critical pathway through which digital training influences productivity outcomes.

The findings of this study highlight the critical roles of digital training and competence in enhancing MSME performance, productivity, and competitiveness. This research contributes to the literature by demonstrating the importance of integrating digital-based training with competence development to achieve optimal business outcomes. From a theoretical perspective, the results provide strong support for digital training theories proposed by Clark dan Mayer (2016) and Noe (2017), particularly in emphasizing that digital training enables faster, more flexible, and skill-oriented learning processes (Clark dan Mayer 2016; Noe 2017). For MSMEs, which often face resource constraints, digital training offers a scalable and cost-efficient approach to human capital development, thereby strengthening their competitive position in increasingly dynamic markets.

Furthermore, this study extends competency theory as articulated by Spencer dan Spencer (1993) by demonstrating that both technical and behavioral competencies play a crucial mediating role in linking digital training with performance and productivity outcomes (Spencer dan Spencer 1993). Competence is not merely a set of technical skills but also encompasses adaptability, critical thinking, and the ability to apply technology effectively across business functions. As such, competence serves as a foundational mechanism through which digital training translates into tangible organizational outcomes.

In addition, the findings contribute to the advancement of competitiveness and productivity theories in MSME contexts. The mediating role of competence enriches Porter's (1985) framework by highlighting human capital quality as a dynamic and technology-driven determinant of competitive advantage (Porter 1985). The integration of digital technologies in competence development enables MSMEs to respond more rapidly to market changes, thereby strengthening their resilience and competitive positioning.

This study offers several important practical implications for stakeholders, particularly in the context of MSME empowerment and competitiveness enhancement. First, the findings underscore the importance of digital-based training as a key strategy for strengthening human resource capacity in MSMEs. Business actors and policymakers should therefore prioritize affordable and relevant digital training programs that enable MSME actors to acquire new skills supporting business growth. Through such training, MSMEs in Mojokerto can accelerate technology adoption and business skill development, thereby improving their readiness to compete in increasingly digital markets and enhancing resource efficiency.

Another important implication is that competence plays a crucial role in maximizing the outcomes of digital training. Accordingly, training programs should not focus solely on technical content delivery but should also foster broader competencies, such as adaptability, analytical thinking, and relevant practical skills. Governments and related institutions need to adopt a more holistic approach that combines technical training with the strengthening of general competencies that support technological adaptation. By reinforcing competence as a developmental foundation, MSME actors will be better prepared to address business challenges and to apply training outcomes in daily operations, ultimately improving business performance.

Furthermore, the finding that competence functions as an intervening variable in improving productivity and competitiveness highlights the need for digital training programs that are oriented not only toward short-term outcomes but also toward sustainable capability development. By designing training initiatives that prioritize competence enhancement, both public and private stakeholders can help MSMEs build lasting competitive

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advantages. MSME actors with stronger technological competence are more capable of leveraging digital innovation to improve efficiency and strengthen competitiveness in dynamic markets. Thus, investment in competence-oriented digital training can provide a solid foundation for MSME survival and growth in the digital era.

This study has several limitations that should be considered when interpreting the findings and applying their implications. First, the research is limited to MSMEs in Mojokerto; therefore, the results may not fully represent MSME conditions in other regions with different characteristics. Factors such as local business culture, access to technology, and government support may influence the effectiveness of digital training and competence development. As a result, the findings may have limited generalizability to MSMEs in other regions or countries with different social and economic contexts.

Second, this study employs a survey method relying on respondents' self-assessments to measure performance, productivity, and competence. Such an approach may introduce perception bias, as respondents may overestimate their performance or the outcomes of training. Although this method is effective for collecting broad data, the results could be strengthened through the inclusion of qualitative or observational evidence capable of capturing performance and productivity more objectively. Future studies would therefore benefit from mixed-method approaches combining surveys with direct observation or actual performance analysis.

Third, this study focuses on digital training and development as the independent variable without accounting for variations in the type and intensity of training received by MSMEs. Different forms of digital training—for example, intensive training versus basic training—may produce different effects on competence and performance. This limitation prevents the study from capturing the differential impact of various digital training models. Future research should therefore investigate how differences in training type and intensity influence MSME outcomes, thereby producing findings that are more specific and practically useful for business actors and training providers.

Based on the limitations identified, several recommendations may guide future studies toward more comprehensive and applicable findings. First, future research should expand the geographical scope by involving MSMEs from different regions or industrial sectors. A broader sample would generate more representative findings and enable comparisons across regions or sectors, thereby providing deeper insight into how local contexts shape the effectiveness of digital training and competence development.

Second, future studies should consider integrating quantitative and qualitative methods to gain a richer understanding of the impact of digital training on MSMEs. Qualitative approaches, such as in-depth interviews or case studies, may reveal how MSME actors experience training implementation in practice, including the challenges they face when applying digital learning outcomes. Such an approach would not only complement survey-based findings but also help identify additional factors influencing performance and productivity, such as barriers to technology adoption or perceptions of training relevance.

Third, future research is encouraged to explore the differential effects of various types of digital training, such as intensive and continuous programs compared with basic or technology-orientation training. By examining differences in training type and duration, future studies can provide more detailed insight into which forms of training are most effective in improving MSME competence and competitiveness. In addition, future research may incorporate additional variables, such as external support from government institutions or business communities, which may mediate or moderate the relationship between digital training and MSME performance outcomes. This would help training providers and policymakers design programs that are more responsive to the specific needs of MSMEs in the digital era.

CONCLUSION

This study demonstrates that digital training and development have a positive and significant effect on the performance, productivity, and competitiveness of MSMEs in Mojokerto, with competence acting as an intervening variable that strengthens these relationships. These findings confirm that digital-based training can serve as a strategic instrument for MSMEs to enhance their capacity to adapt to technological change and increasingly intense market competition. Competence developed through digital training is proven to play a pivotal role in optimizing training outcomes, enabling MSMEs to operate more effectively and efficiently.

The findings also reinforce the view that competence extends beyond technical skills to include adaptability, critical thinking, and technological mastery—capabilities that are essential for business success in the digital era. Enhanced competence directly improves performance and productivity while also providing MSMEs with sustainable competitive advantage. Moreover, competence functions as a vital bridge linking digital training to competitiveness. This suggests that targeted investment in digital training can strengthen MSME positioning in responding to global challenges.

THE EFFECT OF DIGITAL TRAINING AND DEVELOPMENT ON MSME PERFORMANCE, COMPETITIVENESS, AND PRODUCTIVITY WITH COMPETENCE AS AN INTERVENING VARIABLE (A CASE STUDY OF MSMEs IN MOJOKERTO)

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