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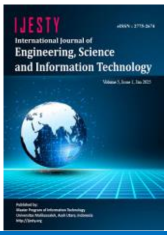

The Effect of Technology Training on Increasing MSME Productivity: Case Analysis of Digital Training Programs for Local Craftsmen

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Abstract

This research aims to explore the impact of technology training on increasing the productivity of micro, small and medium enterprises (MSMEs), focusing on local artisans. The Partial Least Squares structural analysis method (PLS-SEM) tests the proposed hypothesis based on survey data from MSMEs participating in digital training programs. The research results show that active participation in technology training programs significantly increases the application of technology in MSME business operations. Applying this technology will then have a positive impact on improving the productivity of MSMEs. Additionally, consistency in construct measurement, such as reliability and validity, is vital in explaining variation in the dependent variable. These findings provide an essential contribution to understanding the role of technology in increasing the productivity of MSMEs and highlight the importance of consistency in construct measurement in the context of this research.

Keywords: *Technology Training, Productivity, MSMEs, Partial Least Squares Structural Analysis, Local Craftsmen.*

1. Introduction

Micro, Small and Medium Enterprises (MSMEs) have long been recognised as one of the main drivers of economic growth and social development in various countries[1][2]. In Indonesia, the MSME sector contributes significantly to GDP and plays a vital role in job creation and poverty alleviation. However, despite their great potential, MSMEs often face challenges that hinder their growth, especially regarding access to technology and increasing productivity [3][4].

In the increasingly developing digital era, information and communication technology (ICT) has become one of the keys to expanding market access, increasing operational efficiency and strengthening the competitiveness of MSMEs. However, the successful implementation of this technology is not always easy to realise, especially among MSMEs with limited resources and technological knowledge [5]-[7].

Various training programs have been introduced to overcome these challenges and increase literacy and technological skills among MSMEs. These programs cover different topics, from using e-commerce platforms to implementing online management systems. However, the extent to which these training programs effectively increase MSMEs' productivity and business performance, especially among local artisans, still needs to be answered [8][9].

By digging deeper through case analysis of concrete training programs, this paper aims to better understand the impact of technology training on increasing the productivity of MSMEs, especially in the context of local artisans [10]. Through an empirical approach, we hope to identify key factors that influence the success or failure of training programs and provide valuable insights for policymakers, practitioners and academics to improve local communities' economic welfare [11][12].

Thus, a better understanding of the relationship between technological training and increasing the productivity of MSMEs is relevant in economic development and essential for achieving inclusive and competitive sustainable development goals [13].

2. Literature Review

2.1. The concept of MSMEs and Their Important Role in the Economy

Micro, Small and Medium Enterprises (MSMEs) are one of the main pillars of the global economy[14][15]. MSMEs strategically create jobs, drive economic growth, and reduce regional economic disparities. In general, MSMEs are often defined based on the criteria of the number of workers, turnover or assets owned. In many countries, including Indonesia, MSMEs dominate the business structure by making a significant contribution to Gross Domestic Product (GDP)[16][17].

2.2. The Role of Technology in Increasing MSME Productivity

Technology plays a vital role in increasing the productivity and competitiveness of MSMEs. The use of information and communication technology (ICT), such as business management software, e-commerce applications, and digital payment tools, can help MSMEs optimise operational processes, increase production efficiency, and expand market reach[18][19]. By adopting technology effectively, MSMEs can improve the quality of products and services, and strengthen their position in an increasingly competitive market[20][21].

2.3. Challenges in Access and Utilisation of Technology by MSMEs

Despite their extraordinary potential, MSMEs often face challenges with technology access and use. Some primary challenges include limited capital for investment in technology, a lack of digital literacy among business owners, and inadequate technological infrastructure in some regions. In addition, uncertainty about the real benefits of technology and fear of the risks associated with adopting technology also become obstacles for MSMEs in taking steps forward in adopting technology [22]-[24].

2.4. Effectiveness of Technology Training in the MSME Context

To overcome the challenges of access and utilisation of technology, various training programs have been introduced to increase technological literacy and skills among MSMEs[25][26]. These programs cover various topics, from computer use to digital marketing strategies. However, the success of technology training depends not only on the delivery of the material but also on continued support, access to resources, and practical integration of the knowledge gained into daily business operations[27][28].

2.5. Case Study related to Digital Training Program for Local Craftsmen

A case study of a digital training program for local artisans provides valuable insight into how technology training can influence the productivity and business performance of MSMEs locally. By analysing the implementation, impact, and challenges that concrete training programs face, we can understand the key factors that influence the success or failure of such training efforts. This case study provides a more detailed picture of the dynamics involved in efforts to increase technological literacy and skills among MSMEs[29]-[31].

3. Methods

Fig 1. Research Roadmap

In this research flow, the steps are as follows:

1. Population Identification: Identify the group or population that will be the research subject, in this case, local artisans MSMEs participating in the technology training program.
2. Sample Selection: Selecting a representative sample from an identified population for further study.
3. Questionnaire Implementation: Survey questionnaires will be filled out for respondents to collect data on characteristics, training participation, and MSMEs' productivity indicators.
4. Conducting Interviews: Conducting in-depth interviews with several respondents to understand better the trainees' experiences and the impact on their business operations.
5. Data Analysis: Analyse the collected data, both quantitative data from questionnaires and qualitative data from interviews, to draw conclusions and research findings.
6. Conclusions & Suggestions: Prepare findings from the results of data analysis and provide suggestions for improvement or development in the future based on research findings.

3.1. Research Approach

This research uses quantitative and qualitative approaches. A quantitative approach is used to measure the impact of technology training on increasing MSME productivity using objectively measurable numerical data. A qualitative approach was used to understand the context and process of implementing the training program and to explore the perceptions and experiences of training participants.

3.2. Research Design

The research design used is a case study. This case study will take several local artisan MSMEs as research subjects. The case study approach allows researchers to conduct in-depth analysis of the impact of technology training in specific cases and contexts.

3.3. Population and Sample

The population of this research is local artisan MSMEs who participate in a digital training program aimed at improving literacy and technological skills. The sample will be selected purposively, taking into account geographic diversity, industry sector and business size. The number of samples taken will be adjusted to the availability of data and the desired representation.

3.4. Data Collection Techniques

Data will be collected through surveys, interviews and observations. The survey will collect quantitative data on MSME profiles, participation in training programs, and productivity indicators before and after training. Interviews will be conducted to gain a deeper understanding of the trainee's experience and the impact of the training on their business operations. Observations will be conducted to directly observe the implementation of knowledge and skills obtained from training in the daily operational context of MSMEs.

3.5. Data Collection Instruments

The instruments include survey questionnaires, interview guides, and observation checklists. A survey questionnaire will collect data on MSME characteristics, participation in training programs, and productivity indicators. The interview guide will contain structured questions to explore the trainee's perceptions and experiences. An observation checklist will record activities and the implementation of new practices obtained from training in the context of MSME business operations.

Table 1. Questionnaire Table

No	Indicator	Question
1	Participation	1. Have you or your business participated in a technology training program in the last 12 months? 2. How often do you participate in training activities during the program?
2	Quality of Application Materials	1. What do you think about the quality of the training materials provided? 2. How easily can you apply the knowledge and skills you gain from the training program in your business operations? 3. To what extent do you use technology platforms or applications to manage inventory, transactions, or communicate with customers?
3	Productivity	1. How much of an increase in productivity do you feel after implementing technology in your business? 2. Do you have data or figures showing the increase in productivity after implementing technology?
4	Benefits and Challenges	1. What do you think about the benefits of implementing technology in your business? 2. Do you face any particular challenges in adopting technology in your business? 3. How interested are you in improving your technology knowledge and skills in your business? 4. Do you feel that knowledge and skills in technology are critical to the success of your business?
5	Recommendation program promotion feedback	1. Do you have feedback or suggestions for future improvements to the technology training program? 2. Do you feel that technology training programs need to be more publicised or promoted to other MSMEs? 3. Do you have additional suggestions or recommendations to improve the effectiveness of technology training programs for MSMEs? |

3.6. Data Analysis Techniques

Quantitative data will be analysed using descriptive statistical techniques, such as mean, median and standard deviation analysis, to measure changes in MSME productivity before and after training. Qualitative data will be analysed thematically, identifying general patterns, themes and threats that emerge from interviews and observations. The quantitative and qualitative analysis results will be synthesised to provide a comprehensive picture of the impact of technology training on the productivity of local artisan MSMEs.

3.6.1. Variables and Hypotheses

Variables in this study may include:

1. Independent Variable:
   Participation in Technology Training (X)
2. Mediation Variables (optional):
   Application of Technology in MSME (M) Business Processes

3. Dependent Variable:
   Increasing MSME Productivity (Y)

The possible hypotheses put forward are:
Hypothesis H1: Participation in technology training positively affects the application of technology in MSME business processes.
Hypothesis H2: Applying technology in MSME business processes positively increases MSME productivity.
Hypothesis H3: Participation in technology training has a positive effect on increasing MSME productivity, with mediation from the application of technology in MSME business processes.

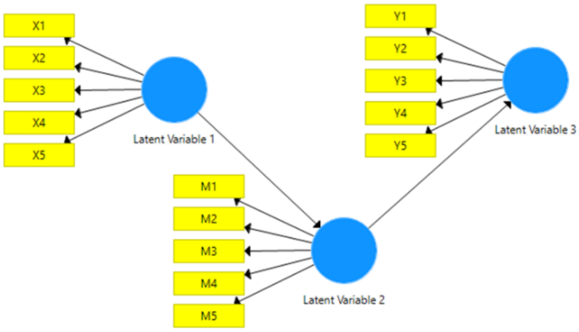

Fig 2. Hypothesis Framework

4. Results and Discussion

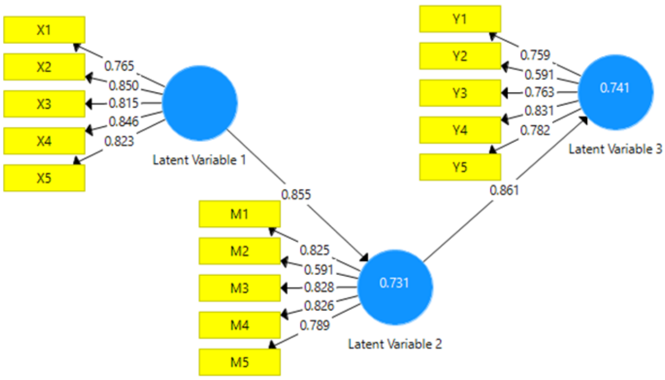

Fig 3. SmartPls-sem Result

From the methods that have been used and the data that have been processed, the results obtained are as depicted in Figure 2. These results show the suitability of the model to the observed data. Using appropriate analytical methods provides a deeper understanding of the relationships between variables in the context of this research. Thus, this research makes an essential contribution to understanding the factors that influence MSME productivity and their implications in the context of technology training.

Table 2. Construct Reliability and Validity

Variable	Cronbach's Alpha	rho_A	Composite Reliability	Average Variance Extracted (AVE)
Latent Variable 1	0.878	0.880	0.911	0.673
Latent Variable 2	0.832	0.846	0.883	0.604
Latent Variable 3	0.800	0.808	0.864	0.562

The results of the model's reliability and construct validity analysis show a pretty good reliability and validity in general. The first latent variable shows excellent values for Cronbach's Alpha, rho_A, Composite Reliability, and good AVE values. This indicates that this variable has a high level of consistency in measuring the desired concept and can effectively reflect the variance of the items that make it up. The second latent variable also showed similar results, with excellent construct reliability and validity values, although the AVE values were slightly below the desired standards. This suggests that most of the variance in the variable can be explained by the items used to measure it, but there is still room for improvement. However, the third latent variable showed lower values for AVE, although its reliability and construct validity were still considered good. This suggests that the construct measured by the third latent variable may not be fully represented by the items used in the analysis. Therefore, it is necessary to evaluate this construct, and adjustments may be needed to the items used to measure it to increase the overall validity of the construct.

Table 3. Outer Loadings

Indicator	Latent Variable 1	Latent Variable 2	Latent Variable 3
M1			0.825
M2			0.591
M3			0.828

M4		0.826
M5		0.789
X1	0.765	
X2	0.850	
X3	0.815	
X4	0.846	
X5	0.823	
Y1		0.759
Y2		0.591
Y3		0.763
Y4		0.831
Y5		0.782

The results of the factor coefficient analysis for the model presented show how much each item contributes to measuring the latent variable. This factor coefficient describes the strength of the relationship between each item and the corresponding latent variable. M1, M3, and M4 have high factor coefficients for the first latent variable, indicating that these three items have a strong relationship with the latent variable. The second latent variable also shows a similar pattern, with M1, M4, and M5 having significant factor coefficients. However, M2 has lower factor coefficients, indicating a slightly lower contribution in measuring the latent variable. Although the third latent variable has a slightly below-standard AVE value, it shows strong factor coefficients for M1, M3, and M4. However, M2 has lower factor coefficients, indicating a lower contribution in measuring the latent variable. All items related to the independent variables (X1-X5) and dependent variables (Y1-Y5) show significant factor coefficients, indicating a good contribution in measuring the corresponding latent variables. This suggests that the items effectively reflect the variance of the measured construct and have a strong relationship with the corresponding latent variable.

Table 4. R Square

Variable	R Square	R Square Adjusted
Latent Variable 2	0.731	0.730
Latent Variable 3	0.741	0.741

The R Square and R Square Adjusted results for the second latent variable show how much variability in the dependent variable can be explained by the latent variable in the proposed model. The R Square value of 0.731 indicates that the second latent variable can explain around 73.1% of the variability of the observed dependent variable. Meanwhile, the Adjusted R Square value, which considers the number of independent variables in the model, is almost the same as R Square, indicating the consistency of these results regarding the complexity of the model. This shows that the second latent variable significantly contributes to explaining the variation in the dependent variable.

Likewise, the R Square and Adjusted R Square results for the third latent variable show how much variability in the dependent variable can be explained by that latent variable. The R Square value of 0.741 indicates that the third latent variable can explain around 74.1% of the variability of the observed dependent variable. The Adjusted R Square value, which is almost the same as R Square, shows the consistency of these results in various model complexities. This confirms that the third latent variable also contributes significantly to explaining the variation in the dependent variable.

Thus, these R Square and Adjusted R Square results confirm that both latent variables have sufficient power to explain the variation in the observed dependent variable in the proposed model.

5. Conclusion

From the analysis carried out, the main conclusion that can be drawn is the importance of technology training for micro, small and medium enterprises (MSMEs) in increasing their productivity. The research results show that participation in technology training programs significantly contributes to the application of technology in MSME business operations. With the increasing application of technology, MSMEs can improve their operational processes, increase efficiency, and expand market reach, increasing their productivity and competitiveness in an increasingly competitive market.

In addition, the findings confirm the importance of consistency in construct measurement in this study. Latent variables with high reliability and validity values show a more substantial contribution in explaining variations in the dependent variable. Therefore, a deep understanding of the factors that influence MSME productivity and consistency in measuring the construct is an essential step in designing effective policies and training programs to support the growth and development of MSMEs in facing the challenges and opportunities in this digital era.

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