



## Financial Literacy and Digital Access as Key Factors in The Success of Women-Owned MSMEs

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### ABSTRACT

*The purpose of this study is to analyze the influence of financial literacy and digital access on the success of women-led Micro, Small, and Medium Enterprises (MSMEs) in Depok City, Indonesia. The research method used is a quantitative approach with an explanatory research design, involving respondents who met the inclusion criteria. Data were analyzed using Partial Least Squares–Structural Equation Modeling (PLS-SEM) with SmartPLS. Financial literacy was measured through indicators related to basic financial knowledge, budgeting practices, record-keeping, loan management, and the use of digital financial products. Digital access was assessed through ownership of digital devices, the use of online platforms for marketing, the adoption of digital financial applications, participation in technology-related training, and the availability of stable internet connectivity. The results of the study show that both financial literacy and digital access have strong and significant positive effects on the success of women-led MSMEs, as reflected in a substantial proportion of variance explained. These findings support Human Capital Theory, the Resource-Based View, the Diffusion of Innovation Theory, and the Dynamic Capabilities Theory, emphasizing the importance of knowledge, skills, and technological adaptability in achieving sustainable competitive advantage. The results highlight the need for integrated empowerment programs that combine financial and digital literacy, strengthened digital infrastructure, and inclusive access to capital to enhance the competitiveness and resilience of women-led MSMEs in Indonesia.*

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**Keywords: Financial literacy; Digital access; Women-led MSMEs; Business success; Indonesia; PLS-SEM; Human Capital Theory; Resource-Based View; Diffusion of Innovation; Dynamic Capabilities Theory.**

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## INTRODUCTION

The Micro, Small, and Medium Enterprises (MSMEs) sector is a driving force of the global economy, playing a crucial role in economic growth, innovation, and job creation in many countries, particularly in developing nations such as Indonesia (Aprilia et al., 2025; Suryani et al., 2021; Tambunan, 2019). In Indonesia, MSMEs constitute the undisputed backbone of the economy, representing nearly 99% of all business units, absorbing about 97% of the national workforce, and contributing significantly between 60% and 61% to the Gross Domestic Product (GDP) (Aprilia et al., 2025; “Empower Women, Drive the Economy,” 2023). The resilience and adaptability of MSMEs have proven essential in facing economic turbulence, including the COVID-19 pandemic, where this sector acted as the main buffer for local economies (Aprilia et al., 2025; Priyono et al., 2023).

Within this context, the role of women entrepreneurs has gained increasing recognition and extraordinary significance. In Indonesia, women-led MSMEs account for 64.5% of total MSMEs, far exceeding the global average (Boston Consulting Group & Stellar Women, 2024; “Empower Women, Drive the Economy,” 2023; Priyono et al., 2023). This involvement not only promotes individual and household economic empowerment but also generates broad positive impacts on family and community welfare, including improvements in nutrition, health, and children’s education (“Empower Women, Drive the Economy,” 2023; Tambunan, 2019).

The phenomenon of digital transformation has also emerged as a major driving force in today’s global economy. Information technology (IT) and digital platforms offer significant opportunities for MSMEs to enhance competitiveness, operational efficiency, and market reach (Hendrawan et al., 2024; Nashir et al., 2025). Digital integration has become a necessity for MSMEs to remain relevant and competitive in increasingly open markets. However, to fully leverage this potential, adequate financial literacy and equitable digital access are crucial prerequisites, especially for women-led MSMEs.

Theoretically, the success of women-led MSMEs is highly influenced by two key factors: financial literacy and digital access. High financial literacy enables women entrepreneurs to make sound financial decisions, manage cash flow, plan investments, access capital, and understand business risks (Kurniasari & Lestari, 2024; Tambunan, 2019). This is the foundation for sustainability and business growth. Digital access, on the other hand, provides women-led MSMEs with the means to expand market reach through e-commerce and social media, improve operational efficiency through business applications, access information and training, and leverage digital financial services (FinTech) (Affandi et al., 2024; Hendrawan et al., 2024; Nashir et al., 2025).

Ideally, women entrepreneurs possess strong financial literacy, enabling them to manage business finances professionally, understand banking and investment products, and

plan for their financial future. They also have easy and affordable access to digital infrastructure (internet, devices) and sufficient digital literacy to optimally utilize online platforms. A robust supporting ecosystem comprising inclusive government policies, financial institution support, comprehensive digital and financial training programs, and widespread IT infrastructure will facilitate the integration of these two factors, leading to improved performance and success of women-led MSMEs (Aprilia et al., 2025; Hendrawan et al., 2024; Kurniasari & Lestari, 2024; Nashir et al., 2025; Suryani et al., 2021; Tambunan, 2019). This ideal condition enables women-led MSMEs to innovate, enhance product quality, and compete effectively in both local and global markets.

In practice, however, there is a significant gap between the ideal conditions and the realities faced by women-led MSMEs. Despite their critical role, many women entrepreneurs still struggle with challenges that hinder their success. A 2025 case study in Depok, for instance, shows that while the use of social media and e-commerce helped MSMEs increase sales by up to 40% and reduce operational costs by 30%, the optimization of IT utilization remains hampered by low digital literacy, limited infrastructure, and inadequate capital (Nashir et al., 2025). This indicates that digital access alone is insufficient without being accompanied by adequate digital literacy.

Furthermore, a study in East Nusa Tenggara (NTT) Province reveals that although the number of women-led MSMEs has increased, they still face difficulties in marketing and accessing raw materials, exacerbated by high shipping costs. Many have not fully utilized digital technology due to unequal internet access and limited digital literacy (Priyono et al., 2023). This also reflects challenges in financial literacy, where access to loans and formal financial institutions often remains a barrier (Kurniasari & Lestari, 2024; Priyono et al., 2023; Tambunan, 2019). Women often have lower access to formal financial resources compared to men, pushing them to adopt self-reliant strategies such as cutting personal consumption or using personal savings to cope with crises (Esquivias et al., 2021, cited in Priyono et al., 2023). These challenges are compounded by the dual roles women frequently hold as both business managers and household caretakers, which can limit their time and resources for business development and capacity-building (Priyono et al., 2023). Based on these ideal conditions and empirical realities, this study identifies key variables for analysis: Financial Literacy and Digital Access as Independent Variables and the Success of Women-led MSMEs as the Dependent Variable.

Recent studies consistently emphasize the importance of digitalization and financial literacy for MSME success, particularly those run by women. Research by Affandi et al. (2024) asserts that digitalization not only drives operational efficiency and market expansion but also simultaneously enhances entrepreneurs' financial understanding, creating a positive synergy. Furthermore, Kurniasari and Lestari (2024) identify FinTech as a key factor mediating the relationship between financial literacy and business success for women, effectively addressing the limitations of traditional capital access that often pose barriers.

Nevertheless, the literature also highlights significant challenges in this digital transformation process. Nashir et al. (2025) critically note that low digital literacy, inadequate infrastructure, and limited capital remain major obstacles to IT optimization. Similarly, Hendrawan et al. (2024) discuss that financial resource constraints, weak digital skills, and uneven infrastructure are identified as key barriers to fully adopting and utilizing technology. In a broader context, the report from Boston Consulting Group & Stellar

Women (2024) provides a comprehensive overview of the role and potential of women entrepreneurs in Indonesia. With 64.5% of MSMEs managed by women, this report explicitly highlights the importance of empowering women through digitalization and financial access while acknowledging the unique challenges they face in running and growing their businesses in the digital era.

Although current literature has acknowledged the importance of financial literacy and digital access separately, several critical research gaps remain, particularly in the context of women-led MSMEs in Indonesia. First, while some studies discuss digital adoption or financial literacy, there is still limited comprehensive and integrated research analyzing how the interaction between financial literacy and digital access simultaneously affects the success of women-led MSMEs. Many studies tend to focus on one factor only or examine them separately. Second, the mediating or moderating mechanisms of external factors (such as specific training programs or types of government support) on the relationship between financial literacy, digital access, and women-led MSME success have not been fully explored. How such support can strengthen the impact of financial literacy and digital access still requires in-depth investigation. Third, there is a lack of studies explicitly providing an empirical framework on how women-led MSMEs can overcome the dual challenges of low financial literacy and digital access to achieve business success across Indonesia's diverse regional contexts. Research is often too general or does not offer detailed, practical strategies that can be implemented. Therefore, this research gap calls for an in-depth and integrated analysis of the influence of financial literacy and digital access on the success of women-led MSMEs in Indonesia, including exploring causal relationships and practical implications for formulating more effective empowerment policies and programs.

To analyze the complex relationship between financial literacy, digital access, and the success of women-led MSMEs, as well as the potential mediating or moderating variables, Partial Least Squares-based Structural Equation Modeling (SEM-PLS) is highly relevant and appropriate (Gujarati & Porter, 2019). SEM-PLS is a powerful multivariate analysis technique for testing models with multiple latent variables (constructs that cannot be directly measured, such as financial literacy or business success) and observed variables (measurable indicators).

Based on the above discussion, this study aims to conduct an in-depth analysis of the influence of financial literacy and digital access as key determinants of the success of women-owned and managed MSMEs. The results of this research are expected to provide valuable insights for policymakers, MSME support institutions, and women entrepreneurs themselves in designing effective intervention strategies to promote women's economic empowerment and sustainable growth of the MSME sector.

## **LITERATURE REVIEW**

### **Success of Women-Led MSMEs**

The success of MSMEs, including those managed by women, is a multidimensional concept that is often measured across various aspects, not merely financial gains. In general, MSME success can be observed from business growth (increased sales, market share, assets, or number of employees), profitability (net income, return on investment), business sustainability (the ability to survive and grow in the long term), as well as the

social and economic impacts on the owner and the community (Nursini, 2020; Tambunan, 2019).

From the perspective of the Resource-Based View (RBV), a firm's success depends on the unique resources and capabilities it possesses (Barney, 1991). For women-led MSMEs, these resources may include human capital (skills, knowledge), financial capital, social networks, and the ability to adapt to changes in the business environment. Effective management of these resources creates a competitive advantage. Furthermore, entrepreneurship theory emphasizes that individual entrepreneurial characteristics such as innovation orientation, risk-taking, proactivity, and managerial capabilities are also determinants of success (Lumpkin & Dess, 1996). In the context of women-led MSMEs, the ability to balance dual roles and leverage external support is also an integral part of their capabilities (Priyono et al., 2023).

To empirically measure the success of women-led MSMEs, this study will employ several indicators that reflect business growth and innovation, including:

1. Measuring financial growth and sales performance (Affandi et al., 2024; Nashir et al., 2025)
2. Measuring market expansion and product/service acceptance (Hendrawan et al., 2024; Nashir et al., 2025)
3. Measuring expanded market reach through digital adoption (Hendrawan et al., 2024; Nashir et al., 2025)
4. Measuring operational growth and business scale expansion (Hendrawan et al., 2024; Suryani et al., 2021)
5. Measuring innovation orientation and product competitiveness (Lumpkin & Dess, 1996; Suryani et al., 2021; Tambunan, 2019)

### **Financial Literacy**

Financial literacy is defined as the ability to understand and effectively use various financial skills, including personal financial management, budgeting, and investing (Lusardi & Mitchell, 2018). In the business context, financial literacy encompasses the ability to interpret financial statements, manage cash flow, set appropriate pricing, plan investments, and access as well as manage funding sources (Kurniasari & Lestari, 2024).

Financial literacy is critical because it represents a form of human capital (Schultz, 1961) that enables individuals to make rational and effective economic decisions. Human Capital Theory posits that investments in knowledge and skills including financial literacy enhance individual productivity and income.

The following are the indicators used to measure Financial Literacy:

1. Understanding basic financial concepts such as interest, inflation, and business risk (Lusardi & Mitchell, 2018; Malhotra & Baag, 2021; Ahamed, 2025; Ansari et al., 2022)
2. Regularly conducting financial planning for the business (Goyal & Kumar, 2021; Ahamed, 2025; Ansari et al., 2022; Winanto et al., 2023)
3. Systematically recording financial transactions (Dewi et al., 2020; Ahamed, 2025; Ansari et al., 2022; Winanto et al., 2023)
4. Managing business loans to avoid disrupting cash flow (Lusardi & Mitchell, 2014; Ahamed, 2025; Kass-Hanna et al., 2022)
5. Knowing and utilizing digital financial products such as e-wallets, mobile banking, and bookkeeping applications (Khyzhak & Mardar, 2021; Kass-Hanna et al., 2022; Lyons

& Kass-Hanna, 2021; Koskelainen et al., 2023; Chhillar et al., 2023; Long et al., 2023; Ahamed, 2025)

### **Digital Access**

Digital access refers to the availability and ability of individuals to use digital technology (internet, hardware, online platforms, applications) for various purposes, including business. It encompasses not only physical access to technological infrastructure but also digital literacy the skills and understanding needed to effectively utilize such technologies (Hendrawan et al., 2024; Nashir et al., 2025).

The Diffusion of Innovations Theory by Rogers (1995) explains how, why, and at what rate new ideas and technologies spread. Digital access and digital literacy are prerequisites for the innovation adoption stage. When women-led MSMEs possess both digital access and relevant skills, they are more likely to adopt digital innovations that can improve their business performance.

Additionally, the Technology Acceptance Model (TAM) (Davis, 1989) posits that technology usage is influenced by perceived usefulness and perceived ease of use. These factors help explain the degree to which entrepreneurs adopt and integrate technology into their business processes.

The following are the indicators for the Digital Access variable:

1. Measuring ownership of digital devices for business purposes (Hendrawan et al., 2024; Nashir et al., 2025; Tambunan, 2019)
2. Measuring the use of social media or online platforms for product marketing (Hendrawan et al., 2024; Nashir et al., 2025; Surya et al., 2021; Priyono et al., 2023)
3. Measuring the use of digital financial applications in business operations (Hendrawan et al., 2024; Nashir et al., 2025; Affandi et al., 2024)
4. Measuring participation in digital technology training or learning for business (Hendrawan et al., 2024; Nashir et al., 2025; Surya et al., 2021; Priyono et al., 2023; Aminullah et al., 2024)
5. Measuring stable internet access for online business activities (Abdillah, 2024; Aminullah et al., 2024; Hendrawan et al., 2024; Nashir et al., 2025; Priyono et al., 2023)

Based on the theoretical review and empirical evidence from previous studies, the research hypotheses are formulated as follows:

### **The Influence of Financial Literacy on the Success of Women-led MSMEs**

Women entrepreneurs with a high level of financial literacy tend to have a better understanding of business financial management, pricing strategies, investment, and risk. This ability enables them to make smarter financial decisions, manage cash flow effectively, and plan sustainable business growth. In turn, this positively impacts the financial performance and sustainability of their MSMEs (Kurniasari & Lestari, 2024; Tambunan, 2019).

H<sub>1</sub>: Financial Literacy has a positive effect on the Success of Women-led MSMEs.

### **The Influence of Digital Access on the Success of Women-led MSMEs**

Digital access allows women entrepreneurs to utilize e-commerce platforms, social media, and business applications for broader marketing, increased sales, operational efficiency, and better access to information. The adoption of digital technology can reduce operational costs, expand market reach, and enhance business competitiveness, ultimately contributing to MSME success (Affandi et al., 2024; Hendrawan et al., 2024; Nashir et al., 2025).

H2: Digital Access as a Determinant has a positive effect on the Success of Women-led MSMEs.

## RESEARCH METHOD

### Research Design

This study employs a quantitative approach with an explanatory research design. The quantitative approach is chosen because this research aims to measure the influence between variables and statistically test the hypotheses, which is appropriate for producing measurable and generalizable findings. The explanatory design is used to explain the cause-and-effect relationships between the independent variables, the dependent variable, and the moderating variable.

### Operational Definition

**Table 1. Operational Definition of Research Variables**

Variable	Conceptual Definition	Operational Definition	Indicator	Scale
<b>Success of Women-led MSMEs.</b>	The success of women-led MSMEs refers to the achievement of economic and operational objectives of MSMEs managed by women, contributing to business growth, improved family welfare, and the ability to adapt and compete in the market	The success of women-led MSMEs is measured based on a set of indicators that reflect business economic growth and operational efficiency. These indicators include increased revenue or sales, increased profits, market expansion, and improved operational efficiency. In addition,	<ol style="list-style-type: none"> <li>1. Measuring financial growth and sales performance (Affandi et al., 2024; Nashir et al., 2025)</li> <li>2. Measuring market expansion and product/service acceptance (Hendrawan et al., 2024; Nashir et al., 2025)</li> <li>3. Measuring expanded market reach through digital adoption (Hendrawan et al., 2024; Nashir et al., 2025)</li> <li>4. Measuring operational growth and business scale expansion (Hendrawan</li> </ol>	Likert

		success can also be seen from the social impacts generated, such as improved family quality of life and the ability of MSMEs to utilize digital technology in their operations	et al., 2024; Suryani et al., 2021) 5. Measuring innovation orientation and product competitiveness (Suryani et al., 2021; Tambunan, 2019)	
<b>Financial Literacy</b>	Financial literacy is an individual's ability to understand and effectively apply various financial skills, including personal and business financial management, investment decision-making, and understanding of financial products and risks. In the context of women-led MSMEs, financial literacy refers to the knowledge and confidence that enable them to make sound financial decisions to grow their businesses	Financial literacy is measured by the level of understanding and application of basic financial concepts by women MSME owners or managers in their operational and business planning activities. This includes the ability to prepare budgets, manage cash flow, understand banking and investment products, and identify financial risks	1. Understanding basic financial concepts such as interest, inflation, and business risk (Lusardi & Mitchell, 2014; Malhotra & Baag, 2021; Ahamed, 2025; Ansari et al., 2022) 2. Preparing business financial plans regularly (Goyal & Kumar, 2021; Ahamed, 2025; Ansari et al., 2022; Winanto et al., 2023) 3. Recording financial transactions systematically (Dewi et al., 2020; Ahamed, 2025; Ansari et al., 2022; Winanto et al., 2023) 4. Managing business loans to avoid disrupting cash flow (Lusardi & Mitchell, 2018; Ahamed, 2025; Kass-Hanna et al., 2022) 5. Knowing and utilizing digital financial products such as e-wallets, mobile banking, and bookkeeping applications (Khyzhak & Mardar, 2021; Kass-	Likert

	and improve their well-being		Hanna et al., 2022; Lyons & Kass-Hanna, 2021; Koskelainen et al., 2023; Chhillar et al., 2023; Long et al., 2023; Ahamed, 2025)	
<b>Digital Access</b>	Digital access is the ability of individuals or MSMEs to connect to and effectively utilize digital technology, infrastructure, and online services. This includes the availability of devices, internet connectivity, and the ability to use various digital platforms and applications for business purposes	Digital access is measured by the level of availability and utilization of digital technology and infrastructure by women-led MSMEs. This includes the ownership and use of digital hardware, the availability and quality of internet connectivity, and the extent to which women-led MSMEs adopt and utilize digital platforms and applications for marketing, sales, operations, and financial transactions. Digital access is crucial for MSMEs in improving operational efficiency and expanding markets, which ultimately contributes to business success.	1. Measuring ownership of digital devices as business tools (Hendrawan et al., 2024; Nashir et al., 2025; Tambunan, 2019) 2. Measuring the use of social media or online platforms for product marketing (Hendrawan et al., 2024; Nashir et al., 2025; Surya et al., 2021; Priyono et al., 2023) 3. Measuring the use of digital financial applications in business operations (Hendrawan et al., 2024; Nashir et al., 2025; Affandi et al., 2024) 4. Measuring participation in digital technology training/learning for business purposes (Hendrawan et al., 2024; Nashir et al., 2025; Surya et al., 2021; Priyono et al., 2023; Aminullah et al., 2024)	Likert

### **Research Population and Sample**

The population in this study consists of all Micro, Small, and Medium Enterprises (MSMEs) owned and/or managed by women in Depok City, West Java, in 2025. Depok City was chosen as the research location due to the high concentration of active women-led MSMEs, the presence of MSME empowerment programs in the area, and demographic characteristics relevant to the objectives of the study.

To ensure the relevance of the data and alignment with the research objective analyzing the influence of financial literacy and digital access on the success of women-led MSMEs, the target population is restricted by the following inclusion criteria:

1. **Active Business Ownership and Management.** The business is actively owned and managed by a woman. This criterion is important to ensure that respondents are the primary decision-makers in business operations, so the data collected directly reflect the experiences and perspectives of women entrepreneurs who are the main focus of this study.
2. **Minimum Business Operation Duration.** The business has been operating for at least two (2) years. This criterion is applied to ensure that the MSME has a sufficiently stable operational track record, allowing for adequate historical data to measure business success indicators. Additionally, this duration is expected to provide enough experience for business actors in managing finances and interacting with an increasingly digital business environment.
3. **Business Sector Relevant to Digitalization.** The business operates in sectors with high potential for leveraging digital technology in operations and marketing, such as culinary, fashion, or crafts. This sector selection aims to ensure the relevance of the “Digital Access” variable in the study, where the use of online platforms and digital technology is assumed to have a significant impact on operational efficiency and market expansion, ultimately contributing to business success (Nashir et al., 2025; Hendrawan et al., 2024).

### **Sampling Technique**

The sampling technique used in this study is non-probability sampling with a purposive sampling method. This technique was chosen based on the following key considerations:

1. **Absence of a Sampling Frame.** There is no complete and accurate list (sampling frame) of all women-led MSMEs in Depok City, West Java, that meet the research criteria. This makes the use of probability sampling techniques (such as simple random sampling) impractical.
2. **Specific Inclusion Criteria.** Members of the population must meet the specific and relevant inclusion criteria as described in the population section, which requires the researcher’s discretion in sample selection.

The purposive sampling method was selected because it allows the researcher to intentionally choose sample units based on judgment and specific characteristics most aligned with the research objectives. In this context, the researcher will identify and select women-led MSMEs deemed most informative and relevant to analyze the relationships between financial literacy, digital access, and business success.

The additional criteria used in purposive sampling for this study are as follows:

1. **Owner or Main Manager.**

The respondent is the owner or main manager of the MSME who is responsible for

strategic, operational, and financial decision-making. This criterion is essential to ensure that information regarding financial literacy, digital utilization, and business success comes from an individual with comprehensive knowledge and authority over the business.

## 2. Utilization of Digital Technology

The respondent's business has adopted at least one form of digital technology in its operations (e.g., the use of social media for marketing, messaging applications for customer service, e-commerce platforms for sales, or digital payment applications). This criterion is crucial to ensure the sample's relevance to the "Digital Access" variable and enable analysis of its impact on MSME success, in line with findings that digital adoption strengthens business performance.

## Sample Size

In Structural Equation Modeling (SEM) using the Partial Least Squares (PLS) approach, sample size determination can refer to several guidelines. As an initial rule of thumb, the "10-times rule" is often used, which recommends a minimum sample size of 10 times the number of formative indicators on the latent variable with the most formative indicators, or 10 times the number of structural paths directed toward a specific latent variable (dependent variable) with the largest number of paths in the model (Hair et al., 2017). However, to achieve more stable results, robust parameter estimation, and sufficient statistical power in the PLS-SEM model, Hair et al. (2017) recommend a minimum sample size between 100 and 150 respondents. Considering the complexity of this research model, which involves multiple latent variables and the potential testing of moderation effects, this study targets collecting data from 150 to 200 respondents who meet the research criteria. This sample size is considered adequate to produce stable estimates, reduce the risk of Type II error, and provide sufficient statistical power for hypothesis testing, including moderation effect analysis, which generally requires larger sample sizes to detect significant effects.

## Data Collection Technique

The data used in this study are primary data collected directly from respondents. The main data collection instrument is a questionnaire composed of closed-ended questions. The questions will use a 5-point Likert Scale with the following range:

1 = Strongly Disagree (SD)

2 = Disagree (D)

3 = Neutral (N)

4 = Agree (A)

5 = Strongly Agree (SA)

The questionnaire will be distributed online via platforms such as Google Forms. This distribution method is chosen to efficiently reach respondents and expedite the data collection process, especially considering the target population dispersed across Depok City.

The questionnaire dissemination will be conducted in collaboration with MSME networks, women entrepreneurs' associations, and relevant agencies/institutions in Depok City that have access to and contacts with the target population. This approach is expected to maximize the participation rate of respondents who meet the research criteria.

## Data Analysis Technique

This study employs the **Partial Least Squares Structural Equation Modeling (PLS-SEM)** method for data analysis. This approach is selected due to its ability to handle complex models, its flexibility with non-normal data distributions, and its focus on prediction and theory development (Hair et al., 2017). The software used for the analysis is **SmartPLS 3**. The data analysis process will be conducted in two main stages, following the procedures recommended by Hair et al. (2017):

### **Stage 1: Evaluation of the Measurement Model (Outer Model)**

This stage aims to test the validity and reliability of the indicators measuring each latent variable (construct).

1. **Convergent Validity**. Measures the extent to which the indicators of a construct converge or correlate highly and positively with each other, indicating that they measure the same construct. Evaluation is conducted through:
  - *Outer Loadings (or Factor Loadings)*: Each indicator should have a loading value above 0.70 on its respective construct. Indicators with loading values below 0.70 but above 0.50 may be retained if no other significant indicators exist and their removal does not substantially improve AVE or Composite Reliability (Hair et al., 2017).
  - *Average Variance Extracted (AVE)*: The AVE for each construct should be greater than 0.50, indicating that the construct explains more than 50% of the variance of its indicators.
2. **Discriminant Validity**. Ensures that a construct is empirically distinct and unique from other constructs in the model, without overlap. Evaluation is conducted through:
  - *Fornell-Larcker Criterion*: The square root of the AVE of each construct should be higher than the correlations of that construct with any other construct in the model.
  - *Heterotrait-Monotrait (HTMT) Ratio*: The HTMT value between constructs should be less than 0.90 (recommended < 0.85 for more conservative conditions) to indicate good discriminant validity (Henseler et al., 2015).
3. **Construct Reliability**. Measures the internal consistency of a set of indicators measuring a construct, showing the extent to which measurement results would remain consistent if the study were repeated. Evaluation is conducted through:
  - *Cronbach's Alpha*: The value should be greater than 0.70. However, Hair et al. (2017) suggest values above 0.60 for exploratory research.
  - *Composite Reliability*: The value should be greater than 0.70 (or > 0.60 for exploratory research), indicating good reliability and considered more suitable for PLS-SEM than Cronbach's Alpha.

### **Stage 2: Evaluation of the Structural Model (Inner Model)**

This stage aims to test the relationships between constructs and the research hypotheses, as well as the model's predictive power.

1. **Coefficient of Determination ( $R^2$ )**. Measures the proportion of variance in the dependent variable (endogenous construct) explained by the independent variables (exogenous constructs) in the model.  $R^2$  values of 0.75, 0.50, and 0.25 can be interpreted as substantial, moderate, and weak, respectively (Hair et al., 2017).

2. **Effect Size ( $f^2$ )**. Measures the relative impact of a specific predictor variable on the  $R^2$  of the dependent variable.  $f^2$  values of 0.02, 0.15, and 0.35 indicate small, medium, and large effects, respectively (Cohen, 1988, in Hair et al., 2017).
3. **Predictive Relevance ( $Q^2$  or Stone-Geisser's  $Q^2$ )**. Assesses the model's ability to predict new observational data.  $Q^2$  is calculated using the blindfolding procedure.  $Q^2$  values greater than 0 indicate that the model has predictive relevance for the endogenous constructs.
4. **Model Fit**. Although PLS-SEM does not emphasize overall model fit as CB-SEM does, some indices such as the Standardized Root Mean Square Residual (SRMR) and Normal Fit Index (NFI) can be used to assess how well the hypothesized model fits the data. SRMR should be less than 0.08 for a good model fit (Henseler et al., 2014). NFI should be greater than 0.90 (Henseler et al., 2014).
5. **Hypothesis Testing (Path Coefficient)**. Hypotheses are tested using the bootstrapping procedure (resampling with 5,000 subsamples) in SmartPLS 3 to obtain t-statistics and p-values for each path relationship. *Direct Effect Hypotheses (H1, H2)*: A hypothesis is accepted if the t-statistics value (result of bootstrapping) is greater than the critical value (e.g., 1.96 for a two-tailed significance level of  $\alpha = 0.05$ ) or if the p-value is less than 0.05. Additionally, the direction of the path coefficient should align with the hypothesized effect (e.g., positive for an expected positive effect).

## RESULTS AND DISCUSSION

### Evaluation of the Measurement Model (Outer Model)

The evaluation of the outer model is carried out to ensure that the research instrument (questionnaire) is valid and reliable.

1. **Convergent Validity**. Convergent validity indicates that the indicators of a construct truly measure the intended construct. The criteria used are Outer Loadings  $> 0.70$  and Average Variance Extracted (AVE)  $> 0.50$ .

**Tabel 2. Results of Convergent Validity and Reliability Testing**

Construct	Indicator	Outer Loadings	AVE	Composite Reliability (CR)	Cronbach's Alpha (CA)	Remarks
Financial Literacy	X11	0,796	0.716	0.926	0.900	Valid and Reliable
	X12	0,899				
	X13	0,861				
	X14	0,890				
	X15	0,779				
Digital Access	X21	0,861	0.604	0.884	0.836	Valid and Reliable
	X22	0,739				
	X23	0,707				
	X24	0,749				

	X25	0,821				
Success of Women-led MSMEs	Y11	0,717	0.696	0.926	0.888	Valid and Reliable
	Y12	0,904				
	Y13	0,881				
	Y14	0,885				
	Y15	0,786				

### Results of Table 1

- **All Outer Loadings values are above 0.70**, indicating that each indicator adequately reflects its respective construct.
- **All AVE values exceed the threshold of 0.50**, confirming that the variance captured by the constructs is greater than the variance due to measurement error. Thus, convergent validity for all constructs has been established.
- **Internal Consistency Reliability**. Reliability was measured using **Composite Reliability (CR)** and **Cronbach's Alpha (CA)** with a criterion of  $> 0.70$ . CR values for all constructs are well above 0.70. o CA values for all constructs are also above 0.70. In conclusion, all constructs exhibit very good reliability.
- **Discriminant Validity**. Discriminant validity ensures that each construct is empirically distinct from other constructs. The method used is the **Fornell-Larcker criterion**.

**Table 3. Results of Discriminant Validity Testing (Fornell-Larcker Criterion)**

	Financial Literacy	Digital Access	Success of Women-led MSMEs
Financial Literacy	<b>0.777</b>		
Digital Access	0.706	<b>0.834</b>	
Success of Women-led MSMEs	0.457	0.708	<b>0.846</b>

### Discriminant Validity

Based on Table 3, the square root of the AVE for each construct (diagonal values) is higher than its correlations with other constructs in the same rows and columns. This indicates that discriminant validity is established.

### Evaluation of the Structural Model (Inner Model)

This evaluation aims to test the relationships between constructs and the predictive power of the model. The structural model in PLS-SEM evaluates the relationships between latent variables (constructs) and the model's predictive capability. This includes hypothesis testing and assessing how well the model explains and predicts the dependent variable (Hair et al., 2017).

1. **Multicollinearity Testing Between Latent Constructs (Inner VIF).** Multicollinearity testing ensures there is no excessively high correlation among predictor variables (exogenous constructs) that could bias path coefficient estimation. The common criterion is that the **Variance Inflation Factor (VIF)** should be below 5.0 (Hair et al., 2017). A VIF value below 3.3 is often recommended to ensure the model is free from lateral collinearity problems (Kock, 2015). The analysis results show the following VIF values between latent constructs:

Digital Access → MSME Success: **VIF = 1.264**

Financial Literacy → MSME Success: **VIF = 1.264**

2. Both VIF values are well below the 5.0 threshold (and even below 3.3). This indicates **no serious multicollinearity issues** among the latent predictor variables (Financial Literacy and Digital Access). Thus, the path coefficient estimates produced by this model can be considered unbiased with respect to collinearity among constructs.

3. **Coefficient of Determination (R<sup>2</sup>).** The coefficient of determination (R<sup>2</sup>) measures the proportion of variance in the dependent variable (endogenous construct) explained by the independent variables (exogenous constructs) in the model. R<sup>2</sup> values range from 0 to 1. The model produces a **high R<sup>2</sup> value of 68.7%**, indicating strong explanatory power—meaning that Financial Literacy and Digital Access explain 68.7% of the variance in the success of women-led MSMEs. The remaining 31.3% is influenced by other factors not included in the model (such as product innovation, business capital, government support, business networks, etc.).

4. **Effect Size (f<sup>2</sup>)**

Effect size (f<sup>2</sup>) assesses the relative contribution of each predictor variable to the R<sup>2</sup> of the dependent variable, helping determine the practical significance of each path relationship. According to Cohen (1988, in Hair et al., 2017), f<sup>2</sup> values of **0.02, 0.15, and 0.35** indicate small, medium, and large effects, respectively.

5. **Analysis Results:**

Digital Access → MSME Success: **f<sup>2</sup> = 0.590** → very large effect.

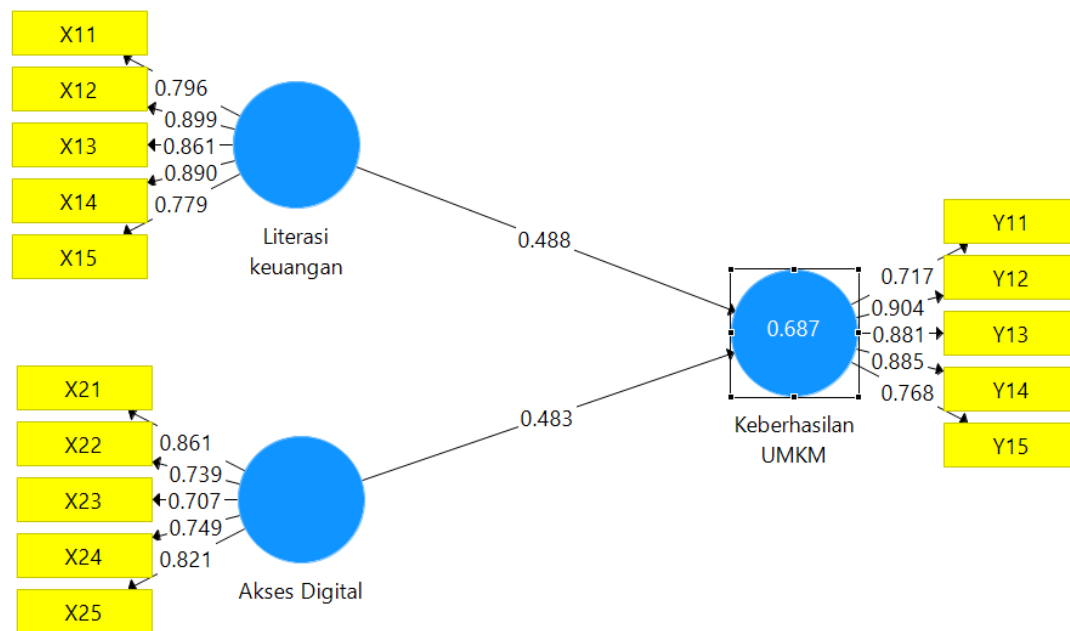
Financial Literacy → MSME Success: **f<sup>2</sup> = 0.601** → very large effect. Both variables (Financial Literacy and Digital Access) exert strong and significant effects on the success of women-led MSMEs. The f<sup>2</sup> values are nearly identical, suggesting their contributions are relatively balanced. From a managerial perspective, programs to enhance both factors should be implemented simultaneously since both produce large effects.

6. **Model Fit**

Model fit evaluates how well the hypothesized model corresponds to the observed data. In PLS-SEM, indicators such as the **Standardized Root Mean Square Residual (SRMR)** and **Normed Fit Index (NFI)** are frequently used.

7. **SRMR = 0.079**, which is below the recommended threshold of  $< 0.10$  (Hair et al., 2017; Henseler et al., 2014). This indicates that your model has a **good fit**, demonstrating strong agreement between the theoretical model and the observed data.
8. **NFI = 0.781**, which is in the moderate category. While the ideal value is often  $> 0.90$ , values above 0.70 are generally considered adequate for PLSSEM (Hair et al., 2017), especially in exploratory research or when the model is complex. This suggests that your model is reasonably capable of reproducing the observed correlations in the data.

### Hypothesis Testing and Path Analysis



### Discussion of Hypothesis Results

1. Hypothesis 1 (Accepted): *Financial Literacy has a positive effect on MSME Success ( $\beta = 0.488$ )*. The higher the financial literacy of women MSME entrepreneurs, the greater their likelihood of achieving business success. This finding confirms that financial knowledge and management capabilities—such as budgeting, cash flow management, and risk assessment—are critical drivers of sustainable business performance and growth.
2. Hypothesis 2 (Accepted): *Digital Access has a positive effect on MSME Success ( $\beta = 0.483$ )*. The better the access of women MSME entrepreneurs to digital technology (devices, internet, applications), the higher their level of business success. This result supports the view that digital platforms and tools enhance market reach, improve operational efficiency, and provide competitive advantages in the current business environment.

Together, these findings highlight the importance of strengthening **both financial literacy and digital access simultaneously** to promote sustainable growth and competitiveness of women-led MSMEs.

## Discussion

### The Influence of Financial Literacy on the Success of Women-led MSMEs

Based on the results of your structural model analysis, Hypothesis 1, which states that Financial Literacy has a positive effect on MSME Success, was accepted with a path coefficient ( $\beta$ ) of 0.488. This value indicates a strong and significant positive relationship. Specifically, the higher the financial literacy level of women MSME entrepreneurs, the greater their likelihood of achieving business success.

A substantial body of empirical literature consistently supports the positive relationship between financial literacy and MSME success. Entrepreneurs with good financial literacy tend to make more accurate financial decisions, including capital allocation, investment, product pricing, and debt management. They are more aware of financial risks and opportunities skills essential for business growth and sustainability (Lusardi & Mitchell, 2019).

Financial literacy helps MSMEs plan, monitor, and manage cash flow. The ability to effectively manage inflows and outflows of cash prevents liquidity problems that often cause small business failures. Financially literate owners are better able to prepare budgets, separate personal and business finances, and track transactions (Fatoki, 2017). Good financial knowledge enables MSME actors to understand different types of financial products, loan conditions, interest rates, and bank or financial institution requirements. This increases their chances of obtaining appropriate and beneficial financing and prevents them from being trapped in illegal high-interest online loans, as highlighted in “Empower Women, Drive the Economy” (2023), which discusses Ultra Micro Financing (UMi) as a rational loan alternative.

Financial literacy allows entrepreneurs to perform financial projections, analyze profitability, and evaluate the financial health of their business. This supports the development of more realistic and sustainable long-term business strategies and helps identify areas for expansion or cost savings (Remund, 2019). According to Kim et al. (2017), MSMEs managed by individuals with higher financial literacy tend to have better profitability and growth rates because they can identify profitable investment opportunities, manage costs efficiently, and optimize revenues.

Specifically for women-led MSMEs, financial literacy can be an empowering factor that helps them overcome traditional barriers and achieve economic independence, positively impacting household welfare (“Empower Women, Drive the Economy,” 2023).

The positive influence between financial literacy and MSME success supports Human Capital Theory, which states that investments in knowledge, skills, and abilities (human capital) increase productivity and income. In this context, financial literacy is a form of human capital. Entrepreneurs who invest time and effort to improve their financial knowledge have higher human capital, enabling them to make smarter business decisions, manage risks more effectively, and seize opportunities—ultimately contributing to business success and growth.

This also supports the Resource-Based View (RBV), which argues that a firm's competitive advantage and superior performance stem from owning and leveraging valuable, rare, inimitable, and non-substitutable resources and capabilities. Financial literacy, as specialized knowledge and skills possessed by entrepreneurs, can be considered an intangible resource. The ability to manage finances effectively, analyze reports, and make sound investment decisions represents a core capability that is difficult for less financially literate competitors to imitate. Thus, financial literacy forms a foundation for creating sustainable competitive advantage for MSMEs.

### **The Influence of Digital Access on the Success of Women-led MSMEs**

Hypothesis 2, which states that Digital Access has a positive effect on MSME Success, was accepted with a path coefficient ( $\beta$ ) of 0.483. This finding shows that the better the access of MSME actors to digital technology (devices, internet, applications), the higher their level of business success. The path coefficient of 0.483 indicates that digital access has a strong and substantial impact on MSME success.

Numerous studies and literature consistently support this positive influence. Access to digital technology enables MSMEs to automate various business processes such as inventory management, accounting, and customer service (Hendrawan et al., 2024; Iskandar et al., 2025; Ikhwan HS & Himawati, 2024). Automation can significantly reduce operational costs, speed up processes, and improve service accuracy and responsiveness (Hendrawan et al., 2024; Nashir et al., 2025). For instance, studies show that using business management software can reduce MSME operational costs by up to 30% (Nashir et al., 2025). Digitalization also simplifies transaction processes, strengthens infrastructure reliability, and automates financial operations (Sipayung, 2025).

Digital technology—particularly e-commerce platforms, social media, and digital marketing—gives MSMEs the ability to reach markets far beyond their physical locations, including national and even international markets (Hendrawan et al., 2024; Hamzah et al., n.d.; Iskandar et al., 2025; Indrayanto et al., 2024). MSMEs utilizing ecommerce and social media have recorded sales increases of up to 40% (Nashir et al., 2025). Digital marketing is also a strong predictor of increased brand awareness and customer interaction (Iskandar et al., 2025).

Access to digital applications and analytics tools enables MSMEs to collect and analyze customer data, market behavior, and promotional performance (Hendrawan et al., 2024; Nashir et al., 2025).

Insights from such data analysis allow business owners to make more precise strategic decisions and tailor their products and services to customer needs (Hendrawan et al., 2024; Nashir et al., 2025). Adoption of digital technology also drives MSMEs to innovate and develop new products, increasing their innovative capacity (Ikhwan HS & Himawati, 2024; Sipayung, 2025).

Digitalization and technology adoption have been proven to enhance the overall business performance of MSMEs (Affandi et al., 2024; Kurniasari et al., 2023). Digital utilization in marketing, advertising, transactions, communication, and funding makes MSMEs more resilient in maintaining sustainable performance, especially during crises (Putra et al., 2023). MSMEs that adopt digital technology show better business performance (Iskandar et al., 2025).

Despite its potential benefits, literature also shows that MSMEs face challenges in digital adoption, such as limited financial and human resources, inadequate digital

infrastructure, and insufficient digital literacy among owners and employees (Hendrawan et al., 2024; Nashir et al., 2025; Faiz, 2023; Dwiputri et al., 2025; Usulu et al., 2023). This underscores that while digital access is essential, comprehensive support is required to optimize its utilization.

The positive influence of digital access on MSME success supports the Diffusion of Innovation (DOI) Theory, the Resource-Based View (RBV), and the Dynamic Capabilities Theory

1. Diffusion of Innovation (DOI) Theory by Everett Rogers. This theory explains how new ideas, practices, or objects (innovations) spread within a social system. Digital technology represents such an innovation, and better access (e.g., availability of devices, internet, and applications) directly facilitates the key adoption factors (Faiz, 2023; Davis, 1989; Santoso, 2010):
  - a. Relative Advantage: Access enables MSMEs to see how digital technology offers greater benefits (higher sales, lower costs, wider market reach) compared to traditional methods (Rahmawati et al., 2024; Faiz, 2023).
  - b. Compatibility: With access, MSMEs can more easily recognize how digital technology aligns with their values, experiences, and needs (Rahmawati et al., 2024; Faiz, 2023).
  - c. Trialability: The availability of devices, internet, and applications allows MSMEs to try and experiment with technology on a small scale before full adoption (Faiz, 2023).
  - d. Observability: When other MSMEs with digital access successfully adopt technology, it motivates additional MSMEs to follow suit (Faiz, 2023). Adequate access therefore lowers the initial barriers to adoption and accelerates the diffusion of digital innovation, which in turn drives MSME success.
2. Resource-Based View (RBV). This theory posits that sustainable competitive advantage arises from owning and leveraging resources and capabilities that are Valuable, Rare, Inimitable, and Non-substitutable (VRIO). In the digital context, access to technology and the ability to utilize it effectively can serve as valuable resources (Iskandar et al., 2025). MSMEs with good digital access (e.g., stable internet infrastructure, advanced software) can transform these resources into unique capabilities (e.g., efficient digital supply chain management systems, hyper-targeted marketing strategies). If such capabilities are rare and difficult for competitors to imitate, they can create a competitive advantage supporting long-term business success.
3. Dynamic Capabilities Theory. In a rapidly changing and digitalized business environment, a firm's ability to integrate, build, and reconfigure internal and external competencies is key to achieving sustainable competitive advantage (Díaz-Arancibia et al., 2024; Hardaningtyas & Sudarmiati, 2023). Digital access is a prerequisite for developing these dynamic capabilities. With sufficient access, MSMEs can:
  - Sense: Identify opportunities and threats arising from changes in digital technology and market trends.
  - Seize: Take steps to capitalize on these opportunities, such as adopting new platforms or developing digital products.

- Transform/Reconfigure: Adapt and reconfigure organizational structures, processes, and business models to fit the needs and potential offered by digital technology (Díaz-Arancibia et al., 2024).

Good digital access enables MSMEs to proactively adapt and innovate, which is key to success in a dynamic business environment.

## CONCLUSION

Financial Literacy has a positive effect on MSME Success, and Digital Access also has a positive effect on MSME Success. These two findings indicate that both financial literacy and digital access are strong and substantial determinants of the success of women-led MSMEs.

High financial literacy enables women entrepreneurs to make sound financial decisions, manage cash flow, plan investments, and access capital more effectively—skills essential for business sustainability and growth. Conversely, digital access provides them with tools to expand market reach through e-commerce and social media, improve operational efficiency, and leverage digital financial services (FinTech), all of which contribute to enhanced performance and competitiveness.

Theoretically, these findings are consistent with Human Capital Theory, the ResourceBased View (RBV), the Diffusion of Innovation Theory, and the Dynamic Capabilities Theory, all of which emphasize that knowledge, skills, and adaptability to technology are key to creating competitive advantage and achieving business success in dynamic environments. Nevertheless, the study also highlights the gap between the ideal conditions and on-the-ground realities, where women MSMEs continue to face challenges such as low digital literacy, inadequate infrastructure, and limited capital.

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