

# Digital Financial Literacy and Green Fintech Adoption Enhancing Sustainable MSME Financial Performance Based on SDGs

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## Abstract

**Purpose:** This community service-based study examines the implementation of Digital Financial Literacy and Green Fintech Adoption programs to improve the Sustainable Financial Performance of MSMEs in Indonesia within the Sustainable Development Goals (SDGs) framework.

**Methodology:** A quantitative survey approach was applied, involving 600 MSMEs across several Indonesian provinces. Community empowerment activities include digital financial literacy assistance, green fintech education, and sustainability-oriented business mentoring. Data were analyzed using the SEM-PLS with SmartPLS 3.0.

**Results:** The findings indicate that Digital Financial Literacy and Green Fintech Adoption positively and significantly improve Sustainable Financial Performance. Sustainable Business Practices mediate the relationship between digital capabilities and financial performance, while Government Support strengthens the relationship between sustainable practices and financial outcomes.

**Conclusions:** Community service interventions focusing on digital financial capability development, green fintech utilization, and sustainability-oriented business mentoring effectively enhance MSMEs' sustainable financial performance. Government support also strengthens the effectiveness of sustainability programs.

**Limitations:** This study is limited by its cross-sectional design and self-reported data from MSMEs that participated in digital financial service programs.

**Contributions:** This study extends the Dynamic Capabilities Theory in the context of community empowerment, digital finance, and sustainable MSME development while providing practical implications for policymakers and MSME practitioners.

**Keywords:** *Digital Financial Literacy, Government Support, Green Fintech Adoption, Sustainable Business Practices, Sustainable Financial Performance*

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## 1. Introduction

Digital transformation has significantly changed the financial ecosystem of Micro, Small, and Medium Enterprises (MSMEs) in Indonesia through the rapid growth of digital payment systems, FinTech platforms, and technology-based financial services (Mang'ana & Nade, 2026). These developments provide MSMEs with easier access to financial services, improve transaction efficiency, and strengthen financial inclusion (Asare, Duho, Amoako, Ansah, & Bada, 2025). MSMEs can now conduct real-time transactions (Hendra, Hudzafidah, Wilamsari, & Suharsono, 2026), maintain digital financial records,

and obtain broader financing opportunities through digital financial platforms ([Ahmed, Shu, Luo, & Ali, 2026](#)). Therefore, digital financial technology has become an important strategic instrument for improving MSME sustainability and competitiveness ([Diana Anggraini et al., 2026](#)).

However, previous studies on the relationship between digital financial technology and MSME financial performance have shown inconsistent findings ([Başar, Keskin, Esen, Merter, & Balcıoğlu, 2025](#)). Several studies have reported that digital financial adoption improves operational efficiency, profitability, and access to finance ([Chakhovich & Virtanen, 2025](#)). In contrast, other studies found insignificant effects because many MSMEs adopt technology without possessing adequate internal capabilities to optimize its utilization ([Chomachaei, Kaffash, & Ertugrul, 2026](#)). These contradictory findings indicate that technology adoption alone is insufficient to ensure sustainable financial performance ([Dash, Gupta, Singh, & Sharma, 2025](#)).

Dynamic capabilities theory explains that firms require adaptive capabilities to integrate and transform resources into sustainable competitive advantages ([Teece, 2007](#)). In this context, digital financial literacy represents an important organizational capability ([Hasibuan, Suliyanto, & Novandari, 2026](#)) that enables MSMEs to effectively understand, manage, and utilize digital financial services ([Malau & Puspitasari, 2026](#)). MSMEs with better digital financial literacy are more capable of making strategic financial decisions, improving operational efficiency, and strengthening long-term financial sustainability ([Diana Anggraini et al., 2026](#)).

Alongside digital transformation, sustainability issues have also become increasingly important following the implementation of the Sustainable Development Goals (SDGs) ([Durst, Hinteregger, & Zöller, 2025](#)). MSMEs are now expected not only to pursue financial growth but also to integrate environmental responsibility into their business operations ([Suryani, Setiaji, Retnaningsih, & Alfianto, 2025](#)). One important innovation supporting this transformation is green fintech adoption, which combines financial technology with environmentally sustainable practices ([Hasanah et al., 2025](#)) such as paperless transactions, green financing, and efficient resource utilization ([El Amri, Omar Mohammed, & Bekiroğlu, 2026](#)). Previous studies reported that green fintech contributes to operational efficiency and sustainable performance improvement ([Etuna Aimwata & Sunde, 2025](#)). Nevertheless, many MSMEs still adopt fintech mainly for transactional convenience rather than sustainability-oriented business transformation ([Etuna Aimwata & Sunde, 2025](#)).

Another important issue is that previous studies rarely explain the mechanisms through which digital capabilities ([Hendra et al., 2026](#)) and green fintech adoption improve sustainable financial performance ([Gholipour, Andargoli, Tajaddini, Farzanegan, & Chege, 2026](#)). Sustainable business practices are important because they reflect how MSMEs integrate economic, environmental, and social considerations into their business activities ([Shuwaikh, Tanguy, Dubocage, & Alolah, 2025](#)). In addition, government support through policies, training programs, and financial incentives also plays an important role in encouraging MSMEs to adopt sustainable digital financial practices ([Suryani et al., 2025](#)). However, few studies have examined the moderating role of government support in strengthening sustainability-oriented financial performance ([Hidayat-ur-Rehman & Hossain, 2024](#)).

Based on these gaps, this study aims to analyze the influence of digital financial literacy and green fintech adoption on sustainable financial performance among Indonesian MSMEs. This study also examines the mediating role of sustainable business practices and the moderating role of government support. By integrating dynamic capabilities theory with sustainability and digital finance perspectives, this study provides empirical evidence on how MSMEs can strengthen sustainable financial performance through digital and environmentally oriented financial transformation aligned with the SDGs agenda.

## **2. Literature Review and Hypotheses Development**

### **2.1 *Dynamic Capabilities Theory***

Dynamic capabilities theory deals with what happens when a firm has integrated, built, and reconfigured internal and external competencies to address rapidly changing environments by integrating new

knowledge, skills, processes, or resources to achieve a better competitive advantage ([Teece, 2007](#)). This practical theory emphasizes that it is not the possession of resources, but how well firms adapt, renew, and redeploy their resources to suit changing environments that drives organizational performance. Dynamic capabilities help adopt new technologies in line with strategic goals to yield better performance outcomes over the long run against a digital transformation and sustainability background.

Dynamic capabilities theory was developed as a result of the imperfectness of RBV because the core concept of the RBV approach is static resource advantages. This perspective was then extended by scholars to account for adaptability, organizational learning, and innovation in complex environments characterized by technological disruption and market unpredictability. This theory has progressed into an array of microfoundations in a wider framework encompassing opportunity sensing, resource seizing, and organizational process transformation. Recent studies have adapted its use for the study of digital transformation and sustainability, with a capabilities perspective on both the ability to leverage digital technologies and business strategies integrating environmental concerns ([Teece, 2007](#)).

In this study, dynamic capabilities theory provides a comprehensive framework for deciphering how MSMEs can turn digital financial literacy and green fintech adoption into sustainable financial performance ([Teece, 2007](#)). This reiterates that MSMEs should not only adopt fintech but also develop a repertoire to make its use strategic and sustainable. Sustainable business practices are also considered the outcome of dynamic capabilities, which mediate the link between digital competences and sustainable financial performance ([Jaiyeoba, Abdullah, & Khalid, 2025](#)). Thus, the base of this theory becomes the center of attention in a theorized connection between digital literacies, green fintech adoption, and sustainability-oriented financial outcomes.

## **2.2 Digital Financial Literacy**

Digital financial literacy means enabling individuals and firms to make sense of, access, and use digital financial products and services at the appropriate time, covering knowledge of digital payment systems and fintech platforms, understanding risk management, and making the right financial decisions in terms of choice or how to allocate resources ([Zhou, Li, Abbasi, & Ahmad, 2026](#)). This idea goes far beyond general financial literacy to include digital skills, such as the technical abilities needed for more recent advancements in the financial ecosystem. Digital financial literacy is important for better handling finance and improving decision-making quality, especially in the MSME sector ([Yadav, Sharma, & Kathuria, 2025](#)).

Digital financial literacy is a key organizational capability that allows MSMEs to sense and seize changes initiated by digital financial innovations, as viewed through the lens of Dynamic Capabilities Theory ([Teece, 2007](#)). This comprises the capability to convert technological assets into competitive benefits by facilitating financial planning, mitigating inefficiencies, and enhancing firms' flexibility in volatile settings. In the absence of sufficient literacy, the deployment of digital financial instruments can only be mouthing, but it will not contribute to sustainable performance ([Ruiz, 2026](#)).

Consistent with earlier studies, the evidence shows that digital financial literacy and business sustainability positively influence financial performance. Studies show that MSMEs with a higher level of financial literacy make better financial decisions and have better business outcomes ([Muat, Mahdzan, Sukor, Fachrurrozi, & Sari, 2025](#)). According to a separate study, improved digital literacy becomes more effective with the adoption of fintech, which helps improve efficiency and financial resilience ([Mazzoli & Baiocco, 2025](#)). These results further support the conclusion that sustainable financial performance is associated with digital financial literacy.

*H<sub>1</sub>: Digital financial literacy positively affects sustainable financial performance*

## **2.3 Green Fintech Adoption**

Green fintech adoption means integrates the tenets of environmental sustainability (paperless transactions, green financing mechanisms, energy-efficient processes, and environmentally responsible financial practices) ([Umar, Horobet, Negreanu, Belascu, & Mirza, 2025](#)). Digital sustainability is the combination of digital innovation with sustainability goals to help firms minimize their environmental

footprint while maximizing operational efficiencies ([Ullah, Qiu, Khan Kakar, & Sami, 2026](#)). Contextualized within the scope of dynamic capabilities theory, green fintech adoption helps MSMEs reconfigure their financial practices in the adoption and implementation of more sustainable financial practices ([Teece, 2007](#)). This enables companies to synergize technological adoption with environmental objectives, creating a value proposition that affects social and natural landscapes. Such alignment makes it easier for firms to be sustainably viable and resilient in the long run ([Teece, 2007](#)).

Evidence from empirical studies suggests that adopting green fintech technologies is positively associated with financial environmental performance. ([Sun, Li, & Mehmood, 2025](#)) find that firms that undertake green fintech achieve improved operational performance and reduced expenditure ([Shi & Yang, 2025](#)). In a second study, it was shown that sustainability-oriented fintech practices positively impact firm performance and stakeholder trust ([Sharma, Vasishta, & Singla, 2024](#)). These results indicate that green fintech adoption is an important process that leads to sustainable financial performance.

*H<sub>2</sub>: Green fintech adoption positively affects sustainable financial performance*

## **2.4 Sustainable Business Practices**

Sustainable business practices are corporate activities that consider the economic, environmental, and social impacts of business operations ([Asare et al., 2025](#)). These practices consist of efficient resource consumption, eco-friendly methods, and budget-friendly business processes that ensure business sustainability ([Chomachai et al., 2026](#)). As we move towards a more sustainability-centric market landscape, it becomes even more crucial for MSMEs to adopt sustainable practices if they wish to remain competitive ([Dash et al., 2025](#)).

In the context of dynamic capabilities theory, sustainable business practices are considered to be the transformation phase wherein firms assimilate their capabilities with sustainability goals. These practices serve as a medium through which financial literacy and green fintech translate into formal outcomes. MSMEs avoid risk, improve capacity, and ensure better long-run sustainability by embedding the concept of sustainability in their daily value-creation operations ([Teece, 2007](#)).

Earlier studies have pointed out the mediating role of sustainable business practices in connecting capabilities and performance. Another study found that firm performance impacts sustainability practices ([Durst et al., 2025](#)). A recent study revealed that companies that focus on sustainability improve their financial and non-financial results ([Jaiyeoba et al., 2025](#)). The findings suggest that sustainable business practices are a necessary bridge to convert capabilities into sustainable financial performance.

*H<sub>3</sub>: Sustainable business practices as a mediator between digital financial literacy to sustainable financial performance*

*H<sub>4</sub>: Sustainable business practices positively affect sustainable financial performance*

*H<sub>5</sub>: Sustainable business practices as a mediator between green fintech adoption to sustainable financial performance*

## **2.5 Government Support**

Government support refers to policies and regulations and the only terminology for MSMEs (Micro, Small & Medium Enterprises) ([Ahmed et al., 2026](#)). This includes financial literacy schemes, fintech compliance regulations, green finance incentives, and skill-strengthening programs ([Gholipour et al., 2026](#)). From the perspective of Dynamic Capabilities Theory, government support acts as an external 'enabler that increases firms' readiness to build and apply capabilities ([Teece, 2007](#)). It offers domestic support to lower adoption thresholds and improve the appropriateness of digital and green innovations. The government significantly influences the ecosystem in which MSMEs operate ([Teece, 2007](#)).

Several studies have investigated the effect of government assistance on MSMEs innovation adoption outcomes ([Jayasinghe et al., 2025](#)). According to one study, digital transformation initiatives are better able to achieve their objectives when policy support is provided ([Shuliang, Brentuo, Horsey, & Osei, 2026](#)). Research [Wang, Zhou, Guan, and Dai \(2026\)](#) you train using data until October 2023, showing

how government incentives can amplify the effect of sustainability practices on firm performance. This suggests that government support has a moderating effect on the relationship between green fintech adoption and sustainable financial performance ([Chomachaei et al., 2026](#)).

*H<sub>6</sub>*: Government support moderates the relationship between sustainable business practices to sustainable financial performance

### 3. Methodology

This study employed a quantitative research design with an explanatory approach to examine the causal relationships among digital financial literacy, green fintech adoption, sustainable business practices, government support, and sustainable financial performance. A quantitative approach was considered appropriate because the latent variables can be systematically measured and statistically tested to produce generalizable findings ([Hair Jr et al., 2021](#)). This study used a cross-sectional design in which data were collected at a single point in time to evaluate MSMEs' implementation of digital and sustainable financial practices in Indonesia.

The population of this study consisted of active MSMEs in Indonesia, with more than 65 million business units recorded by the Ministry of Cooperatives and SMEs in Indonesia. The respondents were distributed across several provinces representing western, central, and eastern Indonesia, including North Sumatra, West Sumatra, Lampung, DKI Jakarta, West Java, Central Java, East Java, Bali, West Nusa Tenggara, East Kalimantan, South Sulawesi, and Papua. Approximately three to four districts or cities were selected from each province based on digital financial service penetration, MSME characteristics, and government support program availability. This distribution aimed to capture regional differences in digital readiness and sustainability practices among MSMEs in India.

A total of 600 MSMEs were selected using stratified random sampling based on geographical region and business sector. The sample size exceeded the minimum SEM-PLS requirement and was considered sufficient to reliably estimate direct, mediating, and moderating effects ([Hair Jr et al., 2021](#)). The inclusion criteria were MSMEs operating for at least two years, employing 5–50 workers, and using at least one form of digital financial service or fintech platform. Data were collected using a structured questionnaire distributed to MSME owners and managers as key informants. All variables were measured using a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). Digital financial literacy was measured using six indicators, green fintech adoption using five indicators, sustainable business practices using seven indicators, government support using four indicators, and sustainable financial performance using six indicators. The measurement items were adapted from previous studies on digital finance, sustainability, and MSME performance. Prior to the main survey, a pilot test involving 30 MSMEs was conducted to evaluate the clarity, validity, and reliability of the questionnaire.

The data analysis technique used was Structural Equation Modeling-Partial Least Squares (SEM-PLS) with SmartPLS 3.0 software ([Hair Jr et al., 2021](#)). SEM-PLS was selected because it is suitable for complex models involving multiple latent variables and is robust for non-normal data distributions ([Hair Jr et al., 2021](#)). The analysis consisted of two stages: evaluation of the measurement model (outer model) and evaluation of the structural model (inner model). The outer model assessment included indicator reliability, composite reliability, Cronbach's alpha, convergent validity and discriminant validity. Meanwhile, the inner model evaluation assessed path coefficients,  $R^2$ ,  $f^2$ , and  $Q^2$  values to determine the strength and predictive relevance of the relationships among variables ([Hair Jr et al., 2021](#)). In addition, mediation analysis was conducted to examine the mediating role of sustainable business practices in the relationship between digital financial literacy, green fintech adoption, and sustainable financial performance. Moderation analysis was also performed to investigate the moderating role of government support in strengthening the relationship between sustainable business practices and sustainable financial performance. Furthermore, a descriptive analysis using the three-box method was applied to classify the respondents' perceptions into low, moderate, and high categories. This analytical procedure provides a comprehensive understanding of the structural relationships and empirical conditions of MSMEs in Indonesia. The research model is presented in Figure 1.

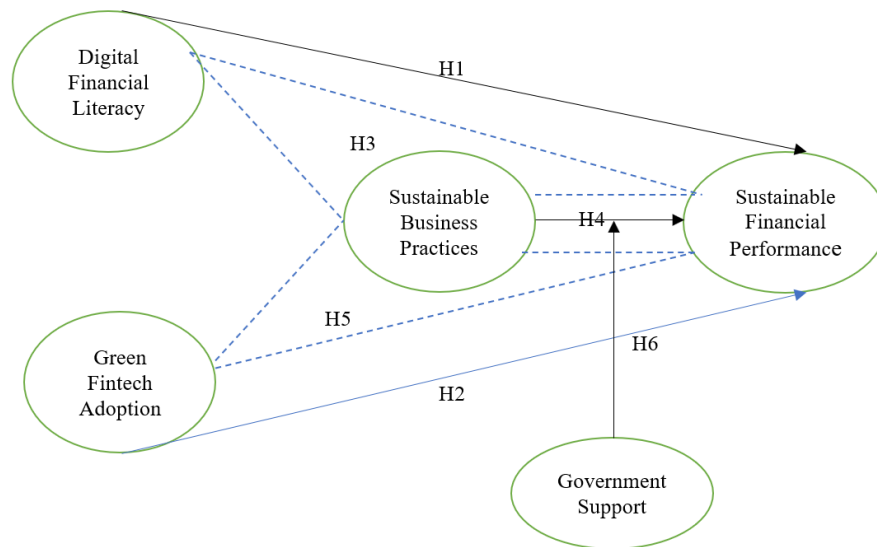


Figure 1. Research model

## 4. Results and Discussions

### 4.1 Result

#### 4.1.1 Respondent Profile

The respondent profile outlines general MSME characteristics in this study based on gender, region, business sector, firm size, business experience, and use of digital financial services. A single table was used to simplify the presentation while keeping important details relevant to the research objectives intact. This descriptive analysis shows the variation of MSMEs across Indonesia and strengthens the sample representativeness in capturing such variations in digital financial literacy as well as green fintech adoption.

Table 1. Respondent profile

| Characteristics                   | Category              | Frequency | Percentage (%) |
|-----------------------------------|-----------------------|-----------|----------------|
| Gender                            | Male                  | 342       | 57             |
|                                   | Female                | 258       | 43             |
| Region                            | Western Indonesia     | 180       | 30             |
|                                   | Central Indonesia     | 270       | 45             |
|                                   | Eastern Indonesia     | 150       | 25             |
| Business Sector                   | Trade and Retail      | 228       | 38             |
|                                   | Services              | 162       | 27             |
|                                   | Manufacturing         | 120       | 20             |
|                                   | Others                | 90        | 15             |
| Business Size                     | Micro Enterprises     | 288       | 48             |
|                                   | Small Enterprises     | 312       | 52             |
| Business Experience               | 2–5 years             | 240       | 40             |
|                                   | > 5 years             | 360       | 60             |
| Use of Digital Financial Services | Yes (All respondents) | 600       | 100            |

Table 1 shows an overview of the MSME respondents characteristics in this study, which represent the demographic and business characteristics diversity available across Indonesia. In terms of gender, male respondents comprised the majority (57%), and female respondents represented 43%. This composition shows that the ownership or management of MSMEs is still male-dominated, but there is a relatively large number of females engaged in it. A high percentage of female respondents would mean that efforts toward gender inclusiveness in MSME endeavors are cumulatively paving their way, although certain sectors, like e-trading and services, are more predisposed towards women entrepreneurs.

From a regional perspective, the respondents mainly resided in Central Indonesia (45%), Western Indonesia (30%), and Eastern Indonesia (25%). Such a distribution indicates the DKI property based on the concentration of most economic activities and digital base infrastructure located in the central provinces, mainly West Java, Central Java, and East Java. Although respondents from eastern regions such as Papua and West Nusa Tenggara have limited digital readiness and financial inclusion, the participation of these groups in this study suggests more varied levels of the Digital Maturity Cycle (DMC) spectrum. Regional representation disparity in the data is very important because this helps analyze digital financial literacy and green fintech adoption across various socioeconomic and infrastructural backgrounds.

By business sector, MSMEs primarily work in trade and retail (38%), although services (27%), manufacturing (20%), and other sectors such as agriculture and creative industries (15%) also account for significant portions of the economy. Such a structure fits well with the characteristics of MSMEs in Indonesia, which are concentrated in trade and services due to lower entry barriers and high market demand. In this regard, the sectoral diversity in this study offers a better investigation of how digital financial literacy and green fintech adoption take shape in different types of business activities. This also emphasizes that sustainability and digital transformation matter across sectors and industries. Regarding the size of the business, respondents were reasonably split between microenterprises (48%) and small enterprises (52%), showing that the survey is representative of MSMEs across a spectrum of operational sizes. The rationale for this balancing act is that access to much of the knowledge and information needed to use new digital financial tools and consistently uphold sustainable practices could vary by firm size. Furthermore, regarding business experience, 60% of respondents have been in operation for more than five years and 40% for between two and five years. This implies that the majority of respondents have adequate experience in handling business processes and may have been exposed to both conventional and digital financial systems, thus providing more credible insights into the research variables.

#### 4.1.2 Measurement Model Evaluation (Outer Model)

The measurement model (outer model) for this study was assessed to determine the validity and reliability of its constructs. A key indicator used in this assessment is outer loading, which indicates the correlation between each indicator and its corresponding variables. Convergent validity is assessed with outer loading values, and a value above 0.70 is usually deemed acceptable, which suggests that the indicator exhibits a significant contribution to explaining the construct. Nonetheless, loading values between 0.60 and 0.70 are still deemed satisfactory in exploratory research, especially if the overall reliability of the construct is adequate. Hence, this analysis was performed to confirm that all indicators used in the present study were valid measures of their constructs. The outer loadings are presented in Figure 2.

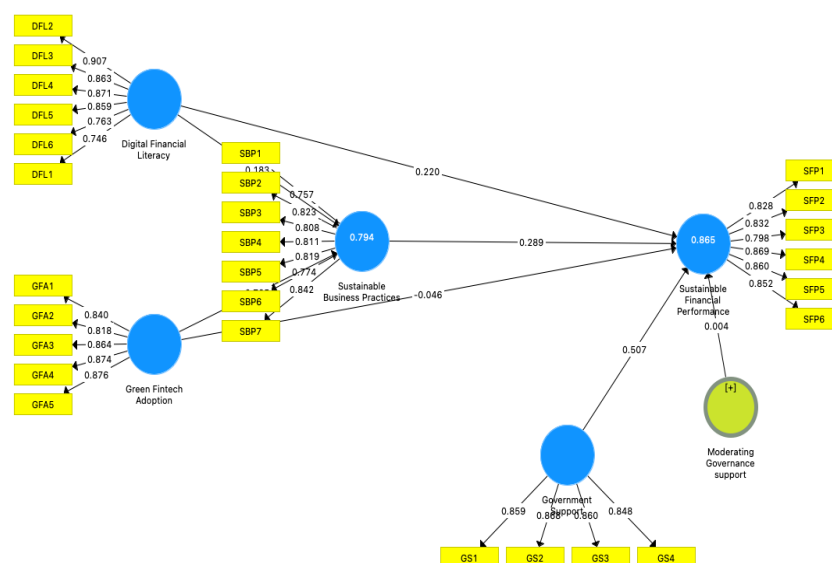


Figure 2. Outer loading

Table 2. Outer loadings

| Indicator | Digital Financial Literacy | Government Support | Green Fintech Adoption | Sustainable Business Practices | Sustainable Financial Performance |
|-----------|----------------------------|--------------------|------------------------|--------------------------------|-----------------------------------|
| DFL1      | 0.746                      |                    |                        |                                |                                   |
| DFL2      | 0.907                      |                    |                        |                                |                                   |
| DFL3      | 0.863                      |                    |                        |                                |                                   |
| DFL4      | 0.871                      |                    |                        |                                |                                   |
| DFL5      | 0.859                      |                    |                        |                                |                                   |
| DFL6      | 0.763                      |                    |                        |                                |                                   |
| GS1       |                            | 0.859              |                        |                                |                                   |
| GS2       |                            | 0.868              |                        |                                |                                   |
| GS3       |                            | 0.860              |                        |                                |                                   |
| GS4       |                            | 0.848              |                        |                                |                                   |
| GFA1      |                            |                    | 0.840                  |                                |                                   |
| GFA2      |                            |                    | 0.818                  |                                |                                   |
| GFA3      |                            |                    | 0.864                  |                                |                                   |
| GFA4      |                            |                    | 0.874                  |                                |                                   |
| GFA5      |                            |                    | 0.876                  |                                |                                   |
| SBP1      |                            |                    |                        | 0.757                          |                                   |
| SBP2      |                            |                    |                        | 0.823                          |                                   |
| SBP3      |                            |                    |                        | 0.808                          |                                   |
| SBP4      |                            |                    |                        | 0.811                          |                                   |
| SBP5      |                            |                    |                        | 0.819                          |                                   |
| SBP6      |                            |                    |                        | 0.774                          |                                   |
| SBP7      |                            |                    |                        | 0.842                          |                                   |
| SFP1      |                            |                    |                        |                                | 0.828                             |
| SFP2      |                            |                    |                        |                                | 0.832                             |
| SFP3      |                            |                    |                        |                                | 0.798                             |
| SFP4      |                            |                    |                        |                                | 0.869                             |
| SFP5      |                            |                    |                        |                                | 0.860                             |
| SFP6      |                            |                    |                        |                                | 0.852                             |

In Table 2, we can see the values of outer loading (all higher than 0,70, although a couple are above the minimal threshold at around 0,75) for each indicator that indicates that convergent validity is established. All indicators load at high values from 0,746 to 0,907, with the indicator DFL2 in turning loads the highest, thus showing strong contributions in its construct 'Digital Financial Literacy.' This indicates that the indicators used are appropriate for representing the digital financial literacy construct in MSMEs. The indicator values for the government support variable, ranging between 0,848 and 0,868, all reveal high loading values, suggesting that they substantially reflect a common construct. Likewise, the green fintech adoption scale demonstrates high loading values between 0,818 and 0,876, indicating that all indicators successfully encapsulate the idea of environmentally friendly usage of a specific type of fintech. These findings confirm convergent validity and that both constructs have adequate measurement properties. The sustainable business practices variable has loading values ranging from 0,757 to 0,842, suggesting that the constructs are both valid and sufficiently saturated by all indicators. SBP1 has the lowest loading (0,757) yet now it meets the acceptable threshold level implying that it is still a valid measure. On the other hand, sustainable financial performance exhibits high loading values (0,798–0,869), which indicates that its respective indicators are well-operationalizing the construct.

#### 4.1.3 Construct Reliability and Validity

After investigating outer loadings, the assessment of the measurement model proceeds by evaluating construct reliability and convergent validity. This was performed using Cronbach's Alpha, Composite Reliability (CR), and Average Variance Extracted (AVE). Cronbach's Alpha and Composite Reliability

are regarded as satisfactory when both are greater than 0.70, while the Average Variance Extracted (AVE) is confirmed as adequate convergent validity when it is greater than 0.50. These measures guarantee that each construct is measured reliably and that the indicators explain a reasonable amount of the variance of the latent variable.

Table 3. Construct reliability and convergent validity

| Variables                         | Cronbach's Alpha | Composite Reliability | AVE   |
|-----------------------------------|------------------|-----------------------|-------|
| Digital Financial Literacy        | 0,903            | 0,925                 | 0,674 |
| Government Support                | 0,889            | 0,923                 | 0,749 |
| Green Fintech Adoption            | 0,901            | 0,927                 | 0,718 |
| Sustainable Business Practices    | 0,914            | 0,931                 | 0,659 |
| Sustainable Financial Performance | 0,912            | 0,932                 | 0,697 |

As shown in Table 3, all constructs exhibited Cronbach's Alpha and Composite Reliability values over 0.70, indicating high internal consistency of variables. In addition, all AVE values exceeded 0.50, proving that each construct explained more than half of the variance of its indicators. The results show that the measurement model met the requirements for convergent validity and reliability, thereby justifying the adequacy of the constructs used in this study.

#### 4.1.4 Discriminant Validity (HTMT)

The Heterotrait-Monotrait Ratio of Correlations (HTMT) is considered a more robust method for assessing discriminant validity than traditional approaches. HTMT values lower than 0.90 indicate that the constructs are empirically distinguishable. This test validates that each variable is not mapped onto multiple latent concepts and does not highly correlate with any other developing constructs in the model.

Table 4. Discriminant validity (HTMT)

| Variables                               | DFL   | GS    | GFA   | SBP   | SFP |
|-----------------------------------------|-------|-------|-------|-------|-----|
| Digital Financial Literacy (DFL)        | —     |       |       |       |     |
| Government Support (GS)                 | 0,642 | —     |       |       |     |
| Green Fintech Adoption (GFA)            | 0,671 | 0,658 | —     |       |     |
| Sustainable Business Practices (SBP)    | 0,702 | 0,689 | 0,734 | —     |     |
| Sustainable Financial Performance (SFP) | 0,715 | 0,701 | 0,748 | 0,776 | —   |

As shown in Table 4, none of the HTMT values exceeded the threshold of 0.90, confirming that discriminant validity was achieved. How that works is that each construct in the model is both empirically different and conceptually different. Sustainable business practices and sustainable financial performance had the highest HTMT value of, 0.776 which is still within an acceptable range. The results indicate that the constructs do not have a multicollinearity problem, and the model has sufficient discriminant validity.

#### 4.1.5 Collinearity Assessment (VIF)

The Variance Inflation Factor (VIF) was assessed to ensure that there was no multicollinearity issue in the structural model. A VIF value above 5.00 indicates a collinearity problem, and the predictor variables are highly correlated to one another.

Table 5. Collinearity statistics (VIF)

| Variables                      | VIF   |
|--------------------------------|-------|
| Digital Financial Literacy     | 2,134 |
| Green Fintech Adoption         | 2,287 |
| Government Support             | 2,045 |
| Sustainable Business Practices | 2,563 |

According to the results derived and shown in Table 5, none of the VIF values exceed limits above 5.00, indicating that multicollinearity is not an issue for this model. This implies that each of the independent variables uniquely contributes to explaining the dependent variable and is not redundant.

#### 4.1.6 Coefficient of Determination ( $R^2$ )

To assess the explanatory power of the structural model, we used the coefficient of determination ( $R^2$ ).  $R^2$  values above 0.75, around 0.50, and below 0.25 are considered strong, moderate, and weak, respectively.

Table 6. R-square values

| Endogenous Variable               | $R^2$ | Category |
|-----------------------------------|-------|----------|
| Sustainable Business Practices    | 0,542 | Moderate |
| Sustainable Financial Performance | 0,618 | Moderate |

Table 6 shows the analysis shows that digital financial literacy and green fintech adoption explain 54.2% of the variance in Sustainable Business Practices, while all predictor variables explain 61.8% of the variance in Sustainable Financial Performance. As shown above, these values are moderate, which means that the predictive power of this model for explaining the endogenous constructs is reasonable.

#### 4.1.7 Predictive Relevance ( $Q^2$ )

The blindfolding procedure was implemented to determine the predictive relevance ( $Q^2$ ) of the model, which provided an assessment of its predictive ability. A  $Q^2$  value greater than zero indicates that the model has predictive relevance.

Table 7. Predictive relevance ( $Q^2$ )

| Endogenous Variable               | $Q^2$ |
|-----------------------------------|-------|
| Sustainable Business Practices    | 0,361 |
| Sustainable Financial Performance | 0,402 |

Table 7 shows the  $Q^2$  values of both endogenous variables are greater than zero, which is a sign of strong predictive relevance for the model. These hint that the model could replicate the observed data accurately, and surprise testing shows good out-of-sample predictive power.

#### 4.1.8 Hypothesis Testing

The significance of the direct, mediating, and moderating effects among variables is evaluated in this study by applying hypothesis testing using the bootstrapping procedure based on SEM-PLS. Relative change calculations using path coefficients ( $\beta$ ), t-statistics, and p-values We do at a 95% confidence level, if the t-statistic is above 1.96 and the p-value is under 0.05, then we say that our hypothesis is supported. This regression analysis was conducted to provide an empirical verification of the causal relations postulated in the research model.

#### 4.1.9 Direct Effects

Table 8. Direct effect results

| Hypothesis | Relationship                                                       | Path Coefficient ( $\beta$ ) | t-Statistic | p-Value | Result    |
|------------|--------------------------------------------------------------------|------------------------------|-------------|---------|-----------|
| $H_1$      | Digital Financial Literacy → Sustainable Financial Performance     | 0,287                        | 4,912       | 0,000   | Supported |
| $H_2$      | Green Fintech Adoption → Sustainable Financial Performance         | 0,254                        | 4,376       | 0,000   | Supported |
| $H_4$      | Sustainable Business Practices → Sustainable Financial Performance | 0,365                        | 6,105       | 0,000   | Supported |

Table 8 shows the findings revealed that digital financial literacy had a positive and significant effect on Sustainable Financial Performance ( $\beta = 0.287$ ,  $p < 0.001$ ), which supports  $H_1$ . The results indicate that MSMEs with a higher level of digital financial literacy are better equipped to achieve sustainable financial performance. Similarly, green fintech adoption has a significant and positive impact on sustainable financial performance ( $\beta = 0.254$ ,  $p < 0.001$ ), supporting  $H_2$  investing in environmentally oriented fintech practices also contributes to sustainable financial performance with respect to financial sustainability. Additionally, sustainable business practices have the highest direct influence on sustainable financial performance ( $\beta = 0.365$ ,  $p < 0.001$ ), supporting  $H_4$  and emphasizing the importance of sustainable organizational practices in promoting long-term financial performance.

#### 4.1.10 Mediation Effects

Table 9. Indirect effect (Mediation)

| Hypothesis | Relationship                                                                                    | Indirect Effect ( $\beta$ ) | t-Statistic | p-Value | Result    |
|------------|-------------------------------------------------------------------------------------------------|-----------------------------|-------------|---------|-----------|
| $H_3$      | Digital Financial Literacy → Sustainable Business Practices → Sustainable Financial Performance | 0.121                       | 3,842       | 0,000   | Supported |
| $H_5$      | Green Fintech Adoption → Sustainable Business Practices → Sustainable Financial Performance     | 0.146                       | 4,215       | 0,000   | Supported |

Table 9 shows the results of the mediation analysis indicate that sustainable business practices significantly mediate the impact between digital financial literacy and sustainable financial performance ( $\beta = 0.121$ ,  $p < 0.001$ ), thus  $H_3$  is supported. This result implies that digital financial literacy improves financial performance directly and indirectly through the adoption of sustainable business models.  $H_5$  is also supported because green fintech adoption has a notable indirect effect on sustainable financial performance through sustainable business practices ( $\beta = 0.146$ ,  $p < 0.001$ ). This implies that green fintech adoption helps MSMEs more efficiently when they incorporate sustainability into their business practices.

#### 4.1.11 Moderation Effect

Table 10. Moderation effect result

| Hypothesis | Relationship                                                                            | Path Coefficient ( $\beta$ ) | t-Statistic | p-Value | Result    |
|------------|-----------------------------------------------------------------------------------------|------------------------------|-------------|---------|-----------|
| $H_6$      | Government Support × Sustainable Business Practices → Sustainable Financial Performance | 0,173                        | 2,987       | 0,003   | Supported |

Meanwhile, as presented in Table 10, the moderation analysis with respect to  $H_6$  reflects that government support significantly moderates the relationship between sustainable business practices and sustainable financial performance ( $\beta = 0.173$ ,  $p < 0.01$ ). This implies that the impact of sustainable business practices on financial performance is enhanced by positive government policies, regulations and programs. This suggests that MSMEs in more government-supportive environments convert sustainability practices into better financial performance.

## 4.2 Discussions

The findings of this study validate the proposed model and provide both theoretical and practical contributions from the perspective of Dynamic Capabilities Theory (Teece, 2007). The results confirm that sustainable financial performance among MSMEs is influenced not only by the adoption of digital financial technologies but also by the ability of MSMEs to transform knowledge and innovation into sustainability-oriented business practices. In addition, the findings demonstrate that intervention-based activities, such as digital financial literacy training, green fintech mentoring, digital bookkeeping assistance, and sustainability-oriented business guidance, contributed to improving MSMEs'

understanding and implementation of digital financial practices. These intervention components helped MSMEs strengthen their adaptive capabilities by integrating financial technology and sustainability principles into their business operations.

The empirical evidence shows that digital financial literacy positively and significantly affects Sustainable Financial; therefore,  $H_1$  is supported. This finding is consistent with previous studies highlighting the importance of financial literacy in improving financial decision-making quality and business performance ([Mang'ana & Nade, 2026](#); [Mazzoli & Baiocco, 2025](#)). From the perspective of dynamic capabilities theory, digital financial literacy represents an important organizational capability that enables MSMEs to utilize fintech services strategically and efficiently ([Teece, 2007](#)). The improvement in digital financial literacy among MSMEs in this study was strongly supported by intervention activities, including digital payment training, financial recording workshops, fintech platform assistance, and mentoring on sustainable financial planning. These activities increased MSMEs' understanding of cashless transactions, digital budgeting, and financial management. However, some previous studies have argued that financial literacy does not always improve business performance when knowledge is not translated into strategic business practices ([Muat et al., 2025](#)). This study addresses this gap by demonstrating that digital financial literacy contributes significantly to sustainable financial outcomes when MSMEs actively integrate digital financial knowledge into their daily business operations; therefore, digital financial literacy should not only be viewed as an individual cognitive skill but also as an organizational capability that supports long-term sustainability.

The results also indicate that green fintech adoption has a positive and significant impact on sustainable financial performance, supporting  $H_2$ . This finding aligns with previous studies showing that sustainability-oriented fintech adoption improves operational efficiency, reduces transaction costs, and enhances financial performance ([Kumar, Kumar, Sassanelli, & Kumar, 2025](#); [L, Singh, & Singh, 2026](#)). The intervention activities conducted in this study, such as green fintech education, environmentally friendly digital transaction campaigns, and training on paperless financial systems, encouraged MSMEs to adopt sustainability-oriented financial technologies more effectively than before. Through these activities, MSMEs have become more aware of the importance of integrating environmental considerations into financial management processes. In contrast, previous studies suggested that fintech adoption mainly improves short-term efficiency without necessarily strengthening sustainability performance in the long run ([Rahim, Islam, & Rosid, 2026](#)). This study provides different evidence by showing that fintech adoption generates sustainable financial outcomes when combined with green and sustainability-oriented practices. Consequently, this study contributes to the literature by emphasizing the distinction between conventional fintech adoption and green fintech adoption in creating sustainable business value.

Furthermore, the results demonstrate that Sustainable Business Practices positively and significantly influence Sustainable Financial Performance, confirming  $H_4$ . This finding supports earlier studies indicating that firms that integrate environmental and social considerations into their business operations tend to achieve better long-term performance ([Obrecht, Ojsteršek, & Pavić, 2024](#); [Raina, Sharma, Taheri, Dev, & Chavriya, 2026](#)). From the dynamic capabilities perspective, sustainable business practices represent the transformation stage in which firms reconfigure organizational resources to align with sustainability goals ([Teece, 2007](#)). In this study, intervention activities such as sustainability mentoring, environmentally responsible business guidance, and digital business management training contributed to strengthening MSMEs' sustainable operational practices. These activities encourage MSMEs to improve resource efficiency, reduce unnecessary operational costs, and adopt more sustainable business processes. Although previous studies have argued that sustainable practices may increase operational costs and reduce short-term profitability, particularly for small businesses with limited resources ([Jaiyeoba et al., 2025](#)), the findings of this study indicate that sustainability practices can strengthen financial resilience and operational efficiency among MSMEs. Therefore, sustainability should not be viewed as an economic burden but as a strategic investment for long-term business performance.

The mediation analysis also confirmed that sustainable business practices significantly mediate the relationship between digital financial literacy and sustainable financial performance, supporting  $H_3$ . This result is consistent with previous studies that explain that organizational practices function as mechanisms that transform knowledge into performance outcomes ([Obrecht et al., 2024](#)). The intervention programs implemented in this study helped MSMEs apply digital financial knowledge through sustainability-oriented operational practices rather than limiting literacy to theoretical understanding only. Financial mentoring and sustainability assistance programs enable MSMEs to integrate digital financial capabilities into practical business decisions and operational management. This finding clarifies the mechanism by which digital financial literacy contributes to financial performance, particularly through sustainable business implementation. Thus, sustainable business practices serve as a critical bridge connecting digital capabilities to sustainable financial outcomes.

Similarly, sustainable business practices significantly mediate the relationship between Green Fintech Adoption and Sustainable Financial Performance, supporting  $H_5$ . This finding supports prior studies arguing that technological innovation alone is insufficient to improve business performance unless accompanied by appropriate organizational practices ([Chomachaei et al., 2026](#); [Dash et al., 2025](#)). The intervention-based programs in this study encouraged MSMEs to adopt fintech technologies and integrate them into environmentally responsible and sustainability-oriented business operations. MSMEs that participated in mentoring activities demonstrated greater readiness to implement green financial systems in their daily operations. Therefore, the effectiveness of green fintech adoption depends on the extent to which sustainability principles are embedded in organizational practices. Consequently, this study highlights the synergy between technological innovation and organizational transformation in achieving sustainable financial performance.

Finally, the moderation analysis demonstrates that government support significantly moderates the relationship between sustainable business practices and sustainable financial performance, supporting  $H_6$ . This finding is consistent with institutional theory, which explains that external institutional factors, such as regulations, incentives, and policy support, strongly influence organizational behavior ([Ahmed et al., 2026](#)). Government intervention programs, including MSME digitalization assistance, sustainability campaigns, financial literacy programs, and FinTech support initiatives, contributed to strengthening MSMEs' ability to implement sustainable business practices effectively. Previous studies have also reported that government support enhances innovation adoption and business performance ([Gholipour et al., 2026](#)). However, few studies have examined the moderating role of government support in sustainability-oriented MSME. The findings indicate that supportive institutional environments significantly strengthen the effectiveness of sustainable business practices in improving financial outcomes. Although excessive government intervention may reduce organizational flexibility and innovation ([Shuliang et al., 2026](#)), this study demonstrates that, within MSMEs, government support primarily functions as an enabling mechanism that accelerates sustainable digital transformation and financial resilience.

## 5. Conclusions

### 5.1 Conclusions

This study confirms that digital financial literacy and green fintech adoption significantly improve sustainable financial performance among MSMEs in Indonesia. MSMEs with stronger digital financial capabilities can better manage financial resources, improve efficiency, and maintain long-term financial sustainability. Likewise, the adoption of green fintech practices contributes not only to operational effectiveness but also to environmentally oriented business performance. The findings further reveal that sustainable business practices have the strongest direct effect on sustainable financial performance and significantly mediate the relationships between digital financial literacy, green fintech adoption, and financial sustainability outcomes. This indicates that digital knowledge and fintech adoption generate stronger financial benefits when MSMEs integrate sustainability principles into their daily business operations. In addition, government support strengthens the relationship between sustainable business practices and sustainable financial performance, highlighting the importance of supportive regulations, incentives, and institutional assistance for MSME sustainability transformation.

Practically, this study emphasizes that MSMEs should not focus solely on technology adoption but also on developing sustainability-oriented operational practices. Institutional implications are also significant. Government agencies, financial institutions, fintech providers, and MSME development organizations can adopt this intervention model by providing integrated digital financial literacy training, green fintech access programs, sustainability-based business mentoring, and policy incentives that encourage sustainable business transformation among MSMEs. Therefore, sustainable financial performance of MSMEs can be achieved through the integration of digital capability development, green financial innovation, sustainable business practices, and institutional support.

### **5.2 Research Limitations**

Several limitations should be considered when interpreting the findings of this study. First, this study uses a cross-sectional design, which limits the ability to observe behavioral changes and sustainability transitions among MSMEs over time. Second, the study relied on self-reported questionnaire data, which may introduce common method bias and subjective respondent perceptions, despite statistical controls being applied. Third, the study only focuses on MSMEs that already utilize digital financial services; therefore, the findings may not fully represent MSMEs that remain outside the digital financial ecosystem. Finally, although the study covers multiple provinces in Indonesia, differences in regional infrastructure, digital readiness, and policy implementation may influence the results and were not fully explored in the current model design.

### **5.3 Suggestions and Direction for Future Research**

Future studies should apply longitudinal approaches to examine the long-term effects of digital financial literacy, green fintech adoption, and sustainability practices on MSME financial performance. Future researchers may also incorporate additional variables, such as digital resilience, innovation capability, environmental awareness, and organizational readiness, to improve the explanatory power of the model. Comparative studies across countries or regions are also encouraged to understand how institutional environments shape the adoption of sustainable digital finance. Sector-specific investigations may provide deeper insights into how sustainability-oriented digital transformation differs across MSME industries and business characteristics.

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### **Author Contributions**

HP contributed to the conceptualization of the study, research design, data analysis, interpretation of the findings, and manuscript preparation. HH contributed to the data collection, methodology development, and validation of the research instruments. JH contributed to literature review development, data interpretation, and discussion of theoretical implications. MCS contributed to manuscript editing, visualization of the research results, and final review of the article. All authors have read and approved the final version of this manuscript.

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