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The mediating role of digital financial inclusion in enhancing sustainable performance among people with disabilities in Indonesia

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Abstract

In this study, the relationships among financial literacy, access to financial services, digital financial inclusion, and sustainable performance among people with disabilities (PWDs) in Indonesia are investigated. Grounded in the resource-based view (RBV), a structural equation model is developed and tested to examine both the direct and the mediated effects of financial capabilities on entrepreneurial sustainability. Data were collected through a purposive survey of 170 PWD entrepreneurs across East Java, Central Java, and Yogyakarta, forming a sample comprising diverse disability profiles and business sectors. Using SmartPLS 4 and PLS-SEM analyses, the reliability and validity of the measurement constructs were confirmed, and the hypothesized relationships were evaluated. The results reveal that financial literacy and access to finance significantly increase digital financial inclusion, which in turn positively affects sustainable performance. Moreover, digital financial inclusion mediates the relationship between financial capabilities and sustainability outcomes, which underscores its role as a critical mechanism for advancing inclusive entrepreneurship. The findings highlight the persistent barriers faced by PWDs in accessing financial services, while also demonstrating the transformative potential of digital platforms in promoting economic independence, social participation, and long-term viability. This study contributes to the literature by integrating financial literacy, financial access, and digital inclusion into a unified sustainable performance framework, offering practical implications for policymakers, financial institutions, and development programs seeking to strengthen disability-inclusive financial ecosystems.

Keywords: financial literacy, access to finance, digital financial inclusion, sustainable performance, people with disabilities

JEL codes J14, Q01

1 Introduction

People with disabilities (PWDs) have the same rights and opportunities as others to become entrepreneurs and achieve economic independence and create employment opportunities for themselves and others. The inclusion of PWDs within the entrepreneurial ecosystem adds a strong dimension of inclusivity, which demonstrates that disability should not be viewed as a barrier to entrepreneurial participation and achievement [1,2]. Furthermore, in terms of the 2030 Sustainable Development Goals (SDGs) agenda, which emphasizes inclusive and equitable development for all members of society by 2030, PWDs should be prioritized [3,4]. In particular, SDG 8 highlights the principle of inclusive economic growth to ensure that no one, including people with disabilities, is left behind in the pursuit of decent work and sustainable economic development.

PWDs account for approximately 16% of the global population, representing nearly 1.3 billion people worldwide [5]. In Indonesia, PWDs represented approximately 5% of the total population, which in 2020, was equivalent to approximately 22.5 million people [6]. However, 73.76% of the PWDs in Indonesia did not have a bank account in 2020 [7]. This situation reflects a relatively low level of financial inclusion among PWDs, particularly among those pursuing entrepreneurial activities, and suggests the existence of barriers that may hinder business sustainability. Compared with other entrepreneurs, PWDs often experience greater difficulties in accessing financial resources, which makes them more vulnerable to business failure.

Sustainable performance measures an entrepreneur's ability to achieve consistent economic, operational, and strategic outcomes while maintaining adaptability to changing environments. Existing studies have focused primarily on sustainable products among PWDs or examined sustainability from a managerial perspective [8,9]. For PWDs who choose entrepreneurship as a career path, achieving sustainable performance represents a unique challenge [1,2]. Factors that may enhance sustainable performance include financial literacy, access to finance, and financial inclusion. These capabilities are expected to be particularly important for businesses owned by PWDs [7,10–13]. Financial literacy refers to the knowledge, skills, and understanding required to manage financial resources effectively and make informed financial decisions [14]. Financial literacy and inclusion makes people with disabilities in India, fostering empowerment, resilience, and long-term well-being [13]. Through a review of seven studies, financial education initiatives for people with disabilities were reported in Brazil, the United States, Australia, and Portugal [15].

In addition to financial literacy, access to finance is another important factor influencing PWD success [16]. Access to finance refers to an entrepreneur's ability to obtain and utilize formal financial services, which includes loans, credit facilities, savings products,

and other financial instruments required for business development [17]. People with disabilities in Indonesia are frequently discouraged from using financial services due to inaccessible infrastructure and restrictive service requirements [18]. Similarly, ongoing barriers to financial access for people with disabilities have been documented, alongside calls for improved inclusion to foster their business development [12]. This study seeks to strengthen and extend these previous findings.

The rapid advancement of digital technology has transformed financial ecosystems and services. Digital financial inclusion refers to the availability, accessibility, affordability, and effective use of financial services as delivered through digital platforms [19,20]. The potential of financial inclusion in driving progress toward the United Nations Sustainable Development Goals lies not only in economic growth but also in empowering communities and enhancing social well-being [21]. The need to improve financial services for people with disabilities has been highlighted, while persistent discrimination in relation to digital financial inclusion has also been revealed [7,10]. Evidence suggests that people with disabilities in Kenya have increasingly gained access to financial products and services, highlighting steps toward financial inclusion [11]. Furthermore, a valuable scoping review emphasized the urgency of redesigning financial systems for universal accessibility [22].

This study focuses on financial inclusion mediation models for PWDs' sustainable performance, which need to be created and researched to address existing gaps. Although digital financial inclusion has received increasing scholarly attention, most previous studies have been focused on SMEs or entrepreneurs in general. The role of digital financial inclusion as an explanatory mechanism linking financial capability and financial accessibility to sustainable performance remains underexplored, particularly within the context of disability entrepreneurship. The novelty of this research object, people with disabilities who have restricted access to financial inclusion and are more likely to fail in business, is what makes this study distinctive. This study is distinct in that it examines how financial literacy and access to finance impact the sustainable performance of individuals with disabilities through digital mediation of financial inclusion.

This study offers several important contributions to the literature on entrepreneurship among people with disabilities. First, it addresses a significant knowledge gap by extending the literature on financial literacy, financial inclusion, and sustainable performance for people with disabilities. Second, an integrated theoretical framework is developed that links financial literacy, access to finance, digital financial inclusion, and sustainable performance, thereby addressing the fragmented nature of previous studies that have examined these constructs independently. By doing so, this study provides a more comprehensive understanding of sustainable performance among PWDs in an increasingly digital financial environment. Therefore, this study aims to examine the

effects of financial literacy and access to finance on sustainable performance and investigate the mediating role of digital financial inclusion among PWD.

2 Theoretical framework

This study is grounded in the resource-based view (RBV), which posits that sustainable competitive advantages arises from organization's abilities to develop and effectively utilize valuable, rare, inimitable, and nonsubstitutable resources [23–25]. PWDs are among the marginalized groups whose rights should be protected, particularly in regard to access to financial institutions. This theoretical perspective is consistent with the study, which proposed strengthening disability-focused financial literacy, expanding accessible banking infrastructure, and increasing account ownership among PWDs in Indonesia [7]. Similarly, previous studies emphasized that people with disabilities require support from a more inclusive financial ecosystem [11,12].

Sustainable performance requires that people with disabilities are not left behind, are protected from discrimination, and are recognized as equal partners within society. This principle aligns with the Sustainable Development Goals (SDGs), particularly those that emphasize reduced inequalities, decent work, and inclusive economic growth [26,27]. For PWDs, sustainable performance extends beyond economic achievement to also encompass the ability to sustain social participation, enhance quality of life, and obtain equal opportunities in economic activities and entrepreneurial endeavours.

In the context of entrepreneurship, the long-term performance of PWDs is shaped by a combination of interrelated factors, which include the accessibility of the business environment, the availability of inclusive policies, continuous institutional support, and opportunities to strengthen individual capacities and resources [1,28]. Although numerous empowerment initiatives and policy frameworks have been introduced, there is still a gap between regulatory intentions and actual implementation [29]. Limited access to finance, technology, information, and business networks continues to hinder the growth and development of disability-owned enterprises [30]. Nevertheless, collaborative and inclusive approaches involving governments, financial institutions, civil society organizations, and the private sector have demonstrated a significant potential to foster a supportive entrepreneurial ecosystem. Such efforts can enable PWDs to achieve sustainable business outcomes and remain competitive over the long term.

Financial literacy remains insufficient among people with disabilities (PWDs), and studies continue to explore appropriate models of financial education tailored to their diverse needs. Research in India shows that financial literacy can strengthen financial inclusion by reducing systemic barriers [13], while findings from Indonesia highlight persistent challenges in accessing financial services, underscoring the need for disability-sensitive infrastructure [18]. For individuals with intellectual and developmental

disabilities, adaptive approaches such as border-crossing strategies and complex learning tasks are required to build procedural fluency and meaningful financial skills [31,32]. Scoping reviews further reveal that comprehensive programs designed specifically for PWDs enhance autonomy, reduce vulnerability, and foster long-term inclusion [15]. These studies demonstrate that financial literacy is not merely a technical competence but a vital pathway to empowerment, dignity, and equal participation in society, making it indispensable for achieving inclusive growth among PWDs.

Several studies conducted in developing countries such as Ghana, Bangladesh, and Indonesia indicate that access to finance remains limited, with significant implications for people with disabilities (PWDs). In Ghana, social workers have been shown to play a vital role in strengthening financial capability and asset building among PWDs [33]. In Bangladesh, exclusion from microfinance programs persists, reflecting discriminatory attitudes that reinforce economic marginalization [34]. In Indonesia, PWDs continue to face restricted financial literacy and barriers to accessing financial services, underscoring the need for inclusive infrastructure and supportive policies [18]. More broadly, challenges in accessing and controlling personal finances remain a fundamental issue for PWDs, limiting autonomy and independence [16]. However, evidence from developed countries such as China shows that account ownership for PWD has experienced a significant amount [17]. There are differences in access to finance for PWD in developing and developed countries.

Several studies across diverse regions highlight that financial inclusion for people with disabilities (PWDs) remains both a challenge and a necessity. In Indonesia, evidence from Yogyakarta shows that inclusive financial initiatives can expand opportunities but still face structural and social barriers [7]. In Sub-Saharan Africa, disability and entrepreneurship are closely linked, with inclusive finance reimagined as a pathway to sustainable livelihoods for young PWDs [12]. In China, digital financial exclusion persists, prompting calls for stronger legal frameworks to guarantee accessibility in the digital economy [10]. Studies in Kenya reveal that both providers and users of financial products encounter obstacles, yet inclusive practices can significantly improve participation and trust [11]. In Muslim-majority contexts, inclusive regulations for Sharia fintech are essential to ensure that disabled entrepreneurs can access financial services without religious or accessibility barriers [30]. A broader scoping review confirms that financial inclusion for PWDs is globally underdeveloped, requiring systemic reforms and tailored interventions [22].

3 Empirical literature review and hypothesis development

The studies on the sustainable performance of entrepreneurs have grown rapidly, focusing on various factors, challenges, and strategies that influence sustainability outcomes. Studies often use resource-based view theory to explain how internal and

external factors shape entrepreneurs' sustainability [35]. The empirical literature highlights the importance of knowledge and external support in driving entrepreneurs' sustainable performance, but also points to significant gaps in economic performance, environmental performance, and social performance research [36]. In this regard, applying the sustainable performance framework to PWD is also important, as they represent a marginalized group that faces structural barriers in accessing resources. Strengthening their sustainable performance not only promotes economic independence and resilience but also advances social inclusion, equity, and the broader agenda of disability-inclusive development.

The sustainable performance of entrepreneurs is widely recognized as a multidimensional concept. Most frameworks for sustainability performance are based on the triple bottom line are economic, environmental, and social dimensions [37]. Some studies advocate for integrating operational and governance aspects for a more holistic assessment [38,39]. There is no universal consensus on specific metrics, and entrepreneurs often prioritize economic aspects due to resource constraints. For this study about dimensions of sustainable performance, PWDs are suitable with stability, resilience, environment, and social [36].

Financial literacy is a mandatory requirement for entrepreneurs in developing their businesses. Individuals with stronger financial literacy tend to be more capable of assessing financial products, allocating resources efficiently, and optimizing the use of available financial services [40,41]. Financial literacy facilitates engagement with the financial system by increasing financial awareness, confidence, and proficiency in the use of digital financial services [42]. Furthermore, entrepreneurs who possess adequate financial knowledge are more inclined to adopt financial technologies and leverage the benefits of a digital financial ecosystem, thereby fostering greater digital financial inclusion [14,43,44]. Studies focusing on PWDs also reveal that financial literacy plays a critical role in reducing information-related barriers and improving access to financial services and opportunities [13,18]. Financial literacy among entrepreneurs is multidimensional, encompassing knowledge, skills, awareness, attitudes, behaviors, and specific practices such as bookkeeping and cash forecasting, with increasing importance placed on digital competencies [45,46]. For this study about dimensions of financial literacy, PWDs is suitable with knowledge, skills, awareness, and behaviors [14].

Improved access to financial resources promotes greater engagement with the financial ecosystem by enabling individuals to utilize banking services, credit facilities, and technology-driven financial products [19]. Sufficient access to financing allows entrepreneurs to participate more effectively in formal financial systems and take advantage of a broader spectrum of financial services [47]. Moreover, entrepreneurs with stronger financial access tend to show a higher propensity to adopt digital financial

services, as they have the resources and opportunities required to engage with digital financial platforms [42]. Empirical evidence further suggests that enhancing access to financial services is a critical step toward advancing financial inclusion among underserved groups, particularly PWDs, who often face substantial obstacles in accessing formal financial institutions and services [7]. For this study about dimensions of access to finance, PWDs are suitable with regulatory, ability, virtue, and integrity [44]. The development of accessible digital financial solutions, including inclusive mobile banking and payment applications, can improve financial independence and strengthen the financial management capabilities of PWDs [13]. For this study about dimensions of digital financial inclusion, PWDs are suitable with a bank account, frequency of bank transactions, access to credit, and platform trust [19].

The research framework and hypotheses were developed based on a comprehensive review of relevant prior empirical studies (Figure 1). The framework illustrates the proposed causal relationships among financial literacy, financial access, digital financial inclusion, and sustainable performance among PWD in Indonesia. Specifically, financial literacy is expected to influence both digital financial inclusion and sustainable performance. Similarly, financial access is hypothesized to contribute to greater digital financial inclusion and improved sustainable performance. Furthermore, digital financial inclusion is proposed to have a mediating positive effect on sustainable performance, which highlights its role in enhancing the long-term economic and social outcomes of PWDs.

H1 The Financial literacy of PWDs positively influences their Digital financial inclusion.

H2 The Access to finance of PWDs positively influences their Digital financial inclusion.

H3 The Financial literacy of PWDs positively influences their Sustainable performance.

H4 The Access to finance of PWDs positively influences their Sustainable performance.

H5 The Digital financial inclusion of PWDs positively influences their Sustainable performance.

H6 The Financial literacy of PWDs positively influences their Sustainable performance with their Digital financial inclusion as a mediating variable.

H7 The Access to finance of PWDs positively influences their Sustainable performance with their Digital financial inclusion as a mediating variable.

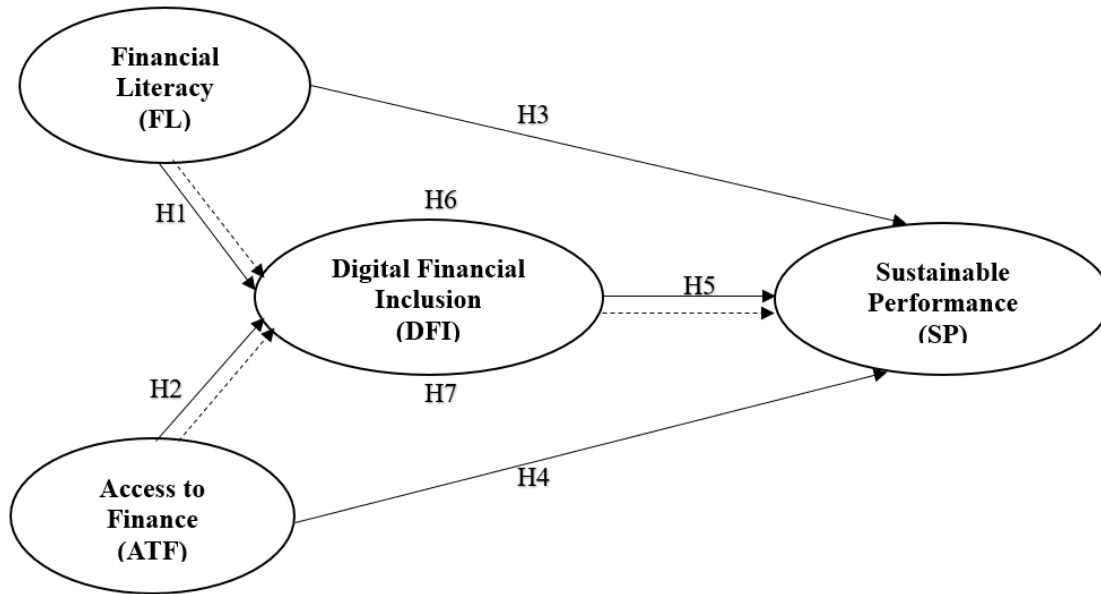


Fig. 1 Conceptual research framework

4 Data and methods

4.1 Data and sample

In this study, a purposive sampling technique, specifically, a nonprobability sampling method that enables researchers to select participants on the basis of specific and relevant, was employed. Five-point Likert scales (ranging from 1: strongly disagree to 5: strongly agree) were used [48]. This sampling approach was considered appropriate given the study's objectives of examining the effects of financial literacy, access to finance, and digital financial inclusion on the sustainable performance of PWDs. The selection criteria included individuals with disabilities who (1) owned or managed a small business, (2) had utilized technology in their business activities, and (3) had participated in entrepreneurship development programs. These inclusion criteria were established on the assumption that PWDs with such experiences would possess a deeper understanding of the phenomena under investigation.

Data were collected using a questionnaire survey, which resulted in a total sample of 170 respondents. The survey was conducted across three regions of Indonesia, namely East Java, Central Java, and Yogyakarta, which are recognized for their relatively high levels of engagement among people with disabilities. This approach facilitated the inclusion of diverse disability profiles and enabled the collection of more comprehensive data across various business sectors. The dataset provided a clearer representation of the conditions and characteristics of PWDs, thereby supporting a more accurate analysis of the relationships among the study variables.

The inverse square root should be used by 160 respondents to obtain optimal results via PLS-SEM [49]. The inverse square root method was chosen because it uses a simple equation and because researchers do not know the absolute minimum value of the path coefficients. This study included 170 PWDs respondents in Indonesia. Therefore, the sample size employed in this study fulfilled the minimum threshold [50]. The sample comprised PWDs and included both men and women, representing a broad range of age groups. In terms of educational attainment, participants ranged from primary school graduates to individuals with higher education qualifications. They also represented various types of disabilities and were engaged in different business sectors, including food and beverage, fashion, agriculture, services, and creative industries. Most of the sampled businesses had been operating for more than ten years.

4.2 Ethical statement

This study was approved by the Research Ethics Committee – Institute for Research and Community Service (LPPM), Universitas Islam Kadiri, located at the Central Office Building, 3rd Floor, Jl. Sersan Suharmaji No.38, Manisrenggo, Kota District, Kediri City, East Java 64128, Indonesia, in accordance with the guidelines and regulations set forth by the National Committee on Health Research Ethics (KEPPKN), Ministry of Health, Republic of Indonesia, Regulation No. 75 of 2020. The protocol number for this approval is 004/040.1.6/TU.00.11/V/2026, dated May 1, 2026.

4.3 Consent statement

To ensure ethical compliance, each participant provided written informed consent prior to their involvement in this study. Consent was obtained through the completion and approval of the consent dialog box embedded in the questionnaire. Participants received detailed information regarding the purpose of the research, the methodology, and their rights, including the option to withdraw at any time without any consequences. For participants under the age of 18, written informed consent was additionally obtained from a parent and/or legal guardian.

4.4 Study variables

The financial literacy indicators used in this study were adopted from a previous study [14]. The measures of financial access were adapted from the work [44]. Moreover, the level of digital financial inclusion was assessed using the indicators developed from a previous study [19]. The determinants of sustainable performance that are employed in this study were adapted from the framework proposed [36]. A detailed description of each variable and its corresponding measurement indicators is presented in Table 1.

Table 1: Observed Variables

Construct	Indicator	Description
Financial Literacy [14]	FL1	I have a good understanding of the fundamental principles of financial management relevant to my business.
	FL2	I am capable of preparing and managing financial plans for my business operations.
	FL3	I have a good understanding of the financial products and services that can support my business activities.
	FL4	I am capable of analysing the risks and advantages of different financial options before making business-related financial decisions.
	FL5	I have a good understanding of how to effectively manage business loans and financing arrangements.
	FL6	I use financial data and information to support business decision-making.
Access to Finance [44]	ATF1	I have easy access to the financial services required for my business operations.
	ATF2	I have adequate opportunities to access loans or other forms of financing to support my business.
	ATF3	Financial institutions offer financing products that are suitable for my business needs.
	ATF4	The procedures and requirements for accessing business financing are easy for me to understand and manage.
	ATF5	I am able to access financial information and advisory support when applying for business financing.
	ATF6	I have sufficient access to business financing from both formal financial institutions and digital financial platforms.
	ATF7	Access to financing allows me to grow and maintain the continuity of my business operations.
Digital Financial Inclusion [19]	DFI1	I have access to a bank account that facilitates the management of my business activities.
	DFI2	I regularly perform financial transfers and receive payments to support my business activities.
	DFI3	I have access to capital funding and loan/credit facilities to support my business activities.
	DFI4	I am confident that the financial and banking services available to me are secure and trustworthy.

Sustainable Performance [36]	SP1	The income generated by my business is relatively stable and consistent.
	SP2	My business can continue running sustainably even when managed primarily by me.
	SP3	Environmental sustainability practices are integrated into my business operations.
	SP4	My business activities generate positive social impacts on the local community.

4.5 Data analysis

With the use SmartPLS 4 software, the PLS-SEM method was adopted for data and path modelling analysis. In the first phase, we analysed the measurement model; in the second phase, we evaluated the structural model for analytical reasons. A bootstrapping method was suggested to assess the significance of the path coefficients at a 5% confidence level using 5000 subsamples. Smart-PLS was also used to evaluate serial mediation via PLS-SEM (path-coefficient analyses). Multiple regressions are used in PLS rather than stepwise regressions, enabling the entire model to be run with sophisticated techniques for validity and mediation [51].

5 Quantitative findings

5.1 Respondent Demographics

The majority of the respondents were female with disabilities (71.8%), with most falling within the 40-49 age group (41.2%). This suggests that the sample was largely composed of mature individuals possessing substantial life and business experience. In terms of educational attainment, nearly half of the respondents had completed senior high school (47.6%), followed by those that had completed junior high school (20.0%) and elementary school (18.2%). These figures indicate that most participants managed their businesses with a moderate level of formal education.

Among the respondents, physical disabilities represented the most common disability type (70.0%), which reflects the active involvement of individuals with mobility-related limitations in entrepreneurial activities. With respect to business sector participation, the respondents were primarily engaged in the culinary sector (27.1%), while a considerable proportion operated in various other industries (38.2%), thus demonstrating a diverse pattern of economic engagement. Furthermore, many respondents had been operating their businesses for more than ten years (42.9%), as presented in Table 2.

Table 2: Demographic Profile of the Respondents

Demographic	Category	Qty	%
Sex	Male	48	28.2
	Female	122	71.8
Age	< 19 years old	3	1.8
	20-29 years old	15	8.8
	30-39 years old	26	15.3
	40-49 years old	70	41.2
	50-59 years old	54	31.8
	> 59 years old	2	1.2
Education Level	Elementary School	31	18.2
	Junior High School	34	20.0
	Senior High School	81	47.6
	Bachelor's Degree	24	14.1
Type of Disability	Hearing Disability	11	6.5
	Visual Impairment	15	8.8
	Physical Disability	119	70.0
	Multiple Disabilities	1	0,6
	Other Disabilities	24	14.1
Business Sectors	Culinary	46	27.1
	Fashion	26	15.3
	Agriculture	1	0,6
	Service and Beauty	25	14.7
	Creative and Automotive	7	4.1
	Others	65	38.2
Years in Business	< 5 years	54	31.8
	5-10 years	43	25.3
	> 10 years	73	42.9

5.2 Outer model

The PLS model must be measured to evaluate the internal consistency reliability, convergent validity, discriminant validity, and reliability of each indicator used to define a variable. The average variance extracted (AVE) and outer loadings are used to evaluate the relationships between the variables and their convergent validity [51,52]. The convergent validity of all the constructs is shown in Table 3, and all the AVE values are greater than the 0.50 threshold. Cronbach's alpha and composite reliability (CR) are used to evaluate the dependability of each construct [51,52]. Because the study's composite reliability and Cronbach's alpha scores were greater than 0.70, each construct satisfied the required criteria.

Table 3: Indicator reliability and convergent validity

Construct	Indicator	Outer loadings	Cronbach's Alpha	CR	AVE
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Financial literacy	FL1	0.822	0.912	0.913	0.694
	FL2	0.852			
	FL3	0.841			
	FL4	0.842			
	FL5	0.810			
	FL6	0.833			
Access to finance	ATF1	0.867	0.933	0.936	0.713
	ATF2	0.869			
	ATF3	0.789			
	ATF4	0.847			
	ATF5	0.853			
	ATF6	0.838			
	ATF7	0.847			
Digital financial inclusion	DFI1	0.887	0.867	0.872	0.716
	DFI2	0.842			
	DFI3	0.808			
	DFI4	0.845			
Sustainable performance	SP1	0.803	0.825	0.826	0.656
	SP2	0.826			
	SP3	0.785			
	SP4	0.825			

The study's discriminant validity was evaluated using the Fornell–Larcker criteria. Table 4 shows the relationships between the construct and the square root of the AVE as well as those between the focal construct and the other constructs. The discriminant validity of the study model is robust. The multitrait-multimethod matrix, also known as the heterotrait ratio (HTMT), was used in this work to determine discriminant validity [53,54]. Every value's HTMT ratio is less than 0.90, thereby demonstrating the study's strong discriminant validity.

Conducting an examination of the discriminant validity an evaluation of the convergent validity is critical. To ensure that each construct in a model evaluates a unique notion and to prevent overlap and multicollinearity issues that could jeopardize results, examining the discriminant validity in SmartPLS is crucial. Valid interpretations and well-informed decision-making are enabled by the improved accuracy, dependability, and theoretical soundness of the model. The Fornell–Larcker criterion, the heterotrait–monotrait (HTMT) ratio, and the cross-loadings, which are used to confirm the distinctiveness of constructs, are frequently used to assess discriminant validity [53–55].

In this study, discriminant validity is assessed using the HTMT ratio and the Fornell–Larcker criterion. The correlation between a construct and other constructs is required to be less than the square root of the average variance extracted (AVE). The square roots of the AVE values for the constructions used in this study exceed the correlations

with the other constructs, as seen in Table 4. Thus, the constructs are unique entities. Because the model satisfies the predetermined requirements, it exhibits good discriminant validity.

Table 4: Discriminant Validity – Fornell–Larcker Criterion

Construct	Heterotrait-monotrait ratio (HTMT)				Fornell-Larcker criterion			
	ATF	DFI	FL	SP	ATF	DFI	FL	SP
ATF					0.845			
DFI	0.609				0.551	0.846		
FL	0.171	0.581			0.161	0.520	0.833	
SP	0.626	0.849	0.579		0.551	0.714	0.504	0.810

In modern approaches to the evaluation of discriminant validity across a range of research questions, the Fornell–Larcker technique has come under fire. The heterotrait–monotrait correlation ratio, which is a multitrait–multimethod matrix, was used in this study to evaluate discriminant validity [53–55]. The HTMT ratios used to evaluate discriminant validity are shown in Table 4. The heterotrait–monotrait ratio must be declared as less than 0.90 to establish discriminant validity of the variable. Applying this criterion revealed that every value was less than 0.90, suggesting that the model had good discriminant validity. The outcome of the measurement (outer) model analysis is shown in Figure 2.

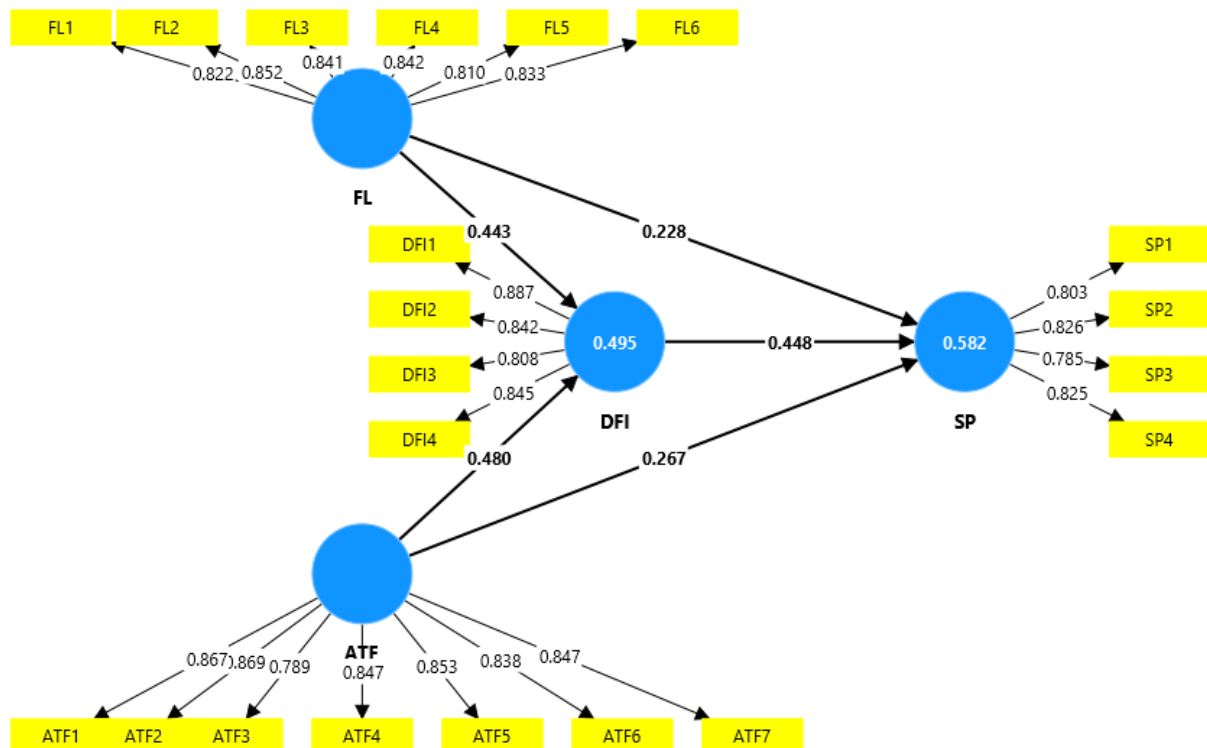


Fig. 2 Measurement model results (outer model).

Abbreviations: FL: financial literacy; ATF: access to finance; DFI: digital financial inclusion; SP: sustainable performance.

5.3 Inner model

As shown in Table 5, the regression model used in this investigation did not violate multicollinearity because the VIF scores for each component were less than 5.000 [52]. The correlations between digital financial inclusion and variable access to finance are 1.026 and 1.482. The correlation of between digital financial inclusion and sustainable performance is 1.981. The correlation between financial literacy and digital financial inclusion is 1.026, and that between financial literacy and sustainable performance is 1.416.

Table 5: VIF Analysis

Construct	Access to Finance	Digital Financial Inclusion	Financial Literacy	Sustainable Performance
Access to Finance		1.026		1.482
Digital Financial Inclusion				1.981
Financial Literacy		1.026		1.416
Sustainable Performance				

The PLS-SEM approach does not require goodness-of-fit measurements to be evaluated [56]. Rather, it uses R² to measure model fit and simply requires basic statistics and data normalcy evaluations [57]. Table 6 and Figure 3 show that the R² value of digital financial inclusion is 0.495, which demonstrates a moderate association between financial literacy and access to finance and indicates a 49.5% variation in digital financial inclusion among people with disabilities. The R² value of sustainable performance is 0.582, indicating that financial literacy, access to finance, and digital financial inclusion collectively explain 58.2% of the variation in sustainable performance among PWDs, demonstrating a strong relationship.

T statistic and beta (β) values were used in this study to test the hypotheses. The beta coefficients represent the magnitude of the influence of each independent variable in the PLS structural model where the more substantial that the effect of endogenous latent construction is, the greater the (β) value [53–55]. In addition, a t statistic test was conducted to confirm the significance level. On the basis of the findings displayed in Table 6, all of the direct hypotheses have been validated. Path analysis revealed a significant and positive association between financial literacy and digital financial

inclusion (β value = 0.443, T value 8.053, and p value = 0.000), and between financial literacy and sustainable performance (β value = 0.288, T value 3.870, and p value = 0.000); thus, H1 and H3 are supported. Hypothesis testing also revealed that access to finance positively affects digital financial inclusion (β value = 0.480, T value 9.865, and p value = 0.000) and sustainable performance (β value = 0.267, T value 3.875, and p value = 0.000); thus, H2 and H4 are supported. Finally, the hypothesis testing results also confirmed that digital financial inclusion positively affects sustainable performance (β value = 0.448, T value 5.922, and p value = 0.000). Therefore, hypothesis 5 is supported.

Effect size (f^2) must be evaluated for substantive significance [52]. The p -value can indicate the existence of the effect, but is not sufficient for assessing the magnitude of the effect. Therefore, in this study, both the p -value and the f^2 value were used to obtain more accurate data for interpretation. The effect size of f^2 , who reported that 0.02, 0.15, and 0.35 indicated minor, medium, and substantial effects, respectively [57]. Table 6 shows that the f^2 of financial literacy has a substantial influence on digital financial inclusion, with a value of 0.379, and a minor influence on sustainable performance, with a value of 0.088. An f^2 value of 0.088 is considered negligible but is reported to cover all of the bases of analysis. This suggests that financial literacy, in this context, has a relatively minimal direct effect on sustainable performance. However, understanding the full dynamics of the study is crucial. Additional significant results of these analyses revealed that access to finance has a substantial effect on digital financial inclusion, with an f^2 value of 0.444, and it has a minor influence on sustainable performance, with a value of 0.115. Finally, the f^2 of digital financial inclusion has a medium influence on sustainable performance, with a value of 0.243.

Table 6: Path Analysis

Hypothesis	Beta (β)	T statistic	p value	Result	R ²	f^2
H1 Financial literacy → Digital financial inclusion	0.443	8.053	0.000	Supported	0.495	0.379
H2 Access to finance → Digital financial inclusion	0.480	9.865	0.000	Supported		0.444
H3 Financial literacy → Sustainable performance	0.228	3.870	0.000	Supported	0.582	0.088
H4 Access to finance → Sustainable performance	0.267	3.875	0.000	Supported		0.115

H5	Digital financial inclusion → Sustainable performance	0.448	5.922	0.000	Supported		0.243
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Table 7 explains the results of the mediation analysis that was conducted for this study. The initial stage involved determining the direct path relation's significance via significance checks (t-statistic significance in bootstrap), including an evaluation of the significance of the indirect effect, if it is substantial, in the mediation analysis [52]. When the indirect relationship is significant, a mediation effect exists. As shown in Table 7, all of the simple hypotheses, namely H6 and H7, are supported. These hypotheses had significant indirect effects with a t-value greater than 1.96, indicating significance at the 0.01 level and meeting the criteria for establishing a mediating relationship.

The 95% bootstrap confidence interval (CI) indirect effects displayed in Table 7 in regard to all the simple mediation hypotheses (H6 & H7) did not encompass zero, thereby demonstrating the presence of mediation. The study also tested the serial mediation relationship of the postulated research framework. The findings show that the link between financial literacy and sustainable performance is mediated by digital financial inclusion. Additionally, they show that the link between access to finance and sustainable performance is mediated by digital financial inclusion. As shown in Table 7, all the direct and indirect relationships among financial literacy, access to finance, digital financial inclusion, and sustainable performance are positive and significant. Thus, the existence of a serial mediation relationship is supported.

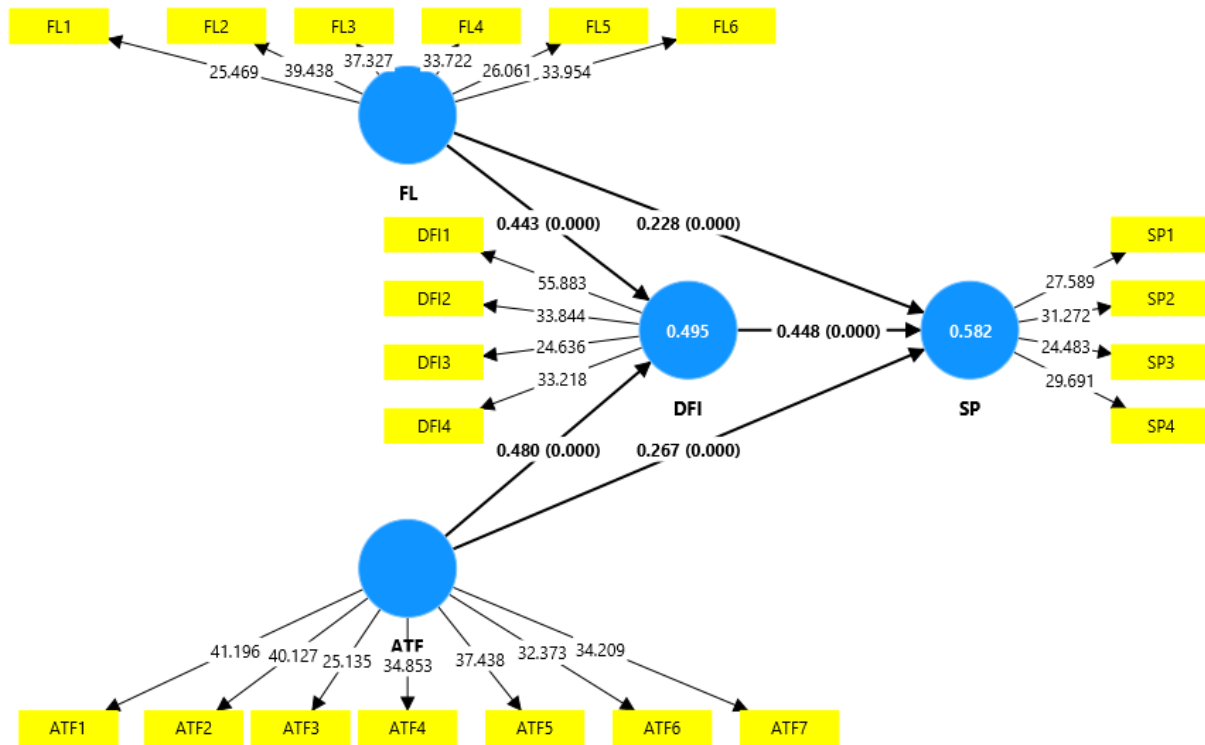


Fig. 3 Structural model results (inner model)

Abbreviations: FL: financial literacy; ATF: access to finance; DFI: digital financial inclusion; SP: sustainable performance.

Table 7: Mediation Analysis

Hypothesis	Beta (β)	T statistic	p value	LL 5% CI	UL 95% CI	Result
H6 Financial literacy → Digital financial inclusion → Sustainable performance	0.199	4.591	0.000	0.118	0.291	Supported
H7 Access to finance → Digital financial inclusion → Sustainable performance	0.215	4.963	0.000	0.136	0.306	Supported

6 Discussion

The findings support H1, indicating that financial literacy has a positive effect on digital financial inclusion among PWDs. These results further support previous evidence that

financial literacy enables people with disabilities to overcome information-related barriers and gain better access to financial systems [7,13]. These findings suggest that greater financial knowledge enhances the ability of PWDs in Indonesia to understand, evaluate, and utilize digital financial services more effectively.

The findings also support H2, demonstrating that access to finance positively influences digital financial inclusion. This finding indicates that PWDs with greater access to financial resources are more likely to participate in digital financial systems. Improved access to financing enables entrepreneurs to utilize banking products, financing facilities, and digital financial platforms more effectively. These findings contrast with those of [17], who reported that different types of disabilities may influence the level of access to financial services. In contrast, the results of the present study suggest that, regardless of disability type, greater access to financing facilitates financial inclusion by increasing the level of participation in formal financial services.

The findings, which reveal that financial literacy positively influences sustainable performance, support H3. These results contradict the findings of [15], who argued that people with disabilities face significant challenges in improving their financial competencies. The current findings suggest that such limitations may be mitigated by the support of government institutions and educational organizations that actively promote financial capability development among PWDs. Consequently, PWDs who possess higher levels of financial literacy are better able to manage financial resources, evaluate opportunities and risks, and make informed business decisions.

The findings also support H4, as they indicate that access to finance positively affects sustainable performance. This differs from the findings of [33], who highlighted the vulnerability of PWDs in accessing financial services. The results of the present study suggest that improved financial accessibility in Indonesia has become an important determinant of business growth and sustainability among PWDs. Those individuals with greater access to financial resources are more likely to invest in business development, strengthen operations, and sustain growth over time.

The findings support H5, showing that digital financial inclusion positively influences sustainable performance. These results are consistent with those studies of [12] and [11], which emphasize the positive role of financial inclusion in the promotion business sustainability and economic participation. The findings indicate that those PWDs who actively utilize digital financial services are in a better position to improve business efficiency, financial accessibility, and resilience than those who do not. Digital financial inclusion enables entrepreneurs to access financial opportunities more effectively and participate more actively in formal financial systems.

Finally, the results of the mediation analysis support H6 and H7, as they indicate that digital financial inclusion significantly mediates the relationships between financial literacy and sustainable performance, as well as those between access to finance and sustainable performance. These findings suggest that the effects of financial literacy and access to finance on sustainable performance are partially transmitted through entrepreneurs' access to and utilization of digital financial services. Consistent with [19], digital financial inclusion expands financial accessibility and economic opportunities, thereby strengthening sustainable business outcomes among people with disabilities.

7 Conclusion

In this study, the effects of financial literacy, access to finance, and digital financial inclusion on sustainable performance among PWDs in Indonesia were examined. The findings indicate that financial literacy and access to finance have positive and significant effects on digital financial inclusion. In addition, financial literacy, access to finance, and digital financial inclusion positively and significantly influence sustainable performance. These results suggest that PWDs can enhance the long-term sustainability of their businesses not only through stronger financial capabilities and improved financial accessibility but also through active participation in digital financial systems.

This study contributes to the literature on disability entrepreneurship, financial inclusion, and sustainable business development by providing empirical evidence regarding the role of digital financial inclusion as a mechanism linking financial resources to sustainable entrepreneurial outcomes. From a practical perspective, the findings highlight the importance of strengthening financial literacy programs, expanding the access to financial services, and promoting inclusive and accessible digital financial ecosystems for PWDs. Such initiatives can enhance business resilience, increase economic participation, and support the long-term sustainability of disability-owned enterprises.

7.1 Policy implications

Financial literacy initiatives should be tailored specifically to the diverse needs of PWDs. Training modules should be developed to cover not only core financial management and budgeting, but also practical guidance on the navigation of digital platforms. Ensuring that materials are available in accessible formats such as screen-reader-compatible digital content, captions, and sign language interpretation can help build genuine confidence and financial capability.

Financial institutions need to actively dismantle the systemic barriers to borrowing. This can be achieved by introducing flexible credit products, alternative credit-scoring models, or low-interest microfinance schemes designed for disability-owned

microenterprises. Simplifying the relevant application procedures and training loan officers on inclusive practices can put formal financing into reach.

Fintech providers and banks must prioritize accessibility features during the design phase. Mobile banking apps, digital wallets, and online payment gateways should align strictly with universal design principles (such as high-contrast interfaces, voice-guided navigation, and simplified user flows). Ensuring that digital platforms are intuitive and barrier-free further ensures that business owners with disabilities can seamlessly integrate their businesses into the broader digital economy.

7.2 Limitations and future research

First, this study is focused exclusively on PWDs in Indonesia, which may limit the generalizability of the findings to other contexts and geographical settings. Second, the cross-sectional research design does not reflect the ways that the relationships among the study variables evolve. Third, the study relies on self-reported data, which may be subject to response bias. Therefore, future research should adopt longitudinal designs, utilize objective business performance indicators, and examine additional factors such as entrepreneurial orientation, social capital, digital capability, innovation, and government support to provide a more comprehensive understanding of sustainable performance among PWDs.

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Author contributions

CrediT: Ahmad Idris: Conceptualization, Funding acquisition, Investigation, Methodology, Supervision, Validation, Visualization, Writing – original draft, Writing – review & editing; Lina Saptaria: Conceptualization, Investigation, Methodology, Writing – original draft, Writing – review & editing; Arni Surwanti: Formal analysis, Investigation, Writing – review & editing.

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Data availability

The authors confirm that all data generated or analysed during this study are included in this published article.

Declarations

Ethics approval

This study was approved by the Research Ethics Committee – Institute for Research and Community Service (LPPM), Universitas Islam Kadiri, located at the Central Office Building, 3rd Floor, Jl. Sersan Suharmaji No.38, Manisrenggo, Kota District, Kediri City, East Java 64128, Indonesia, in accordance with the guidelines and regulations set forth by the National Committee on Health Research Ethics (KEPPKN), Ministry of Health, Republic of Indonesia, Regulation No. 75 of 2020. The protocol number for this approval is 004/040.1.6/TU.00.11/V/2026, dated May 1, 2026.

Consent to participate

All participants provided written informed consent prior to their involvement in this study. Consent was obtained through the completion and approval of the consent dialog box embedded in the questionnaire. Participants received detailed information regarding the purpose of the research, the methodology, and their rights, including the option to withdraw at any time without any consequences. For participants under the age of 18, written informed consent was additionally obtained from a parent and/or legal guardian.

Consent for publication

All participants provided consent for the publication of the research findings. This consent included explicit agreement that results could be published in academic journals. For participants under the age of 18, written informed consent was additionally obtained from a parent and/or legal guardian.

Competing interests

The authors declare no competing interests.

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