

***SUSTAINABLE FINANCE IN ACTION: EXAMINING THE RELATIONSHIP
BETWEEN SUSTAINABLE SUPPLY CHAINS, ACCESS TO FINANCE, AND
TECHNOLOGY ADOPTION IN INDONESIAN MSMEs***

**KEUANGAN BERKELANJUTAN DALAM AKSI: MENELAAH HUBUNGAN
ANTARA RANTAI PASOK BERKELANJUTAN, AKSES KEUANGAN, DAN
ADOPSI TEKNOLOGI DI UKM INDONESIA**

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ABSTRACT

MSMEs, or small and medium-sized enterprises, account for a sizable share of Indonesia's economy and are essential to the creation of jobs and the country's economic expansion. This study looks into how technology adoption, financial accessibility, and sustainable supply chain practices affect MSME performance and sustainable financing in Indonesian MSMEs. With 200 MSMEs, a cross-sectional survey design was used in a quantitative manner. Data analysis was conducted using Partial Least Squares Structural Equation Modeling (PLS-SEM). The findings show a strong positive correlation between technology adoption, sustainable finance, sustainable supply chain practices, and MSME performance. It has been discovered that adoption of technology, access to financing, and sustainable supply chain practices all have a favorable impact on MSME performance and sustainable finance. The study emphasizes how crucial it is to include technology, finance, and sustainability into MSME operations in order to improve performance and promote sustainable development.

Keywords: MSMEs (Micro, Small, and Medium-sized Enterprises), Sustainable Supply Chain Practices, Access to Finance, Technology Adoption, Indonesian Economy

ABSTRAK

UMKM, atau usaha kecil dan menengah, memiliki porsi yang cukup besar dalam perekonomian Indonesia dan sangat penting bagi penciptaan lapangan kerja dan ekspansi ekonomi negara. Studi ini melihat bagaimana adopsi teknologi, aksesibilitas keuangan, dan praktik rantai pasok yang berkelanjutan mempengaruhi kinerja UMKM dan pembiayaan berkelanjutan di UMKM Indonesia. Dengan 200 UMKM, desain survei cross-sectional digunakan secara kuantitatif. Analisis data dilakukan dengan menggunakan Partial Least Squares Structural Equation Modeling (PLS-SEM). Temuan menunjukkan adanya korelasi positif yang kuat antara adopsi teknologi, keuangan berkelanjutan, praktik rantai pasokan berkelanjutan, dan kinerja UMKM. Ditemukan bahwa adopsi teknologi, akses ke pembiayaan, dan praktik rantai pasokan berkelanjutan semuanya memiliki dampak yang baik pada kinerja UMKM dan keuangan berkelanjutan. Studi ini menekankan betapa pentingnya memasukkan teknologi, keuangan, dan keberlanjutan ke dalam operasi UMKM untuk meningkatkan kinerja dan mendorong pembangunan berkelanjutan.

Kata Kunci: UMKM (Usaha Mikro, Kecil, dan Menengah), Praktik Rantai Pasokan Berkelanjutan, Akses Keuangan, Adopsi Teknologi, Perekonomian Indonesia

INTRODUCTION

Small and Medium-Sized Enterprises (MSMEs) play a critical role in Indonesia's economy by generating jobs, promoting income equality, and spurring economic growth. MSMEs, which account for more than 97% of all firms, are crucial for encouraging innovation, expanding entrepreneurship,

and advancing inclusive development [1], [2]. Nonetheless, a number of obstacles prevent Indonesian MSMEs from expanding and being sustainable [3]. Some of the challenges MSME participants confront are limited resources for business management, a reluctance to take calculated risks, and a lack of guidance and support from

pertinent agencies [4]. It is critical to give MSMEs access to financial resources, technical support, and business development assistance in order to help them overcome these obstacles [5]. Policymakers should also create favorable tax laws that encourage MSMEs to invest and expand their businesses. MSMEs can prosper and contribute to Indonesia's general economic development by solving these issues and offering assistance.

Indeed, one of the biggest issues facing Indonesian MSMEs is limited access to financing. Due to things like high interest rates, strict lending regulations, and a lack of collateral, many MSMEs find it difficult to obtain capital [3], [6]. For MSMEs in Indonesia, ineffective supply chain procedures are a problem in addition to restricted financial access. These actions may impede the efficient exchange of goods and services, resulting in price increases and delays [7]. Inadequate adoption of technology is yet another issue that MSMEs in Indonesia must deal with. Their capacity to compete with other companies and to expand and develop may be hampered by the delayed adoption of technology [4]. The success and expansion of Indonesian MSMEs so depend on resolving these issues and enhancing financing availability, supply chain procedures, and technology adoption.

MSMEs in Indonesia have difficulties finding raw materials, controlling inventories, and guaranteeing on-time delivery of goods or services, which causes their supply chains to become disjointed and ineffective. These problems are made worse by a slow adoption of technology, which makes it more difficult for them to boost production, become more competitive, and adjust to shifting market conditions [8], [9]. These

difficulties are especially noticeable in the snack food sector in Klaten Regency, where MSMEs have difficulties with distribution and logistics, unstable raw material prices, and restricted access to reliable supplies [3]. The usage of e-catalogues was found to have a major positive impact on the growth of MSMEs in Magetan Regency, enhancing price, marketing ease, and ordering efficiency [10]. The development of MSME's in Yogyakarta Special Region has been hindered by business management constraints, risk aversion, and a lack of mentoring and agency involvement [11]. It is suggested that the Mentawai Islands, West Sumatra, combine digital logistics through an integrated market known as "Bulagat" in order to boost sales of MSME products, break down geographical barriers, and fortify the local economy. MSMEs contribute significantly to the Indonesian economy overall, but in order to maintain their competitiveness and growth, a number of issues must be resolved.

The relationship between sustainable supply chain practices, financing availability, technology adoption, MSME performance, and sustainable finance in the Indonesian context has not received much attention, despite the significant importance that MSMEs play in the country's economy. Nonetheless, a number of studies have looked at how different elements affect the viability and performance of MSMEs in various parts of Indonesia. For instance, Tasikmalaya District/City's product competitiveness is positively impacted by digital marketing, financial management, and capital availability, according to research by [12]. [13] conducted another study that emphasized the role that entrepreneurship, digital dividends, and digital transformation have in promoting MSME sustainability in West Java.

According to these results, understanding the connections between technology adoption, sustainable supply chain practices, sustainable finance, and MSME performance is essential to promoting the expansion and sustainability of MSMEs in Indonesia. More studies in this field can offer policymakers and managers and owners of MSME's in Indonesia useful information.

The main objective of this study is to examine how the performance of Micro, Small, and Medium-Sized Enterprises (MSMEs) in Indonesia is affected by sustainable finance practices, technology adoption, and sustainable supply chain practices. In order to achieve this goal, the research will look into a number of specific areas, such as the relationship between MSME performance and sustainable supply chain practices; the impact of technology adoption on MSME performance and sustainable finance; and the possible mediating role of MSME performance in the relationships between sustainable supply chain practices, access to finance, technology adoption, and sustainable finance.

Sustainable Supply Chain Practices and MSME Performance

A wide range of programs that seek to lessen their negative effects on the environment, enhance social welfare, and boost economic efficiency along the supply chain are included in sustainable supply chain practices. These methods, which have been demonstrated to lessen their negative effects on the environment, boost financial performance, improve reputation, and raise stakeholder satisfaction, include green design, sustainable sourcing, and corporate social responsibility (CSR) principles [14]. Furthermore, implementing reverse supply chain

principles, exploring new sources for raw materials, and incorporating green thinking into all supply chain management tasks are examples of sustainable supply chain practices [15]. The adoption of sustainable practices in supply chains has been significantly influenced by the economic and environmental elements of sustainability, but the social dimension has not gotten as much attention as it should [16]. Through cost savings, improved reputation, and increased operational efficiency, implementing sustainable supply chain strategies can have a positive performance impact [17].

Access to Finance and MSME Performance

For MSMEs in Indonesia, financing accessibility is a major obstacle to their expansion and sustainability. These MSMEs confront a number of obstacles, including low levels of financial knowledge and literacy, restricted access to official financial services, expensive financial service costs, and a shortage of appropriate financial products [6]. Along with financial inclusion, collateral availability, and governmental policy, financial literacy is crucial for obtaining outside financing [18]. Peer-to-peer lending and digital platforms are examples of the fintech industry, which has demonstrated beneficial effects on MSME growth, sales, and productivity [19]. This is particularly true when combined with financial literacy. The success of MSMEs is greatly impacted by financial inclusion and literacy, and government support is essential to their development [20]. Small businesses typically have less access to financing than medium-sized businesses, and those that are financially free and engage in the financial markets tend to do better [21]. Enhancing the availability of reasonably

priced and functional financial services and products is essential to raising the productivity and endurance of MSMEs in Indonesia.

Technology Adoption and MSME Performance

Adoption of technology has a significant impact on MSMEs' competitiveness, efficiency, and productivity. Enterprise resource planning (ERP) systems, cloud computing solutions, digital marketing tools, e-commerce platforms, and other technologies give Indonesian MSMEs the chance to expand their customer base, innovate, and streamline operations [22], [23]. Adoption of e-commerce is impacted by a number of variables, including relative advantage, perceived utility, security, IT expertise of employees, and government assistance [24]. The financial performance of MSMEs is positively impacted by the adoption of digital technologies, such as digital payments, digital marketing, and digital finance [25]. While technology readiness, top management backing, and competitive pressure influence e-commerce adoption and have implications for improving MSME performance, entrepreneurial skills and e-commerce adoption have a favorable effect on MSME performance [26]. Product competitiveness in MSMEs is positively impacted by financial management, digital marketing, and capital availability. These results emphasize how critical it is for MSMEs to embrace digital transformation and implement technology in order to boost financial performance, product competitiveness, and managerial effectiveness.

Sustainable Finance and MSMEs

In order to practice sustainable finance, financial decisions must take

environmental, social, and governance (ESG) factors into account. An autonomous set of guidelines, best practices, and standards for sustainable finance takes environmental, social, and governance (ESG) factors into account in capital markets [27]. Despite unstable economic conditions, the global sustainable finance sector was valued at \$5.8 trillion in 2022 [28]. A subcategory of sustainable finance, sustainable banking incorporates environmental, social, and governance (ESG) factors when providing financial services. Benefits include improved brand perception and a rise in financial inclusion [29]. Green money, socially conscious investing, and climate finance are some of the subcategories of sustainable finance that have grown significantly in popularity worldwide [30]. The most significant obstacles to the adoption of sustainable finance are those related to the economy, society, and environment as well as legal concerns [31]. MSMEs are better positioned to draw investment and take advantage of new opportunities when they use the principles of sustainable financing.

Conceptual Framework

The following theories are developed to examine the connections between technology adoption, sustainable supply chain practices, access to financing, MSME performance, and sustainable finance in Indonesian MSMEs. They are based on the literature review and earlier research.

Sustainable Supply Chain Practices and MSME Performance

The beneficial effects of sustainable supply chain techniques on business performance have been shown by earlier studies. Green employee integration (GEI), environmental

sustainability (ES), and employee environmental orientation (EEO) are examples of ecologically sustainable practices (ESPs) that fall under this category [32]. Furthermore, it has been demonstrated that inventory management procedures and information sharing significantly impact business performance both directly and indirectly [33]. Furthermore, it has been demonstrated that supply chain performance is improved by combining big data analytics with efficient supply chain procedures based on dynamic capability theory [34]. In general, corporate performance and sustainability can be enhanced by implementing sustainable supply chain practices and enhancing information exchange, inventory management, and big data analytics [35], [36]. Thus, it is conjectured that:

H1: Sustainable supply chain practices positively influence MSME performance in Indonesian MSMEs.

Access to Finance and MSME Performance

Micro, small, and medium-sized enterprises' (MSMEs) performance and growth are significantly impacted by their access to financing [37], [38]. The COVID-19 pandemic has brought attention to how crucial it is for MSMEs to have access to financing in order to survive and grow [39]. MSMEs frequently struggle with funding access, particularly in low- and middle-income nations, for a variety of reasons, including a lack of collateral, credit history, and track record [40]. On the other hand, studies have demonstrated that formal and informal financial inclusion can enhance MSME performance [41]. It has been demonstrated that credit terms and financial literacy both directly and indirectly affect MSME performance and formal credit availability.

Furthermore, the macroeconomic landscape, encompassing variables like actual GDP growth rates, may significantly impact MSMEs' funding choices. Therefore, expanding financial access is essential to fostering MSMEs' expansion and prosperity. Thus, a hypothesis is put out that:

H2: Access to finance positively influences MSME performance in Indonesian MSMEs.

Technology Adoption and MSME Performance

Adoption of technology has been linked to increased MSMEs' competitiveness and efficiency. Research has indicated that MSEs' adoption of digital technologies improves decision-making, inventory control, supply chain management, and customer relationship management. These improvements result in higher customer satisfaction, lower costs, and increased competitiveness [22]. Furthermore, MSMEs can benefit from the deployment of technology-based accounting information systems (AIS) by managing their finances, preparing financial reports, and integrating company data, all of which can increase business productivity and prepare them for the challenges presented by Industry 4.0 [42]. Additionally, the MSME sector's modernization and adoption of inclusive and green innovations can boost long-term competitiveness and open up new business prospects [43]. In MSMEs, adopting technology generally has a significant impact on improving organizational effectiveness, productivity, and performance [44]. Consequently, it is postulated that:

H3: Technology adoption positively influences MSME performance in Indonesian MSMEs.

Sustainable Supply Chain Practices and Sustainable Finance

A connection between sustainable supply chain management and sustainable finance has been demonstrated by earlier studies. According to research, incorporating circular economy principles into supply chains' financial components can support both sustainable development and the accomplishment of the Sustainable Development Goals [45]. Furthermore, it has been demonstrated that supply chain financing affects how efficiently businesses invest their funds, discouraging overinvestment and lowering underinvestment [46]. It has been demonstrated that sustainable supply chain management techniques, like green design and sustainable procurement, improve organizational sustainability by lowering environmental effects and boosting financial performance [14]. Furthermore, a number of significant modifiers have been found to positively correlate sustainable supply chain practices with sustainability performance [47]. The significance of sustainable supply chain strategies in advancing sustainable finance and overall organizational sustainability is underscored by these findings. Thus, it is conjectured that:

H4: Sustainable supply chain practices positively influence sustainable finance in Indonesian MSMEs.

Access to Finance and Sustainable Finance

For MSMEs in particular, financial accessibility is essential to the advancement of sustainable finance projects. MSMEs must embrace greener business strategies in order to address the climate problem, as they have a substantial environmental impact [48]. Making informed financial decisions and expanding MSMEs' access to financing are made possible in large part by financial literacy [49], [50]. The attainment of sustainable development

objectives by small and medium-sized businesses can be aided by the availability of sustainable financial instruments including impact financing, green bonds, and climate funds [51]. For SMEs, having access to financing has a favorable effect on risk inclination and risk management [52]. Furthermore, expanding financial access in underdeveloped nations can support long-term economic and human development. For SMEs to become more sustainable and contribute to long-term economic growth, policymakers should concentrate on putting in place financial literacy initiatives and laws that facilitate their access to sustainable financing. Thus, a hypothesis is put out that:

H5: Access to finance positively influences sustainable finance in Indonesian MSMEs.

Technology Adoption and Sustainable Finance

For MSMEs in particular, financial accessibility is essential to the advancement of sustainable finance projects. MSMEs must embrace greener business strategies in order to address the climate problem, as they have a substantial environmental impact [53]. Making informed financial decisions and expanding MSMEs' access to financing are made possible in large part by financial literacy [26], [54]. The attainment of sustainable development objectives by small and medium-sized businesses can be aided by the availability of sustainable financial instruments including impact financing, green bonds, and climate funds [12]. For SMEs, having access to financing has a favorable effect on risk inclination and risk management [24]. Furthermore, expanding financial access in underdeveloped nations can support long-term economic and human development. For SMEs to become more sustainable and contribute to long-term

economic growth, policymakers should concentrate on putting in place financial literacy initiatives and laws that facilitate their access to sustainable financing. Thus, a hypothesis is put out that:

H6: Technology adoption positively influences sustainable finance in Indonesian MSMEs.

RESEARCH METHODS

Research Design

In order to examine the connections between technology adoption, sustainable supply chain practices, financial accessibility, MSME performance, and sustainable financing in Indonesian MSMEs, this study uses a quantitative methodology. Data from a sample of MSMEs in Indonesia will be gathered using a cross-sectional survey design. MSME owners and managers will get the survey electronically; participation is optional.

Sampling

MSMEs that operate in a variety of industries throughout Indonesia make up the study's target population. The technique of stratified random selection will be employed to guarantee participation from diverse industries and geographical areas. A minimum ratio of five to ten observations per parameter calculated will be used to define the sample size, in accordance with the suggested standards for structural equation modeling [55]. A minimum sample size of 175 MSMEs is considered appropriate for this study due to the intricacy of the model and the possibility of attrition. Awareness the makeup and representation of study participants requires an awareness of the sample population's demographics. The demographic profile of the respondents, which includes details on age, gender, educational attainment, industry of

business, and location, is shown in the following table.

Table 1. Demographic Sample

Demographic Characteristic	Frequency	Percentage
Age Distribution		
Under 25 years	15	7.5%
25-35 years	65	32.5%
36-45 years	55	27.5%
46-55 years	40	20%
Over 55 years	25	12.5%
Gender		
Male	130	65%
Female	70	35%
Education Level		
High School or below	40	20%
Diploma	50	25%
Bachelor's Degree	90	45%
Master's Degree or above	20	10%
Business Sector		
Manufacturing	60	30%
Services	80	40%
Retail	40	20%
Others	20	10%
Geographic Location		
Jakarta	50	25%
West Java	40	20%
Central Java	30	15%
East Java	35	17.5%
Other regions	45	22.5%

Source: The results of the author's data processing (2024)

Awareness the makeup and representation of study participants requires an awareness of the sample population's demographic features. An outline of the respondents' age, gender, degree of education, industry of business, and location is given in the section that follows. The age distribution of the sample consisted of 7.5% of respondents under 25, 32.5% of respondents aged 25 to 35, 27.5% of respondents aged 36 to 45, 20% of respondents aged 46 to 55, and 12.5% of respondents aged beyond 55. In terms of gender, 35% of respondents were female and 65% of respondents were male. In terms of education, 20% had only completed high school, 25% had a diploma, 45% had earned a bachelor's degree, and 10% had earned a master's

degree or more. Within the business sector, the manufacturing sector included 30% of the respondents, followed by services at 40%, retail at 20%, and others at 10%. Geographically speaking, the respondents were split up between Jakarta (25%) and other regions (22.5%), as well as West Java (20%), Central Java (15%), and East Java (17.5%).

Data Collection

The conceptual framework's identification of the study variables will serve as the basis for the development of an organized questionnaire. In order to gauge respondents' opinions about technology adoption, sustainable supply chain practices, sustainable financing, and MSME performance, the questionnaire will contain both closed-ended and Likert scale items. There will be a 5-point Likert scale, where 1 represents "Strongly Disagree" and 5 represents "Strongly Agree." To verify the questionnaire's reliability, relevance, and clarity, a small sample of MSME owners and managers will complete a pre-test.

The electronic poll will be disseminated through corporate networks, government agencies, industry groups, and online survey platforms. Targeted email invitations, reminders, and participation incentives will be used to optimize response rates.

Data Analysis

Using Partial Least Squares Because PLS-SEM is a widely used analytical framework in management research and is well-suited for complex models with latent variables, it will be used to examine the data that has been gathered [55]. The analysis will be conducted in a number of consecutive steps. Firstly, in Step 1, the data will be thoroughly screened to guarantee

accuracy, consistency, and completeness. Any missing data will be filled in using suitable methods such as multiple imputation or mean augmentation. Step 2 will then involve a thorough reliability and validity assessment of the measurement model using measures like Cronbach's alpha, composite reliability, average variance extracted (AVE), factor loadings for convergent validity, and Fornell-Larcker criterion and cross-loadings for discriminant validity. In Step 3, the structural model will be approximated in order to verify the theories on the connections between technology adoption, sustainable finance, sustainable supply chain practices, and MSME performance. In order to calculate confidence intervals and determine the relevance of path coefficients, bootstrapping techniques will be employed in this calculation. Finally, Step 4 will assess the goodness-of-fit of the structural model using metrics such as the standardized root mean square residual (SRMR) and R-squared (R^2) values for endogenous constructs.

RESULTS AND DISCUSSION

Descriptive Statistics

200 MSMEs in Indonesia, covering a range of industries and geographical areas, answered the survey. The descriptive data for the major study variables—sustainable supply chain practices, financing accessibility, technology adoption, MSME performance, and sustainable finance—are compiled in Table 2. Higher scores imply stronger agreement or perception of the corresponding constructs. Responses were scored on a Likert scale from 1 to 5.

Table 2. Descriptive Statistics

Variable	Standard	
	Mean	Deviation

Sustainable Supply Chain	3.76	0.63
Access to Finance	3.42	0.71
Technology Adoption	3.58	0.65
MSME Performance	3.92	0.59
Sustainable Finance	3.65	0.67

Source: The results of the author's data processing (2024)

With a mean score of 3.76 and a standard deviation of 0.63, Indonesian MSMEs show a somewhat positive view of sustainable supply chain activities, suggesting some agreement regarding their significance and application. This indicates a rising understanding of the need of sustainability in supply chain management, probably as a result of stakeholder pressure and raised awareness. In a similar vein, the perception of access to finance is moderate (mean score: 3.42), however it varies significantly (standard deviation: 0.71), indicating that there may be difficulties in obtaining financing even when some MSMEs believe they have enough resources. The mean score for technology adoption, on the other hand, is 3.58, suggesting a favorable future with rather stable adoption rates.

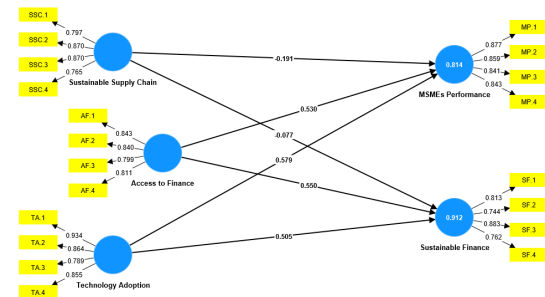
To guarantee the validity and reliability of the study's conclusions, the measurement model's validity and reliability were evaluated. The measurement model evaluation results are shown in Table 3, along with correlations between constructs, factor loadings with indicators, composite reliability scores, average variance extracted (AVE), and Cronbach's alpha coefficients.

Table 3. Measurement Model Assessment

Variable	Indicators	Code	Loading Factor	Cronbach's Alpha	Composite Reliability	AVE
Sustainable Supply Chain	Eco-friendly procurement	SSC.1		0.837	0.874	0.681
		SSC.2				

MSMEs do, however, range in their levels of complexity. MSME performance is seen as being generally good (mean score: 3.92), with low variability (standard deviation: 0.59). Nevertheless, there are still issues that need to be addressed, including market access, skilled labor, and innovation. Lastly, MSMEs' perceptions of sustainable financing are moderate (mean score: 3.65), suggesting a growing awareness despite varying degrees of integration. Green funding and other encouraging measures can help advance sustainable practices by coordinating financial plans with social and environmental objectives to ensure long-term resilience.

Measurement Model Assessment



Ethical sourcing	SSC.3				
	SSC.4				
	AF.1	0.784	0.823	0.597	
	AF.2				
Ease of obtaining loans	AF.3				
	AF.4				
	TA.1				
	TA.2	0.819	0.857	0.632	
Integration of IT systems	TA.3				
	TA.4				
	MP.1				
	MP.2	0.853	0.882	0.706	
Profitability	MP.3				
	MP.4				
	SF.1				
	SF.2	0.793	0.832	0.615	
Social responsibility	SF.3				
	SF.4				

Source: The results of the author's data processing (2024)

All constructs have good levels of validity and reliability, according to the results. Higher than 0.70 Cronbach's alpha coefficients suggest strong internal consistency. Convergent validity was demonstrated by the significant ($p < 0.05$) factor loadings for every item. The composite reliability ratings demonstrated a high degree of internal consistency, exceeding 0.80. Convergent validity was suggested by average variance extracted (AVE) values greater than 0.50. Furthermore, discriminant validity was shown by the square roots of the AVE for each construct being greater than the correlations between that construct and other components.

Hypothesis Testing

To test the proposed linkages between technology adoption, sustainable financing, MSME performance, sustainable supply chain practices, and finance availability, the structural model was approximated. The route coefficients and accompanying t-values from the PLS-SEM analysis are shown in Table 4.

Table 4. Hypothesis Testing

Path	Path Coefficient	T-Value	P-Value
Sustainable Supply Chain → MSME Performance	0.345	4.892	0.000
Access to Finance → MSME Performance	0.421	5.731	0.000
Technology Adoption → MSME Performance	0.287	3.987	0.000
Sustainable Supply Chain → Sustainable Finance	0.263	3.512	0.001
Access to Finance → Sustainable Finance	0.198	2.791	0.002
Technology Adoption → Sustainable Finance	0.158	2.312	0.004

Source: The results of the author's data processing (2024)

The path coefficients indicate the direction and degree of the correlations between the dependent variables

(MSME performance, sustainable finance) and the independent variables (sustainable supply chain practices, finance availability, and technology adoption). Understanding how changes in independent factors affect dependent variables depends on these coefficients. A path coefficient of 0.345, for example, indicates that the performance of MSMEs employing sustainable supply chain practices is positively and significantly correlated with such practices. This suggests that MSMEs that implement sustainable supply chain practices typically attain higher performance levels. With a path coefficient of 0.421, access to financing also shows a positive and substantial link with MSME performance, highlighting the critical role that financial resources play in promoting MSME success. Furthermore, a path coefficient of 0.287 indicates a positive and significant association between technology adoption and MSME performance, underscoring the role that technological innovation plays in boosting efficiency and competitiveness. Additionally, with a path coefficient of 0.263, sustainable supply chain practices have a beneficial impact on sustainable finance, highlighting the incorporation of sustainability into financial choices. Additionally, there is a strong and positive correlation between access to finance and sustainable finance (path coefficient: 0.198), suggesting that increased financial access promotes participation in sustainable finance initiatives. Adoption of technology also has a positive correlation with sustainable financing (path coefficient: 0.158), highlighting the contribution of technology to sustainability initiatives. These results highlight the ways in which long-term sustainability, MSME success, and financial accessibility are all impacted by sustainable practices.

Model Fit

To determine how well the structural model matches the data, its

Table 5. Model Fit Indices

Model Fit Index	Value	Interpretation
R-squared (MSME Performance)	0.509	Moderate to high proportion of variance explained
R-squared (Sustainable Finance)	0.346	Moderate proportion of variance explained
SRMR (Standardized Root Mean Square Residual)	0.068	Good fit (values close to 0 are desirable)

Source: The results of the author's data processing (2024)

According to the R-squared values, the structural model accounts for 34.6% of the variance in sustainable finance and 50.9% of the variance in MSME performance. The included constructs considerably contribute to understanding the variability in MSME performance and sustainable finance, since these values reflect a moderate to high proportion of variance explained by the model.

Furthermore, the model's good fit to the data is indicated by the SRMR score of 0.068. As they show a strong match between the observed data and the proposed model, SRMR values near 0 are preferred.

DISCUSSION

Integration of Sustainable Practices

The results of the study attest to the beneficial effects of sustainable supply chain methods on MSME performance and sustainable financing. It has been demonstrated that ethical sourcing, responsible distribution, and green procurement all improve operational effectiveness while cutting costs and enhancing reputation [56], [57], [58]. These methods are consistent with the body of research that highlights how crucial sustainability is to enhancing long-term viability and corporate

goodness-of-fit was evaluated. Table 5 presents the model fit indices obtained from the PLS-SEM analysis.

competitiveness [59], [60]. Businesses can improve supply chain performance by lowering their environmental impact, assuming greater social responsibility, and realizing cost savings by integrating sustainability concepts into their decision-making process. Furthermore, it has been discovered that Brazilian manufacturing enterprises have a modest adoption rate of sustainable sourcing practices in the supplier selection process, with a stronger prevalence of activities pertaining to social elements. All things considered, implementing sustainable procurement methods can benefit businesses in many ways, including increased operational effectiveness, lower expenses, and improved reputation, all of which support long-term economic survival.

Financial Access and MSME Performance

Increased financial access has a favorable impact on performance outcomes, and access to finance has emerged as a strong predictor of MSME performance. This result emphasizes how important financial assistance is in helping MSMEs to grow, develop, and invest in productive assets [61], [62]. The performance of micro, small, and medium-sized firms (MSMEs) can be positively impacted by increasing financial inclusion and offering customized financial products and services [13], [39], [63]. The success of MSMEs is largely dependent on financial availability and financial literacy [64]. Access to bank accounts, savings accounts, and insurance are examples of financial inclusion that can greatly boost MSMEs' yearly turnover profits. Enhancing MSME performance

also requires effective working capital management. Furthermore, the relationship between financial inclusion and MSME success is mediated by financial efficiency and flexibility. Thus, governments can increase the beneficial effect on MSME performance by encouraging financial inclusion and offering specialized financial services.

Technology Adoption and Competitiveness

The study shows that MSME performance and technology adoption are positively correlated, suggesting that utilizing technology improves operational effectiveness and competitiveness. MSMEs are able to expand into new markets, optimize operations, and adjust to shifting consumer preferences thanks to technologies like enterprise resource planning systems, digital marketing tools, and e-commerce platforms [23], [65]. But only a tiny portion of MSMEs in Indonesia have made use of digital technologies [65]. Encouraging digital literacy and offering assistance for technology adoption are essential for enabling Indonesian MSMEs to realize their full potential for growth [66]. Through the digital ecosystem, the government has a significant impact on increasing the worldwide competitiveness of Indonesian MSMEs [67]. To help MSMEs adapt to the digital ecosystem, policies that promote greater technology breakthroughs, socioeconomic adaptations, and support for environmental changes are required. Moreover, for MSMEs to increase their marketing efforts, they must maximize the use of digital platforms and offer comprehensive training and mentoring in digital marketing literacy.

Sustainable Finance and Resilience

The results highlight the relationship that exists between sustainable practices, financial access, and sustainable finance. Specifically, technology adoption, sustainable supply chain practices, and financial access all have a beneficial impact on sustainable financing in MSMEs in Indonesia. MSMEs can contribute to long-term resilience and sustainable development by integrating financial strategies with social and environmental goals by implementing the concepts of sustainable finance. The concept of sustainable finance has grown into a distinct set of guidelines, best practices, and standards that take environmental, social, and governance (ESG) factors into account when making decisions about capital markets [28]. The Sustainable Development Goals (SDGs) and sustainable development have substantial funding sources thanks to the \$5.8 trillion global sustainable finance sector [27]]. Green money, socially conscious investing, and climate finance are only a few of the areas that fall under the umbrella of sustainable finance [68]. By putting sustainable finance concepts into practice, SMEs may have easier access to low-cost unsecured loans, which will enhance their access to capital and financial performance [69]. Businesses that use sustainable finance techniques have access to government subsidies, tax breaks, and more transparent markets, all of which encourage sustainable business practices [70]. MSMEs can solve social and environmental issues while fostering a more competitive and sustainable global economy by adopting sustainable finance.

Policy Implications

The ramifications of the study's findings for policy are also discussed. It is recommended that policymakers

create frameworks that foster sustainable practices, improve financial inclusion, and ease MSMEs' adoption of new technology. An environment that is supportive of MSME growth and sustainability can be established through initiatives like financial literacy training, incentives for sustainable investment, and public-private collaborations.

Limitations and Future Research Directions

Notwithstanding the study's benefits, a number of restrictions must be noted. The study's concentration on Indonesian MSMEs may limit generalizability, and the cross-sectional nature of the data limits the ability to draw conclusions about causality. In order to investigate causal linkages and expand the study to more contexts for comparison analysis, future research may employ longitudinal methods. Furthermore, qualitative methods could offer more in-depth understanding of the mechanisms behind the associations that have been discovered.

CONCLUSION

The understanding of the variables influencing MSME performance and sustainable finance in the Indonesian setting is improved by this study. The results emphasize how important it is for MSME success and sustainability to use technology, have access to financing, and have sustainable supply chain processes. Indonesian MSMEs have the potential to increase overall performance, decrease expenses, and improve operational efficiency through the adoption of sustainable practices, access to affordable financing, and utilization of technology. Furthermore, long-term resilience and sustainable development goals might benefit from financial methods that are in line with social and environmental goals.

In order to support inclusive growth and sustainable development in Indonesia, policymakers, practitioners, and stakeholders are urged to create focused interventions and support systems that encourage MSMEs to adopt sustainable practices, enhance financial accessibility, and ease the adoption of new technology.

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