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Can the green intellectual capital dimension, in conjunction with fintech adoption, achieve business sustainability?

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Abstract: *MSMEs are important pillars of the Indonesian economy as economic drivers, but they also have social and environmental responsibilities in supporting sustainable development. This study aims to analyze the green intellectual capital model, which not only considers profits but also contributes to environmental sustainability by leveraging fintech, thereby achieving business sustainability across economic, social, and environmental dimensions. This research method uses a quantitative approach, collecting primary data through questionnaires and analyzing them using SEM-PLS, with a sample of 220 businesses. The results of the study indicate that green intellectual capital has a significant influence on fintech adoption and on sustainability performance in all aspects, i.e., economic, social, and environmental. Fintech adoption has a significant influence on economic and social sustainability performance, but not significantly on environmental performance. Fintech adoption can mediate the effect of green intellectual capital on economic and social performance. Still, it cannot mediate the effect of green intellectual capital on environmental performance among MSMEs in the Serikat Usaha Muhammadiyah (SUMU) community of East Java. To achieve scale-up for MSMEs, specific policies are needed to direct the use of green fintech in company operations, thereby achieving a significant impact in realizing sustainable businesses, such as the use of environmentally friendly raw materials and products, energy efficiency, and access to green financing.*

Keywords: *fintech adoption; green intellectual capital; MSMEs; sustainability performance*

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Apakah dimensi *green intellectual capital* dengan adopsi *fintech* dapat mewujudkan keberlanjutan bisnis?

Abstrak: *UMKM memiliki tanggung jawab sosial dan lingkungan dalam mendukung pembangunan berkelanjutan sebagai salah satu pilar penggerak perekonomian. Penelitian ini bertujuan untuk memberikan analisis model green intellectual capital yang dialokasikan tidak hanya untuk memperhitungkan keuntungan semata, tetapi juga berkontribusi dalam menjaga kelestarian lingkungan dengan memanfaatkan fintech sehingga tercapai keberlanjutan usaha dari aspek ekonomi, sosial, dan lingkungan. Metode penelitian ini menggunakan pendekatan kuantitatif dengan data primer melalui kuesioner, kemudian dianalisis menggunakan SEM-PLS dengan sampel sebanyak 220 usaha. Hasil penelitian menunjukkan bahwa green intellectual capital memiliki pengaruh signifikan terhadap adopsi fintech serta sustainability performance pada semua aspek kinerja, baik ekonomi, sosial, maupun lingkungan. Adopsi fintech memiliki pengaruh signifikan terhadap kinerja keberlanjutan ekonomi dan sosial, namun tidak signifikan terhadap kinerja lingkungan. Adopsi fintech dapat memediasi pengaruh green intellectual capital terhadap kinerja ekonomi dan sosial, namun tidak dapat memediasi pengaruh green intellectual capital terhadap kinerja lingkungan UMKM dalam komunitas Serikat Usaha Muhammadiyah (SUMU) di Jawa Timur. Dalam rangka mencapai scale-up bagi UMKM, dibutuhkan kebijakan spesifik yang mengarah pada pemanfaatan green fintech dalam operasional perusahaan sehingga dapat mencapai dampak yang signifikan dalam mewujudkan bisnis yang berkelanjutan, seperti pemanfaatan bahan baku dan produk ramah lingkungan, efisiensi energi, serta akses pembiayaan hijau.*

Kata kunci: *adopsi fintech; green intellectual capital; kinerja keberlanjutan; UMKM*

INTRODUCTION

The issue of environmental degradation is currently a focus of the government because various studies have stated that 60% of the production process can increase carbon emissions and damage the ecosystem if not balanced with an attitude of concern for the environment (Borsatto & Bazani, 2023; Peña-Vinces et al., 2020). In Indonesia, the commitment to protecting the environment is stated in *Asta Cita 8*, which encourages digital transformation and moves towards a sustainable, green economy, as stated in *Asta Cita 4* (Hermawan, 2025). Micro, small, and medium enterprises (MSMEs) are a crucial pillar of the Indonesian economy. Data from the Ministry of Cooperatives and SMEs (2023) shows that MSMEs contribute approximately 61.9% to national GDP and employ over 97% of the workforce (Kurniawan, 2024; Mauliddah & Maharani, 2023). This significant role confirms that MSMEs are not merely economic drivers but also have social and environmental responsibilities in supporting sustainable development (Chege et al., 2020; Sulaiman, 2025). However, MSME activities can create environmental problems, such as the use of single-use packaging and the disposal of production waste. This situation is increasingly relevant amid global challenges of climate change, environmental pollution, and limited natural resources (Csikósová et al., 2019; Winslow et al., 2019).

MSMEs need to be aware of the importance of environmentally based knowledge assets to support business sustainability (Suwandi, 2025; Yusoff et al., 2019). This understanding is known as green intellectual capital (GIC). GIC consists of green human capital, green structural capital, and green relational capital, which involve a complex understanding and awareness of human resources, innovation, and trust-building, as well as a positive image with consumers and business partners through the application of green values (Suengkamolpisut et al., 2025). The application of GIC in MSMEs not only increases the efficiency of resource use and waste management but also encourages green product innovation to achieve sustainable business (Namagembe, 2021; Safriansyah et al., 2020). This situation aligns with the triple bottom line theory introduced by Elkington (1998), which asserts that financial profits, social contributions, and environmental sustainability measure business success.

Furthermore, MSME sustainability is also significantly influenced by access to capital and financial management. Limited capital has historically been a significant barrier to MSME growth, particularly for environmentally friendly practices that require additional investment (Shahin et al.,

2024). Moreover, Lee & Shin (2018) emphasize that financial technology plays a role in increasing financial inclusion and is a crucial instrument in supporting business sustainability, including by encouraging MSMEs to adopt more environmentally friendly practices.

Several MSMEs in Indonesia, including those affiliated with the Serikat Usaha Muhammadiyah (SUMU) in East Java, have formed a community that serves as a networking platform for business managers to improve their businesses. The use of fintech by MSMEs has grown significantly, and MSME awareness is improving, indicating one application of green intellectual capital in their business practices (Muzdalifa et al., 2018; Rehan et al., 2025; Siddik et al., 2023). At the same time, its relationship with MSMEs' environmental concerns is still rarely studied, especially at the regional level, such as East Java, one of the provinces with the largest number of MSMEs in Indonesia, and also facing serious problems in waste management (Soetjipto, 2020).

Based on this situation, this investigation intends to examine the impact of (1) GIC on financial technology adoption, as well as economic, social, and environmental performance; (2) financial technology adoption on economic, social, and environmental performance; and (3) the mediating role of financial technology adoption in the relationship between GIC and economic, social, and environmental performance. This research is expected to make academic contributions to the literature and to provide practical benefits, including recommendations for MSME strategies to become more competitive and environmentally friendly.

According to the resource-based view, intellectual capital (IC) is a resource of the company. It must be valuable, rare, and inimitable (Barney, 1991). In the green concept, intellectual capital encompasses green human, structural, and relational elements (Chen, 2008). This IC is believed to play a crucial role in driving fintech adoption among businesses (Mir & Sheikh, 2026). In their investigation, Mir & Sheik (2026) confirm a positive tendency of IC on fintech adoption.

H_1: Green intellectual capital significantly influences fintech adoption.

Green intellectual capital (GIC) has significantly contributed to sustainability, but has been mostly studied for publicly traded companies. The achievement of business sustainability is divided into economic, social, and environmental performance, i.e., economic, social, and environmental performance (Kocmanová & Dočekalová, 2011). As intangible assets, employees have skills and knowledge. Developing them with specific training will create higher value for a company. Besides, a company needs to equip them with structural capital, such as systems and databases, as well as organizational structure and culture. The better these components, the greater its potential to profit (Purnamawati et al., 2022). In their investigation, Purnamawati et al. (2022) find that human and structural capital positively influence the financial performance of MSMEs of the businesspeople in Buleleng, Bali. Additionally, Wati et al. (2024) and Sabita & Dasman (2025) report a positive tendency of GIC toward the profitability of the IDX companies that participated in the PROPER assessment from 2019 to 2022 and IDX companies in the food and beverage industry from 2020 to 2023, respectively.

H_2: Green intellectual capital significantly influences economic performance.

Associated with the social aspect, green human capital reflects employee competence and awareness of responsible social practices. Meanwhile, green structural capital supports this through systems, organizational culture, and policies oriented toward social sustainability. Green relational capital, on the other hand, strengthens relationships with stakeholders such as communities, customers, and business partners, contributing to organizational social legitimacy. Rehan et al. (2025) document a positive impact of GIC on sustainable social performance based on the perspectives of 320 Pakistani employees in Islamic banks. Using the employees and owners of SMEs in Ghana, Antwi-Boateng et al. (2025) find a positive association between GIC and social performance.

H_3: Green intellectual capital significantly influences social performance.

Regarding the environmental aspect, green intellectual capital is a strategic, knowledge-based asset that can encourage organizations to develop environmentally friendly capabilities, such as efficient resource use, waste reduction, and sustainable business practices. Green human capital reflects employee competence and awareness of environmental issues; green structural capital supports this through pro-environmental systems, procedures, and organizational culture; and green relational capital strengthens collaboration with stakeholders to support sustainable practices. In their investigation, Alnaim & Metwally (2024) find that each component of green intellectual capital positively contributes to the environmental performance of manufacturing companies. Similarly, using employees and owners

of SMEs in Ghana, Antwi-Boateng et al. (2025) find a positive association between GIC and environmental performance.

H_4: Green intellectual capital has a significant effect on environmental performance.

Fintech adoption is increasingly becoming a crucial factor in improving organizational economic performance, particularly in the context of digital transformation and operational efficiency. According to the Technology Acceptance Model (TAM), technology adoption is influenced by perceived ease of use and usefulness, which ultimately impacts performance improvement. Furthermore, organizational ability to adopt and utilize technologies, such as fintech, can be a source of sustainable competitive advantage. Efficient transactions, easy-to-access financing, and increasingly affordable financial inclusion, are all conveniences fintech, can provide that directly increase productivity and income. In their research, Antoni et al. (2024) and Waqar et al. (2025) find a positive tendency of fintech adoption towards the economic performance of MSMEs and SMEs, respectively.

H_5: Fintech adoption has a significant influence on economic performance.

Low-income communities and the MSME sector benefit significantly from fintech adoption, particularly in financial inclusion and social protection (Morgan & Long, 2020). In their study, Siddik et al. (2023) explain that financial access increases, communities become more economically empowered, and social disparities are reduced. All of this is achieved when social development is supported by fintech implementation. A company's social performance is maximized when it adopts fintech comprehensively across all its lines. In their study, Siddik et al. (2023) confirm a positive association between fintech adoption and social performance of SMEs in Bangladesh.

H_6: Fintech adoption has a significant influence on social performance.

Environmental performance in this digital era can be easily achieved when companies leverage key drivers, including the widespread adoption of fintech. Strategic resources created to gain a competitive advantage for companies and support sustainable business models depend, in part, on how companies utilize and adopt financial technology. Fintech implementation enables paper reduction through transaction digitization, energy efficiency through electronic payment systems, and optimization of more environmentally friendly resource management. Previous research has shown that fintech contributes to green finance and encourages more sustainable business practices, including reducing carbon footprints and increasing operational efficiency (Hassan et al., 2026; Mertzanis et al., 2026). In their research, Siddik et al. (2023), Thomas et al. (2025), and Waqar et al. (2025) demonstrate that the higher the level of fintech adoption in an organization, the better its environmental performance.

H_7: Fintech adoption has a significant impact on environmental performance.

The era of digital transformation is a crucial moment for companies to improve economic performance through the role of green intellectual capital, encompassing complex aspects of human capital, corporate structure, and partner relationships. Companies possess assets that serve as a defining characteristic, enabling them to demonstrate comparative advantage in the market, thereby achieving increased efficiency and innovation. This capability is considered green intellectual capital according to the resource-based view theory. The ability of companies and organizations, to adopt technology, plays a significant role in supporting the ownership of green intellectual capital in this digital economy era, including financial technology. GIC capabilities strengthen the implementation of technology adoption to support company readiness and perception of the benefits of the technology mentioned above. Aspects of green intellectual capital help improve digital literacy through the presence of green human capital. The provision of systems and infrastructure to support digitalization can be realized in green structural capital. The expansion and collaborative network of fintech use are realized in the company's ability in the aspect of green relational capital. Previous research on GIC shows that company performance and sustainable innovation can improve significantly when companies have a high level of GIC (Yong et al., 2019; Zalfa & Novita, 2023). Meanwhile, other studies suggest that economic performance can be improved when companies contribute through fintech adoption, supported by operational efficiency, credit availability, and increased productivity (Lee & Shin, 2018). Therefore, improved economic performance can be achieved when fintech utilization increases, as previously optimized in GIC (Li et al., 2024).

H_{8a}: Green intellectual capital influences economic performance through fintech adoption.

Employee well-being and strengthening stakeholder relationships are currently key factors in a company's success. When employees are prosperous and relationships with stakeholders are strong, the company can achieve strong social performance. The demands of companies, in the current digital era,

have an indirect impact on social performance, as companies with strong green intellectual capital are better able to compete and survive. Ethical and inclusive business practices can be achieved by companies when they have a comparative advantage through GIC. However, the demands of digital business practices must be balanced with adequate internal readiness and capabilities, including knowledge, systems, and strong relationships with the company's partners or stakeholders. Yong et al. (2019) explain that sustainability performance, one aspect of which is social performance, can significantly improve when a company has a high GIC, both internally and externally. Other research has identified the role of fintech adoption in advancing financial inclusion, openness, accountability, and community empowerment, all components of social performance (Thomas et al., 2025). In fact, there is currently very limited research on the increase in social performance triggered by the integration of GICs and fintech. Therefore, this study will provide a new perspective on GICs' impact on social performance, bridging it with fintech adoption via a mediating mechanism. Through this research, a clearer picture and broader social impact can be obtained from environmentally based capabilities optimized by integrating digital technology, especially in the financial sector. Correspondingly, an increase in GIC will be followed by optimal fintech utilization, which will, in turn, lead to an increase in the company's social performance.

H_{8b}: Green intellectual capital influences social performance through fintech adoption.

A company's success in adopting technology depends on the readiness of its ecosystem to implement it, strengthened by GIC. GIC is a complex aspect of employee and management readiness to adopt technology, supported by green human capital. Adequate infrastructure and systems needed for technology implementation through digitalization are met by green structural capital (Hassan et al., 2026; Vukmirovic et al., 2024). Meanwhile, the need for stakeholder relationships that support energy efficiency and sustainable technology-based performance is realized through green relational capital. Achieving environmental performance along with eco-innovation is significantly supported by GIC, according to Yang et al. (2026) and Yong et al. (2019). Previous studies have demonstrated that green intellectual capital enhances environmental performance primarily through green innovation and organizational capabilities rather than through direct effects. For example, Siddik et al. (2023) reported that fintech adoption contributes positively to environmental performance by facilitating green innovation and improving access to sustainable financial resources. Meanwhile, carbon footprint reduction and operational efficiency are achieved when companies integrate transaction digitization into fintech implementation, thus achieving green finance. Integrative research on GIC and fintech adoption is still limited, particularly within a single research topic. Furthermore, fintech adoption is positioned as a mediating variable that strengthens its relationship with environmental performance.

H_{8c}: Green intellectual capital influences environmental performance through fintech adoption.

Based on the articulated hypotheses, the conceptual framework is shaped in Figure 1.

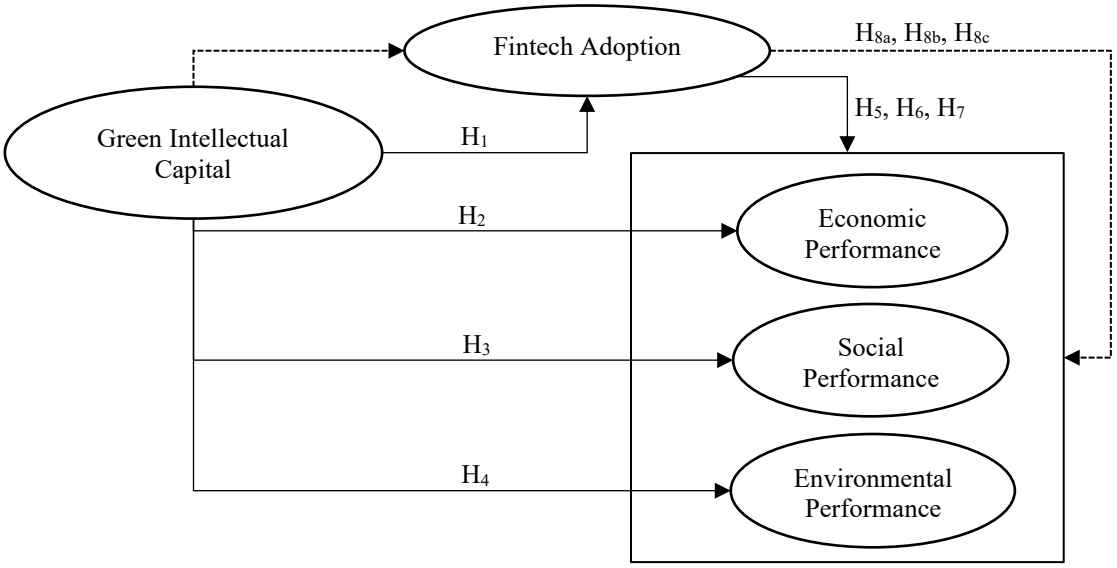


Figure 1. Conceptual framework
Source: Hypothesis development (2026)

There are interrelationships among the three aspects of performance, fintech adoption, and green intellectual capital. Thus, the direct and indirect effects (via mediation) are applied to those variables.

METHOD

An explanatory research design is used, beginning with quantitative data collection to test the hypotheses. As further fundamental research, this study used MSME members of SUMU in East Java as its population, totaling 488 businesses spread across several regions, namely Surabaya City, Lamongan, Malang, Malang City, Tulungagung, and Sidoarjo, with a sample calculated using the Slovin formula, obtained as 220 businesses (Santoso, 2023). The margin of error in the sample calculation is 5%, which is sufficient to obtain a number that can represent the population and generally describe the condition of MSMEs in Indonesia.

Furthermore, green intellectual capital acts as the exogenous variable with three dimensions, i.e., green human capital, green structural capital, and green relational capital. Meanwhile, fintech adoption and business sustainability (measured by economic, social, and environmental performance) act as the endogenous variables. The questionnaire items to measure these variables are presented in Table 1, where the responses are assessed by a five-point Likert scale, ranging from strongly disagree to strongly agree. Before being used, the questionnaire was tested for validity and reliability to ensure the instrument's quality. The research data are analyzed using qualitative, inferential, and descriptive statistics. The inferential analysis used was structural equation modeling-partial least squares (SEM-PLS) analysis assisted by SmartPLS.

This study examines the measurement model through validity and reliability. The validity detected is convergent, as quantified by the factor loadings and the average variance extracted (AVE). Items are considered valid if the factor loading and AVE are greater than 0.5. Meanwhile, the reliability is tested using Cronbach's alpha and composite reliability. Moreover, item responses will be considered reliable if they are above 0.7. The evaluation of this model is based on R-square and adjusted R-square. Their cut-off values are 0.25, 0.5, and 0.75, indicating weak, moderate, and substantial contributions to explaining the dependent variable, respectively. Finally, the hypothesis is examined by comparing the probability value with the 5% significance level. If the probability is lower than this level, the research hypothesis is accepted (Hair et al., 2021).

Table 1. Variable measurement

Variable	No	Items	Source
Green intellectual capital	GIC1	Employees at this company are productive and contribute positively to environmental protection.	Yusoff et al. (2019)
	GIC2	Employees at this company have adequate competency and provide services related to environmental protection.	
	GIC3	The company demonstrates a high level of teamwork in environmental protection.	
	GIC4	Managers support employees in environmental protection.	
	GIC5	The company has an environmental management system.	
	GIC6	The company has made adequate investments in environmental protection facilities.	
	GIC7	The overall operational processes for environmental protection are efficient.	
	GIC8	The company's knowledge management system supports environmental management.	
	GIC9	The company has established environmental protection regulations.	

Variable	No	Items	Source
	GIC10	The company designs its products and services to meet its customers' environmental requirements.	
	GIC11	Customers are satisfied with the company's environmental protection practices.	
	GIC12	Environmental protection is not neglected in its collaborative relationships with suppliers, clients, and customers.	
Economic performance	EcP1	The company sells waste products to generate additional revenue.	Waqar et al. (2025)
	EcP2	This company has a high level of cost efficiency.	
	EcP3	This company reduces waste management costs during production.	
	EcP4	This company collaborates with government officials to protect its interests.	
	EcP5	Businesses in various business sectors use this company's products.	
Social performance	SoP1	This company prioritizes the health and safety of employees and the community.	Zalfa & Novita (2023)
	Sop2	This company protects the rights of local communities.	
	SoP3	It pays attention to aesthetics and operational design.	
Environmental performance	EnvP1	This company reduces energy consumption, waste, and emissions from its operations.	Siddik et al. (2023)
	EnvP2	This company reduces the risk of environmental accidents, spills, and releases of hazardous substances by reducing the use of chemical components.	
	EnvP3	This product uses easily recyclable packaging.	
	EnvP4	This company conducts regular environmental inspections.	
	EnvP5	The company has planned to invest in waste management.	
	EnvP6	The company's owners understand the opportunity to access capital in banking to increase green investments.	
Fintech adoption	FA1	Fintech creates new opportunities and supports innovation for our business.	Siddik et al. (2023)
	FA2	The process of using online financial services runs smoothly at this company.	
	FA3	All employees support the use of online financial transactions.	
	FA4	Online financial services create new collaborative networks.	

Source: The authors' literature review (2026)

RESULTS AND DISCUSSION

Results

The study included 220 MSMEs (micro, small, and medium enterprises) affiliated with Serikat Usaha Muhammadiyah in East Java, representing 45% of the total membership of 488. In this demographic analysis, the authors collected data across categories such as gender, position within the MSME, length

of operation, number of employees, product type, and turnover. The complete demographic characteristics of the respondents are presented in Table 2.

The demographic data show that 202 respondents are male (92%) and 18 respondents are female (8%). In the dominant position, 187 respondents are business owners (85%), with the remainder being managers (11%) and staff (4%). Based on operational length, 117 companies have been established for 1 to 5 years (53%), 61 firms for 6 to 10 years (28%), and 42 enterprises for more than 10 years (19%). At the leading level, 169 companies employ fewer than or 10 employees (77%), while at the lowest level, 3 companies employ 41-60 employees (1%). By product type, 78 companies are in the services business (36%), followed by food (30%), information and technology (25%), fashion (4%), and others (5%). Finally, 68 companies have income between IDR 11 and 50 million (30%) at the highest rank, while at the lowest rank, 39 companies have income between IDR 50 and 100 million (18%).

Table 2. Demographic features (n = 220)

Category	Subcategory	Frequency	%
Gender	Male	202	92%
	Female	18	8%
Role in SMES	Owner	187	85%
	Manager	24	11%
	Staff	9	4%
Company establishment	1 - 5 years	117	53%
	6 - 10 years	61	28%
	> 10 years	42	19%
Number of employees	≤ 10 people	169	77%
	11-20 people	20	9%
	21-40 people	22	10%
	41-60 people	3	1%
	> 60 people	6	3%
Product	Fashion	9	4%
	Service	78	36%
	Food	67	30%
	Information and technology	56	25%
	Others	10	5%
Income	≤ IDR 10 million	52	24%
	IDR 11 - 50 million	68	30%
	IDR 50 - 100 million	39	18%
	> IDR 100 million	61	28%

Source: The output of Microsoft Excel (2026)

Table 3 demonstrates that the loading factor for final valid items is higher than 0.7, ranging from 0.703 up to 0.960. This situation is also confirmed by AVE for all variables, with values above 0.5, ranging from 0.586 up to 0.912. The Cronbach's alpha for all variables is greater than 0.7, ranging from 0.773 up to 0.968. Thus, the reliability test is acceptable, as confirmed by composite reliability values that higher than 0.7, from 0.850 up to 0.972.

Table 4 presents the contributions of the determinants of fintech adoption (FA), economic, environmental, and social performance (EcP, EnvP, and SocP), as indicated by R-squared and adjusted R-squared. The R-squared and adjusted R-squared for the FA model are 0.339 and 0.336; for the EcP model are 0.336 and 0.330; and for the EnvP model are 0.462 and 0.457. According to the cut-off value of Hair et al. (2021), their contributions are between the weak and moderate levels. The social performance determinants have R-squared and adjusted R-squared values of 0.688 and 0.685, respectively; hence, their contribution is between the moderate and substantial levels.

Table 5 presents the variance-based SEM estimation results, with probability values for H_1-H_7 and H_{8a}, H_{8b}, and H_{8c} are ranging from 0.000 up to 0.970. Because the *p*-values are lower than 5%, H_1-H_6 and H_{8a}-H_{8b} are accepted. However, H_7 and H_{8c} are not accepted because the *p*-values are higher than 5%, either 0.970.

Table 3. Final validity and reliability testing results

Construct	Code	Loading factor	Average variance extracted (AVE)	Cronbach's alpha	Composite reliability
Green intellectual capital	GIC1	0.884	0.743	0.968	0.972
	GIC2	0.875			
	GIC3	0.866			
	GIC4	0.843			
	GIC5	0.890			
	GIC6	0.863			
	GIC7	0.895			
	GIC8	0.897			
	GIC9	0.800			
	GIC10	0.811			
	GIC11	0.848			
	GIC12	0.863			
Economic performance	EcP2	0.751	0.586	0.773	0.850
	EcP3	0.826			
	EcP4	0.773			
	EcP5	0.707			
Social performance	SocP1	0.955	0.912	0.952	0.969
	SocP2	0.950			
	SocP3	0.960			
Environmental performance	EnvP1	0.741	0.646	0.888	0.915
	EnvP2	0.856			
	EnvP3	0.745			
	EnvP4	0.917			
	EnvP5	0.847			
	EnvP6	0.703			
Fintech adoption	FA2	0.858	0.746	0.831	0.898
	FA3	0.850			
	FA4	0.883			

Source: The output of SmartPLS (2026)

Table 4. R-squared and adjusted R-squared

Model	R-squared	Adjusted R-squared	Interpretation
FA	0.339	0.336	Between-weak-and-moderate contribution
EcP	0.336	0.330	
EnvP	0.462	0.457	
SocP	0.688	0.685	Between-moderate-and-substantial contribution

Source: The output of SmartPLS (2026)

Table 5. The estimation results of variance-based SEM

Hypothesis	Causality	Original sample	Standard deviation	T statistics	*P* values
1	GIC → FA	0.583	0.061	9.585	0.000
2	GIC → EcP	0.471	0.097	4.876	0.000
3	GIC → SocP	0.673	0.048	14.123	0.000
4	GIC → EnvP	0.681	0.061	11.155	0.000
5	FA → EcP	0.162	0.063	2.575	0.010
6	FA → SocP	0.232	0.051	4.590	0.000
7	FA → EnvP	-0.002	0.045	0.038	0.970
8a	GIC→ FA→ EcP	0.094	0.043	2.210	0.028
8b	GIC→FA → SocP	0.135	0.031	4.384	0.000
8c	GIC→FA → EnvP	-0.001	0.027	0.037	0.970

Source: SmartPLS output (2026)

Discussion

Hypothesis 1 is accepted; green intellectual capital has positive influence on fintech adoption. It supports the RBV theory, which states that companies with competitive advantages not possessed by competitors will develop more easily. This development is partly due to technological and information advancements, particularly in corporate financial management. Green intellectual capital, as an effort to increase organizational understanding of managerial processes that consider environmental sustainability, strongly supports technological developments, including those in financial management. Companies that adopt a mindset focused on reducing waste and increasing efficiency through online transactions will more easily adapt to financial technology. TAM theory states that technology aims to provide convenience and increase its usefulness to users (Waqar et al., 2025). Fintech can provide significant benefits when users also have a good understanding of how to use it. Companies with strong green human capital will more easily adapt to technology, making fintech adoption easier to implement and improving company efficiency (Siddik et al., 2023). Companies with highly productive employees and management, teamwork that supports environmental preservation, and technological literacy will more easily create new opportunities and support business innovation through technology adoption. This research supports Mir & Sheikh (2026), who state that companies with good green intellectual capital and resources will more easily adapt and utilize fintech well.

Hypothesis 2 is accepted; green intellectual capital has positive impact on economic performance. These results indicate that the combination of three components of green intellectual capital, human, structural, and relationship, can improve a company's economic performance. When a company has human capital that is committed to managing the company without neglecting environmental preservation, this will positively impact the company's financial performance. Efficiency can be improved, production costs can be reduced, and revenues can be increased, thereby increasing economic performance; in this case, the company's profits. Furthermore, the organizational structure and relationships with partners who support the production process, while considering environmental impact, will be factors in the company's success, increasing its positive impact on profits. Partner support and a sound structure in achieving long-term environmental goals will help the company increase its value, such as its stock price. However, in the context of MSMEs, improved economic performance is defined as an increase in company profits. Therefore, this investigation aligns with Purnamawati et al. (2022), who found that human and structural capital positively influence the financial performance of MSMEs of the businesspeople in Buleleng, Bali.

Hypothesis 3 is accepted; a positive and significant effect of green intellectual capital on firm performance in the social aspect. It indicates that companies with strong implementations of environmental conservation, carbon emission reduction, and waste management will receive positive perceptions from the surrounding community. These results align with the natural resource-based view theory, which states that companies with a dominant comparative advantage in environmental sustainability will have significant opportunities to establish business sustainability in the social aspect. The surrounding community is aware of the company because it maintains environmental stability without disrupting the surrounding social order and norms. Companies committed to reducing carbon emissions and utilizing waste are protecting the rights of local communities and encouraging continued collaboration. Mertzanis et al. (2026) show that environmentally-based intellectual capital management can enhance competitive advantage through socially responsible business practices. GIC encourages eco-innovation, which ultimately impacts sustainability performance, including employee well-being and corporate social responsibility (Yong et al., 2019). Therefore, this result aligns with Antwi-Boateng et al. (2025), documenting a positive association between GIC and social performance.

Hypothesis 4 is accepted; a positive and significant impact of green intellectual capital on a company's environmental performance. Companies that prioritize environmentally friendly production processes will perform well in terms of environmental sustainability and performance. MSMEs, with an environmental protection management system and adequate investment in environmental protection facilities, will reduce energy consumption, waste, and emissions from their operations, and reduce the risk of environmental accidents, spills, and the release of hazardous substances by reducing chemical components. MSMEs, whose management and employees have a good understanding of waste management, will use biodegradable product packaging and will routinely conduct environmental checks. This condition is in line with the natural resources-based view theory, which states that a

company's significant comparative advantage in environmental sustainability will have a positive long-term impact on the company, particularly regarding environmental conditions that can still be utilized in the long term. Therefore, this result aligns with Antwi-Boateng et al. (2025) that documenting a positive association between GIC and environmental performance.

Hypothesis 5 is accepted, indicating a positive and significant influence of fintech adoption on economic performance. The demands of increasingly advanced technological developments require MSMEs to adapt. Companies that fail to keep pace with these changing times will fall behind their competitors. Fintech, as a technological phenomenon adapted to financial transactions, is inextricably linked to company operations. The company's operational efficiency, which is realized through reducing operational costs and increasing company profits, can be achieved by utilizing technology that provides speed and accuracy in working, especially in financial transactions. The company's sustainable competitive advantage can be achieved through ownership of employee and stakeholder capabilities in utilizing technology, as adopted fintech must be supported by organizational readiness, due to the perception of user-friendliness and the usefulness of technology adoption as a supporter of performance improvement, which is an opinion based on TAM theory (Jain et al., 2021). Expanding the reach of financial services, efficient transactions, and easy access to financing are all possibilities that can be achieved if the company adopts fintech and is followed by increased revenue and production (Abbasi et al., 2021). Therefore, this result aligns with Antoni et al. (2024) and Waqar et al. (2025) that documenting a positive association between GIC and the financial performance of MSMEs and SME, respectively.

Hypothesis 6 is accepted, showing the influence of fintech adoption on social performance. Fintech implementation allows organizations to expand access to financial services for previously unaffordable communities (financial inclusion), improve transaction transparency, and promote more accountable business practices. Companies with a strong integration of technology and social performance benefit more from employee well-being and customer relationships, as they operate more ethically and value customers and the social community. Customers experience convenience and speed when companies implement fintech in their transactions. This situation builds positive sentiment, encouraging them to make further purchases. Consistent with TAM, successful fintech adoption is achieved when users experience the ease and speed of utilizing the technology. Consequently, the positive value created by the company impacts the well-being of users and the wider community within the company's ecosystem (Mertzanis et al., 2026). Therefore, this result aligns with Siddik et al. (2023), who used SMEs in Bangladesh as the object.

Hypothesis 7 is rejected, indicating that businesses' adoption of digital financial technology has not significantly affected environmental performance. It may be due to fintech's primary focus on efficient financial transactions, access to financing, and improving economic performance, resulting in environmental sustainability not being a top priority in its implementation. Furthermore, limited integration of fintech services with environmentally friendly business practices, as well as MSMEs' limited literacy about green practices, also hampers the creation of tangible ecological impact. Therefore, these results indicate that fintech adoption, without strong sustainability awareness and strategies, is insufficient to drive improved environmental performance. Therefore, this indication supports Nurisaputri (2025) after investigating the businesspeople of batik in Yogyakarta.

The research accepts hypothesis 8a, stating that green intellectual capital supports economic performance, but only with strong fintech adoption. Intellectual capital management, consisting of three dimensions, green human, green structural, and green relational, explained previously, can help improve economic performance through digitalization in the financial sector. According to the resource-based view, a company's competitive advantage can be sustained by possessing green intellectual capital (Vukmirovic et al., 2024). Combining these rare and unique assets with fintech can be a catalyst for accelerating efficient transactions, easy-to-access financing, and greater financial transparency and openness to stakeholders. Creating a company's economic value is easy when internal insight and capabilities are the main factors. This opinion belongs to Shestak et al. (2019); economic performance, as expressed in increased profitability, cost efficiency, and a business that continues to grow in the long term, requires the role of financial technology, which is a conversion of green stakeholder knowledge. Employee and management competencies, adequate support to utilize fintech, and teamwork, combined with the use of online services and technological literacy, will enable maximum sales and increase business profits compared to sales and transactions carried out manually.

This study accepts H_{8b}, demonstrating that the effect of green intellectual capital on social performance is mediated by fintech adoption. MSMEs are required to create value not only for their owners but also for the wider community. Fintech adoption can strengthen the influence of green intellectual capital on a company's social performance. Fintech adoption acts as a mechanism that links social performance to green intellectual capital. Manifestations of this improvement include access to financial services for communities, community empowerment, and increased public trust. These results align with the resource-based view perspective, which states that optimal utilization of superior internal resources will provide added value through in-line company capabilities, one of which is leveraging strengthened relationships with stakeholders through fintech adoption to expand the reach of financial services. Maintaining the importance of social performance by implementing one of the company's essential skills is crucial to building a positive public perception of business activities. Because company operations are closely linked to environmental impacts that disrupt comfort, this needs to be communicated beforehand (Lisha et al., 2023). Building positive public sentiment toward these operations is essential for sustaining social performance. Social performance improved when technology effectively manages the relationship between the company and the public (Siddik et al., 2023). The ease of access and opportunities for collaboration between companies and the public, through the application of financial technology, enhance corporate efficiency in terms of both time and resources, thereby fostering public commitment to support and sustain the company's operations.

In line with previous research, integrating sustainability practices and financial digitalization has been shown to strengthen a company's social impact, particularly for adaptable SMEs (Zalfa & Novita, 2023). The improvement in social performance mediated by fintech reflects the company's tangible contribution to sustainable community well-being, including increased financial inclusion, reduced social inequality, and the empowerment of small business groups. Thus, the combination of green intellectual capital and fintech adoption not only strengthens short-term social performance but also fosters an inclusive, adaptive, and long-term socially sustainable business ecosystem. The improvement in social performance, mediated by fintech, reflects the company's tangible contribution to sustainable community well-being, including increased financial inclusion, reduced social inequality, and the empowerment of small business groups. Thus, the combination of green intellectual capital and fintech adoption not only strengthens short-term social performance but also fosters an inclusive, adaptive, and long-term socially sustainable business ecosystem.

This study rejects H_{8c}, indicating that the effect of green intellectual capital on environmental performance is not mediated by fintech adoption. The company's existing capabilities in environmental knowledge have not significantly improved environmental performance, even though they are supported by fintech. Within this framework, fintech adoption cannot yet support the transformation mechanism that connects the potential of green intellectual capital with operational practices that directly impact the environment. This situation is inconsistent with the resource-based view theory (Yong et al., 2019). However, in this context, fintech adoption has not yet served as a transformative mechanism linking the potential of green intellectual capital to operational practices that directly impact the environment. More profoundly, reducing environmental impacts, such as more efficient energy use, waste recycling, and environmentally friendly innovation, poses significant demands, especially when companies lack the capabilities to achieve good environmental performance (Borsatto & Bazani, 2023). Fintech adoption generally focuses solely on increasing profits, neglecting aspects of transaction convenience, access to financing, and cost efficiency, which are challenging for MSMEs to achieve. This condition aligns with previous research showing that a strong green finance strategy or sustainability policy, without integration with digital financial technology, tends to have no significant impact on environmental performance (Nurisaputri, 2025; Rachmawati, 2025). Therefore, the relationship between green intellectual capital and environmental performance cannot yet be mediated by fintech adoption, with the caveat that stronger interaction between technological innovation and sustainable business practices is essential, thereby underscoring the need for stronger cooperation between digital innovation and environmental sustainability strategies.

CONCLUSION AND SUGGESTIONS

The findings of this study confirm the natural resource-based view, which holds that companies need a comparative advantage, particularly in environmental protection. Environmental protection campaigns should be actively carried out by various parties, especially by SMEs within the Serikat Usaha Muhammadiyah (SUMU) community in East Java. Strong competencies in environmentally friendly production processes, along with the use of recyclable raw materials and packaging, are the primary drivers of maintaining a company's sustainability across economic, social, environmental dimensions, and governance. However, SMEs must keep pace with this massive technological development, as the positive impacts of adopting financial technology are key to bridging the gap between achieving business sustainability and leveraging a company's existing competitive advantages. Nevertheless, based on this study's results, the impact of financial technology implementation on environmental sustainability is not significant among SMEs in the SUMU community. This situation occurs because the implementation of fintech in many organizations remains focused on improving financial efficiency and access to financing, leading to a relatively limited contribution to environmental management and, consequently, to improvements in environmental performance not yet achieved.

In light of these results, policies are needed that specifically guide the development of green fintech. Firstly, the SUMU community, which aims to encourage businesses to scale up, needs to collaborate with regulators to encourage digital financial institutions to offer products and services that support environmentally friendly practices, such as green financing, incentives for businesses implementing energy efficiency measures, and environmental impact reporting features. Secondly, the SUMU community can encourage their members to access digital financing sources that support environmentally friendly practices, thereby fostering cooperation among the government, academia, the fintech industry, and SME stakeholders to create an ecosystem that supports sustainable digital transformation. Support for applied research, the development of green-innovation-based business models, and the provision of inclusive digital infrastructure will accelerate progress toward sustainable development goals.

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