

LEVERAGING FINTECH FOR SUSTAINABLE SUPPLY CHAINS: THE ROLES OF ORGANIZATIONAL CAPABILITIES AND ENVIRONMENTAL UNCERTAINTY IN SMALL AND MEDIUM ENTERPRISES



Muhammad Usman ^(a) Muhammad Ismail ^{(b)1} Basharat Raza ^(c)

^(a)PhD. Scholar, Business Administration Department, NCBA&E (Alhamra University), Lahore, Pakistan; E-mail: director.purchase@gu.edu.pk

^(b)PhD. Scholar, Business Administration Department, NCBA&E (Alhamra University), Lahore, Pakistan; E-mail: ismaileghari14@gmail.com

^(c)Associate Professor and Head of Department, Business Administration Department, NCBA&E (Alhamra University), Lahore, Pakistan; E-mail: basharat.hailians@gmail.com

ARTICLE INFO

Article History:

Received: 28th June 2026
Reviewed & Revised: 28th June to 30th September 2026
Accepted: 10th October 2026
Published: 20th October 2026

Keywords:

Small and Medium Enterprises (SMEs), Fintech Adoption, IT Capability, Green Technology Adoption, Supply Chain Transparency, Environmental Uncertainty, Green Supply Chain Management

JEL Classification Codes:

M41, G21, G23, L25, L26, O16, O33

Peer-Review Model:

External peer review was done through double-blind method.

ABSTRACT

The purpose of the study is to analyse the factors affecting green supply chain management (GSCM) within small and medium-sized enterprises (SMEs), with respect to the adoption of Fintech, organisational capabilities, and the impact of environmental uncertainty. It aims to provide information on how digital tools and internal resources can be used to promote sustainable supply chain practices and help firms respond effectively to a dynamic market environment. A self-administered survey of SME entrepreneurs was used to collect data, which were analysed using Partial Least Squares Structural Equation Modelling (PLS-SEM) to test direct, mediating, and moderating relationships. The findings show that the adoption of Fintech can have a significant positive or indirect impact on GSCM through IT capability, supply chain transparency, and the adoption of green technology. Environmental uncertainty moderates the positive relationship between IT capability and green technology adoption and the negative relationship between supply chain transparency and GSCM. These results indicate that digital finance and organisational capabilities are more effective at fostering sustainable supply chains when aligned with the external environmental context. The research builds upon the Resource-Based View and Contingency Theory by showing that fintech adoption is a strategic digital resource whose effectiveness in enhancing GSCM depends on internal capacity and the environment, thereby providing a comprehensive picture of the mechanisms for operating sustainable supply chain management and its boundary conditions. It is recommended that managers strategically implement fintech solutions, develop IT and green technology capacity, and balance transparency programs in response to environmental uncertainty, and that policymakers promote SME sustainability by supporting fintech implementation and the adoption of adaptive green technologies.

© 2026 by the authors. Licensee CRIBFB, USA. This open-access article is distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license (<http://creativecommons.org/licenses/by/4.0>).

INTRODUCTION

Sustainability has emerged as a critical strategic priority for organisations worldwide, driven by increasing environmental concerns, regulatory pressures, and stakeholder expectations (Bello-Pintado et al., 2023). Green supply chain management (GSCM) integrates environmentally responsible practices across procurement, production, distribution, and reverse logistics, enabling firms to reduce their ecological footprint while enhancing operational efficiency. In parallel, the adoption of financial technologies has transformed how organisations manage financial transactions, operational processes, and supply chain information (Ioannou & Demirel, 2022). Fintech solutions, such as digital payments, blockchain, and smart

¹Corresponding author: ORCID ID: 0000-0002-9437-9212

© 2026 by the authors. Hosting by CRIBFB. Peer review is the responsibility of CRIBFB, USA. <https://doi.org/10.46281/ijsmes.v9i1.2981>

To cite this article: Usman, M., Ismail, M., & Raza, B. (2026). LEVERAGING FINTECH FOR SUSTAINABLE SUPPLY CHAINS: THE ROLES OF ORGANIZATIONAL CAPABILITIES AND ENVIRONMENTAL UNCERTAINTY IN SMALL AND MEDIUM ENTERPRISES. *International Journal of Small and Medium Enterprises*, 9(1), 37-49. <https://doi.org/10.46281/ijsmes.v9i1.2981>

contracts, not only enhance efficiency but also offer new avenues to support sustainability initiatives by improving transparency, traceability, and resource allocation (Elias et al., 2024).

Although interest in fintech adoption and GSCM has increased, the number of studies analysing their intersection remains rather small. Current research has paid much attention to the immediate influence of Fintech on financial performance or operational efficiency, without placing particular emphasis on the processes by which Fintech adoption can be translated into sustainable practices within a supply chain. Furthermore, organisational factors, including IT infrastructure, the use of green technology, and supply chain visibility, are likely to mediate this relationship significantly (Khan et al., 2022). These are the same capabilities that enable firms to successfully leverage fintech resources to execute and oversee green initiatives across intricate supply chains.

The environmental uncertainty also makes it difficult to implement green supply chains. The effectiveness of organisational abilities may also be accelerated or constrained by volatile markets, evolving regulations, and technological turbulence, implying that the role of fintech adoption in GSCM might be contingent on specific scenarios (Chatterjee & Chaudhuri, 2022). Resource scarcity among SMEs in specific situations and high sensitivity to environmental changes underscore the need to understand how Fintech and organisational abilities interact across different degrees of uncertainty to achieve sustainable outcomes (Moreira-Santos et al., 2022).

Against this background, the current research paper builds on the integrated framework to investigate the direct, mediating, and moderating effects of fintech adoption on organisational abilities (IT capability, green technology adoption, and supply chain transparency), as well as on environmental uncertainty and green supply chain management in SMEs. In this way, the research fills critical gaps in the literature by providing a multifaceted understanding of how digital finance can drive sustainable supply chain practices and of the circumstances under which these effects are likely to be most pronounced.

In the current research article publication, the first chapter contains the introduction about leveraging Fintech for sustainable supply chains among small and medium enterprises (SMEs); the second chapter contains the literature review; the third chapter contains the methodology used in this study; the fourth chapter contains the discussion portion; and the last chapter contains the conclusion.

LITERATURE REVIEW

The research is largely based on the Resource-Based View (RBV) that explains the processes through which competitive advantage is established by firms by obtaining and utilising valuable or organisational resources and capabilities (Lubis, 2022). In this view, fintech adoption is understood as a strategic digital asset that enhances firms' financial integration, data access, and technological infrastructure (Jayalath & Premaratne, 2021). By implementing fintech solutions, companies enhance supply chain visibility, facilitate the adoption of green technologies, and build strong IT capabilities, all of which are key organisational competencies for the realisation of green supply chain management (Shahid, 2025). RBV also indicates that such capabilities are mechanisms by which the adoption of Fintech translates into better environmental outcomes, thus supporting the direct and mediating relationships postulated in the study (Jia et al., 2025).

Building on the RBV, the research also draws on Contingency Theory to identify the contextual factors under which fintech-enabled capabilities can shape green supply chain management (Tosi Jr & Slocum Jr., 1984). According to contingency theory, organisational resources are effective in relation to the external environment, especially uncertainty and volatility (Turkulainen, 2022). The ever-evolving and unpredictable nature of the business environment forces companies to become increasingly dependent on transparent supply chains, green technologies, and sophisticated IT infrastructure to address environmental and regulatory shocks, as well as market volatility (Kareem et al., 2025). The effects of supply chain transparency on green technology adoption and of IT capability on green supply chain management will therefore differ depending on the degree of environmental uncertainty (Wu, 2013).

By combining RBV and Contingency Theory, the study provides a comprehensive account of how and when fintech implementation leads to green supply chain management. RBV explains the internal processes of capability building that link fintech adoption to sustainability, whereas Contingency Theory details the boundary conditions that shape these relationships (Hidayat-ur-Rehman, 2025). These theories collectively provide a solid basis for understanding the direct impacts of fintech adoption, the moderating impact of organisational abilities, and the moderating impact of environmental uncertainty; hence, the entire set of hypotheses suggested in this study.

Fintech adoption and organisational abilities: The widespread adoption of financial technologies has radically transformed organisational processes by improving data integration, automation, and real-time decision-making (Ionescu & Diaconita, 2023). Fintech Adoption will enable companies to digitise financial transactions, increase traceability, and integrate financial information across supply chain partners, resulting in greater supply chain transparency (Han et al., 2024). Earlier studies indicate that blockchain, mobile payments, and smart contracts, as digital financial innovations, decrease information asymmetry and promote supply network visibility, which is essential for tracking environmental and social activities (Liu et al., 2021).

Besides being transparent, fintech adoption is quite central in supporting the adoption of green technology (Hidayat-ur-Rehman & Hossain, 2025). Fintech helps anyone invest in environmentally friendly technologies by making finance more accessible, reducing transaction costs, and enabling new financing methods (Cen & He, 2018). Digital financial tools have been empirically found to motivate firms to adopt energy-efficient systems, green logistics solutions, and environmentally friendly production technologies by reducing financial and operational obstacles (Sun et al., 2025).

Also, the use of Fintech reinforces an organisation's capabilities by improving its technological infrastructure, data analytics capabilities, and system integration (Pazouki et al., 2025). Within the Resource-Based View, fintech-enabled IT capability is a strategic organisational resource that increases firms' capacity to use digital tools to pursue sustainability-

related goals (Wang & Zhang, 2025). Literature that has been reviewed so far clearly points to the fact that companies that have a developed digital financial system are more likely to have high IT capabilities, which, by extension, contribute to operational flexibility and innovativeness (Maryam et al., 2025). In this connection, the adoption of Fintech is likely to have a positive impact on supply chain transparency, green technology adoption, and IT capability.

H₁: Fintech adoption has a direct positive relationship with supply chain transparency.

H₂: Fintech adoption has a direct positive relationship with green technology adoption.

H₃: Fintech adoption has a direct positive relationship with IT capability.

Fintech adoption and green supply chain management outcomes: Green supply chain management has become an urgent organisational priority to reduce environmental impacts across procurement, production, distribution, and reverse logistics (Letunovska et al., 2023). The use of Fintech can directly add value to green supply chain management through efficient resource distribution, green financing, and the selection of environmentally responsible suppliers (Shahid, 2025). Digital financial systems can deepen the monitoring and analysis of environmental performance, enabling companies to align financial decision-making with environmental sustainability objectives (Shahid, 2025).

Supply chain transparency has been widely recognised as a key driver of green supply chain management (Morgan et al., 2023). Open supply chain enables companies to monitor the flow of materials, evaluate suppliers' environmental management, and assess sustainability and quality standards (Vangeri et al., 2024). Earlier research indicates that increased transparency mitigates opportunistic behaviour, increases accountability to the environment, and facilitates the adoption of green practices across supply chain phases (Khan et al., 2024).

On the same note, the adoption of green technology makes a significant contribution to green supply chain management by enabling cleaner production processes, energy-efficient logistics, and waste-reduction programs (Yu et al., 2022). Using green technologies enables companies to put sustainability into practice and deliver quantifiable environmental results (D'Amato et al., 2021). It has been empirically observed that companies investing in green technologies are better positioned to implement green supply chain practices effectively (Rahman et al., 2025).

Green supply chain management is also assisted by IT capabilities, including the ability to monitor the environment using data, integrate green information systems, and coordinate supply chain partners (Esfahbodi et al., 2023). Good IT capacity improves firms' ability to process complex sustainability data and act proactively on environmental issues (Li & Huang, 2023). Therefore, fintech adoption, supply chain transparency, the adoption of green technology, and IT capability are likely to directly and positively impact green supply chain management (Jia et al., 2025).

H₄: Fintech adoption has a direct positive relationship with green supply chain management.

H₅: Supply chain transparency has a direct positive relationship with green supply chain management.

H₆: Green technology adoption has a direct positive relationship with green supply chain management.

H₇: IT capability has a direct positive relationship with green supply chain management.

Mediating role of organisational mechanisms: Fintech adoption has significant sustainability potential, but its effects on green supply chain management are unlikely to be directly related to it (Jia et al., 2025). Organisational mechanisms are important mediators in the conversion of fintech-enabled capabilities into green outcomes (Wu et al., 2026). Supply chain transparency is an important mechanism through which fintech adoption can impact green supply chain management by enhancing visibility, traceability, and environmental accountability throughout the supply chain (Jia et al., 2025).

The adoption of green technologies is also a significant mediator, as fintech adoption expands access to financial resources and technological innovation for operating in an environmentally sustainable manner (Yan et al., 2022). The sustainability gains from adopting green technologies might be realised without adopting Fintech. Preceding research highlights that digital finance is more effective in increasing sustainability outcomes in the case when it is used to finance investments in green technologies (Hidayat-ur-Rehman & Hossain, 2025).

Moreover, IT capability mediates the association between fintech adoption and green supply chain management, as it enables firms to use digital tools effectively, integrate sustainability-related information, and coordinate green initiatives among supply chain partners (Meng et al., 2025). In terms of capability, the adoption of Fintech will increase IT capability, thereby boosting the firm's ability to adopt green supply chain practices (Jia et al., 2025). These mediating forces help gain a more insightful view of how the adoption of Fintech supports green supply chain management.

H₈: Supply chain transparency mediates the relationship between fintech adoption and green supply chain management.

H₉: Green technology adoption mediates the relationship between fintech adoption and green supply chain management.

H₁₀: IT capability mediates the relationship between fintech adoption and green supply chain management.

Moderating role of environmental uncertainty: Environmental uncertainty, which includes rapid technological change, regulatory volatility, and unstable market conditions, is a significant contextual variable that affects organisational decision-making (Shafizadeh, 2024). The contingency theory holds that the performance of organisational resources and capabilities is contingent on environmental conditions (Mahmud et al., 2021). The increased pressure to change their strategies and actively take advantage of digital and technological opportunities is observed under conditions of high uncertainty (Jelonek, 2023).

Supply chain transparency is especially valuable when environmental uncertainty is high, as improved supply chain visibility helps firms respond promptly to disruptive events or regulatory changes without compromising environmental standards (Holloway, 2025). Likewise, the success of adopting green technology to spur green supply chain management can vary with the intensity of environmental uncertainty, since an uncertain environment can either intensify the need to be green or limit firms' ability to utilise green technologies (Wang et al., 2025).

The contingent role of IT skills also arises, as companies in uncertain environments are more dependent on robust IT systems to manage and organise sustainability programs and address environmental challenges (Inman & Green, 2022). According to previous studies, the effect of IT capability in highly uncertain environmental settings is more decisive for performance, since companies must handle large amounts of information and make quick adjustments (Mao et al., 2015). Thus, environmental uncertainty is anticipated to smooth the association among supply chain transparency, green technology adoption, IT capability, and green supply chain management.

H₁₁: Environmental uncertainty moderates the relationship between supply chain transparency and green supply chain management.

H₁₂: Environmental uncertainty moderates the relationship between green technology adoption and green supply chain management.

H₁₃: Environmental uncertainty moderates the relationship between IT capability and green supply chain management.

In Figure 1, the conceptual framework identifies fintech adoption as the independent variable and green supply chain management as the dependent variable. Supply chain transparency, green technology adoption, and IT capability are included as mediating variables explaining the mechanism by which fintech adoption influences sustainable supply chain practices. Environmental uncertainty moderates the relationship between the mediating variables and green supply chain management. The framework therefore integrates technological, organisational, and environmental factors within SMEs.

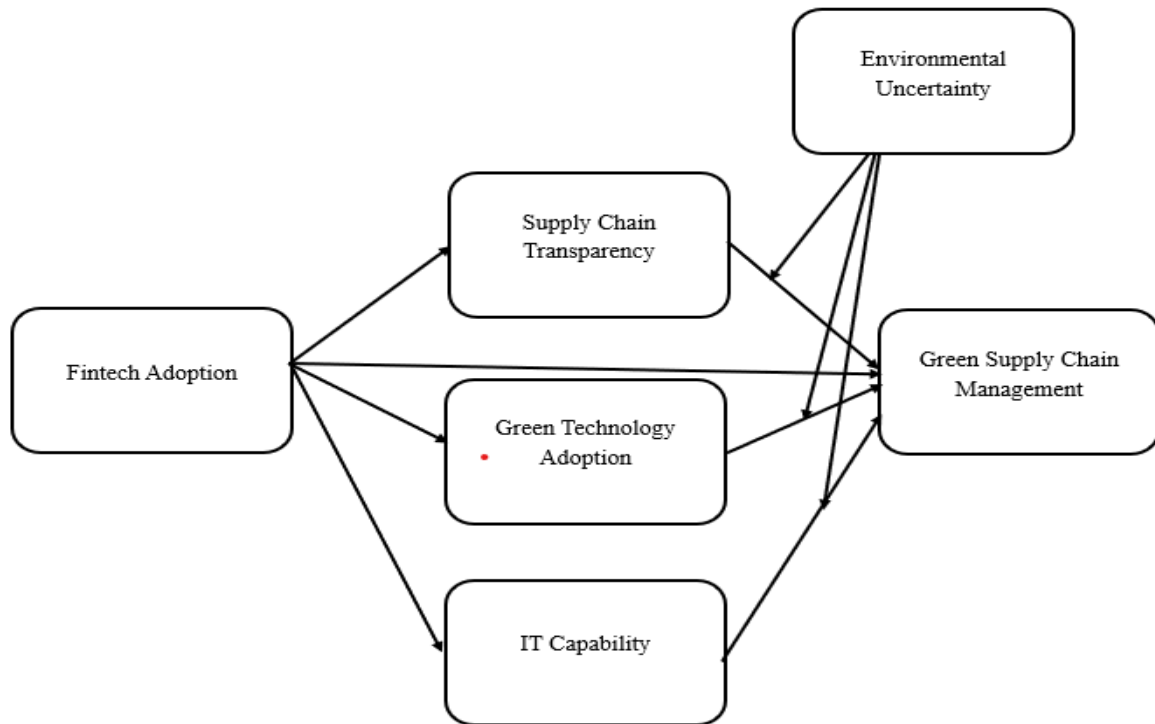


Figure 1. Conceptual Framework
Source: Author's own work

MATERIALS AND METHODS

The target population of the study will be supply chain managers and decision-makers in small and medium enterprises (SMEs) in Pakistan who are directly involved in decisions related to finance, technology, and the environment. The data were collected as primary data through a self-administered questionnaire using validated measurement scales from previously conducted research on Fintech, IT capability, environmental sustainability, and green supply chain management. The questionnaire was designed using a seven-point Likert scale, as the methodology includes well-known recommendations for capturing accurate respondent perceptions. A probability-based random sampling method was used to ensure the samples were representative. The sample comprised 700 questionnaires, which were disseminated via online and physical methods, and 550 were returned, constituting a response rate of about 78.57. Results of data screening led to the exclusion of 51 questionnaires due to missing or incomplete responses, leaving an empirical sample of 499 respondents. A two-tailed test was conducted at a significance level of 5% (0.05) to ensure that the inference is strong and reliable.

Measurement of all constructs was conducted using reliable, validated instruments from previous studies. Three modified items from Meng et al. (2025) were used to measure fintech adoption; five items from Setiawan et al. (2021) were used to measure supply chain transparency; and four items from Bastian and Zentes (2013) were used to measure green technology adoption. The measure of IT capability had eight items, four internal capability items, and four external capability items, which were adapted from (Wu et al. 2021). Three items were developed as measures of green supply chain management, and three were adapted from Roh et al. (2022). Moreover, 3 items were used to measure environmental uncertainty, adapted from Kafetzopoulos et al. (2019).

Empirical Findings: The Partial Least Squares Structural Equation Modelling (PLS-SEM) method is considered a highly effective tool for analysing complex models, especially when the strict normality assumptions are not satisfied, or the sample size is small (Ali et al., 2018; Hair et al., 2016). In accordance with the principles proposed by Henseler et al. (2012), the study's hypotheses were analysed using SmartPLS in two steps. The initial stage was the confirmatory factor analysis that was done to test the reliability and validity of the measurement model, both in convergent and discriminant validity. The path analysis was conducted in the second stage; the structural model was tested for mediation and moderation effects. Using this methodology enabled a deep analysis of the relationships among fintech adoption, organisational capabilities, environmental uncertainty, and green supply chain management.

Measurement model assessment: Figure 2 depicts the study's measurement model. The measurement model assessment in Table 1 indicates that all constructs exhibit high reliability and convergent validity. Factor loadings of all items are above the recommended change of 0.70, and it shows that all items have a sufficient representation of what they were intended to be, with Environmental Uncertainty of 0.826-0.879 and Fintech Adoption of 0.782-0.878. Cronbach's alpha values above 0.70 are used to assess internal consistency, with IT Capability demonstrating the highest reliability (0.904), and Green Supply Chain Management and Green Technology Adoption also showing high reliability (0.778 and 0.742, respectively). The composite reliability values are also above 0.70 across all the constructs, which shows that indicators that are demonstrated by the latent variables can always explain the variance. The AVE values are greater than 0.50, indicating that the constructs explain more than half of the variance in their items, and Environmental Uncertainty (0.729) and IT Capability (0.722) demonstrate very robust convergent validity. **Moderation analysis:** interaction terms such as GTAEU, ITCEU, and SCT*EU have factor loadings and reliability values of 1.000, which indicates they were computed correctly. Overall, these findings suggest that the measurement model is sound and valid, providing a strong basis for testing the structural model, which consists of direct, mediating, and moderating relations.

Table 1. Convergent Validity

	Items	Factor Loadings	Apha	CR	AVE
Environmental Uncertainty	EU1	0.845	0.876	0.915	0.729
	EU2	0.864			
	EU3	0.879			
	EU4	0.826			
Fintech Adoption	FA1	0.878	0.790	0.878	0.706
	FA2	0.858			
	FA3	0.782			
Green Supply Chain Management	GSCM1	0.824	0.778	0.871	0.693
	GSCM2	0.856			
	GSCM3	0.817			
Green Technology Adoption	GTA2	0.736	0.742	0.840	0.637
	GTA3	0.795			
	GTA4	0.858			
	ITC1	0.867			
IT Capability	ITC2	0.852	0.904	0.929	0.722
	ITC3	0.838			
	ITC4	0.858			
	ITC5	0.833			
	SCT1	0.863			
Supply Chain Transparency	SCT2	0.851	0.869	0.911	0.718
	SCT3	0.871			
	SCT4	0.803			
	GTA* EU	1.131			
	IC * EU	1.211	1.000	1.000	1.000
	SCT * EU	1.187	1.000	1.000	1.000

The discriminant validity assessment model in Table 2 and Table 3 shows that all the constructs in the model are independent of others, which proves that all the latent variables are used to measure different concepts. The square root of the AVE for each construct (diagonal) exceeds the correlation of that construct with all others, according to the Fornell-Larcker criterion. For example, the square root of the AVE for Environmental Uncertainty is 0.854, which exceeds those for Fintech Adoption (0.763), Green Supply Chain Management (0.727), and other constructs, indicating a high level of discriminant validity. The same trends are followed by all other constructs, such as Fintech Adoption, Green Technology Adoption, IT Capability, and Supply Chain Transparency.

A high ratio of heterotrait-monotrait (HTMT) also confirms that it is discriminant in nature since they all lie within the conservative threshold of 0.90. For example, the HTMT values for Environmental Uncertainty versus Fintech Adoption are 0.715, and for IT Capability versus Green Supply Chain Management are 0.880, both well below the critical threshold,

indicating that the constructs are empirically distinct. The interaction terms of moderation (e.g., ITCEU>GCM and SCTEU>GCM) exhibit tolerable discriminant validity below 0.90.

Overall, the results of both the Fornell-Larcker and HTMT approaches support the conclusion that the measurement model has been used to reach satisfactory discriminant validity, based on which every construct reflects a specific element of the theoretical construct, and on which it is possible to test the structural model, the direct, mediating, and moderating effects.

Table 2. Discriminant Validity (Fornell-Larcker Criteria)

	EU	FA	GTA>EU>GCM	GSCM	GTA	ITC	ITC>EU>GCM	SCT>EU>GCM	SCT
EU	0.854								
FA	0.763	0.840							
GTA>EU>GCM	-0.237	-0.239	1.000						
GSCM	0.727	0.758	-0.174	0.833					
GTA	0.498	0.483	-0.190	0.476	0.798				
ITC	0.700	0.652	-0.176	0.740	0.491	0.850			
ITC>EU>GCM	-0.308	-0.357	0.602	-0.313	-0.165	-0.283	1.000		
SCT>EU>GCM	-0.267	-0.284	0.603	-0.327	-0.138	-0.257	0.832	1.000	
SCT	0.607	0.698	-0.145	0.637	0.490	0.594	-0.252	-0.185	0.847

Table 3. Discriminant Validity (HTMT Ratio)

	EU	FA	GTA>EU>GCM	GSCM	GTA	ITC	ITC>EU>GCM	SCT>EU>GCM	SCT
EU									
FA	0.715								
GTA>EU>GCM	0.254	0.269							
GSCM	0.879	0.765	0.197						
GTA	0.563	0.560	0.216	0.571					
ITC	0.785	0.771	0.186	0.880	0.577				
ITC>EU>GCM	0.330	0.400	0.602	0.354	0.169	0.297			
SCT>EU>GCM	0.286	0.319	0.603	0.370	0.128	0.270	0.832		
SCT	0.696	0.840	0.153	0.773	0.544	0.668	0.268	0.196	

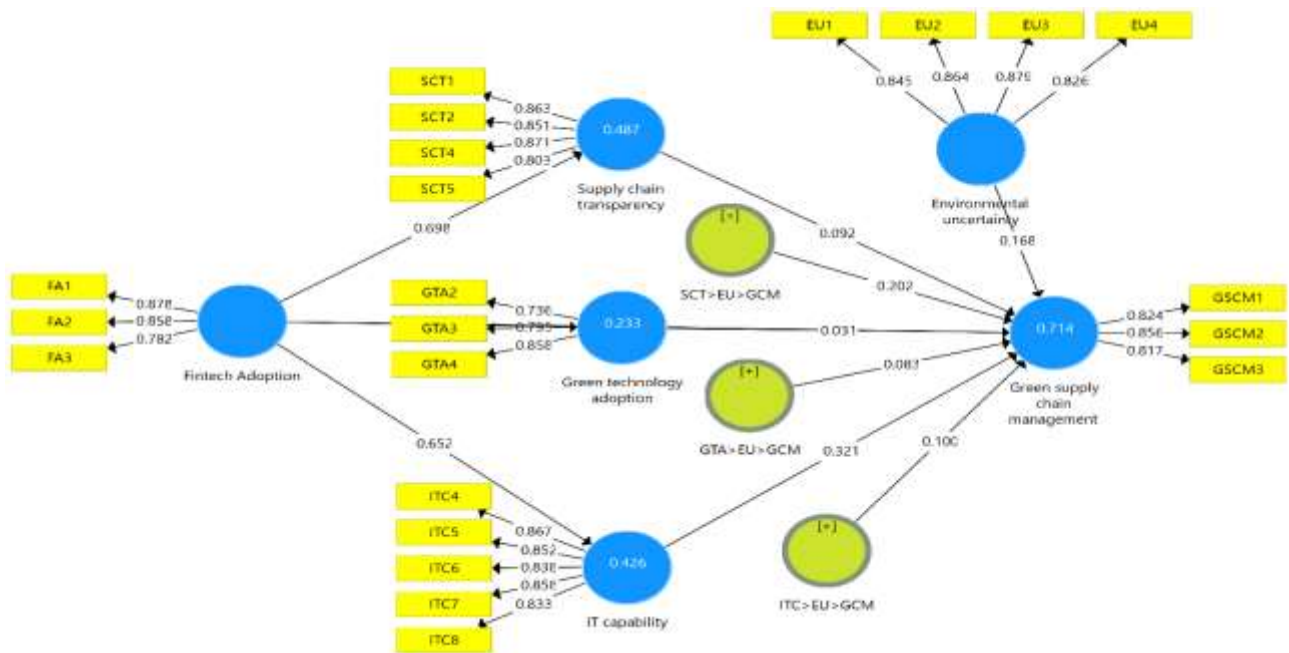


Figure 2. Measurement Model

Source: SmartPLS

Structural Model Assessment: Figure 3 presents the study's structural model. The results of the structural models in Tables 4, 5, and 6 indicate that the potential relationships examined in the study are generally supported and meaningful. Direct impacts demonstrate that Fintech Adoption is positively and significantly influential on Green Supply Chain Management ($\beta = 0.339$, $t = 7.131$, $p < 0.001$) and Green Technology Adoption ($\beta = 0.483$, $t = 14.126$, p under 0.001), IT Capability (0.652 , $t = 22.023$, p under 0.001) and Supply Chain Transparency (0.698 , $t = 24$). These results prove that the use of Fintech is a crucial factor in organisational capabilities and sustainable supply chain performance. The positive influence of Environmental Uncertainty on Green Supply Chain Management is also very significant (0.168 , $t = 3.542$, $p < 0.001$), indicating that firms respond to uncertainty by enhancing supply chain practices towards sustainable operations.

The mediators with a significant positive impact on Green Supply Chain Management include IT Capability (0.321, $t = 6.548$, $p = 0.001$) and Supply Chain Transparency (0.092, $t = 2.383$, $p = 0.009$). Green Supply Chain Management is the least affected by Green Technology Adoption (0.031, $t = 0.984$, $p = 0.004$). The terms of moderation interaction (ITCEU>GCM and SCTEU>GCM) indicate that there are positive and significant effects (0.100, $t = 1.902$, $p = 0.029$; 0.202, $t = 3.898$, $p < 0.001$), indicating that Environmental Uncertainty enhances the influences of IT Capability and Supply Chain Transparency on Green Supply Chain Management.

The mediating effects of organisational capabilities are further confirmed by the indirect effects. Fintech Adoption has a positive effect on Green Supply Chain Management with respect to IT Capability ($\beta = 0.209$, $t = 5.958$, $p = 0.001$) and Supply Chain Transparency ($\beta = 0.065$, $t = 2.370$, $p = 0.009$). The mediation through Green Technology Adoption is less significant ($\beta = 0.015$, $t = 0.982$, $p = 0.004$) but significant, which suggests that IT Capability and Supply Chain Transparency are better mediums through which fintech adoption can be transferred to sustainable supply chain results.

The R-squared values show that the model accounts for a significant percentage of the variance in the endogenous constructs: Green Supply Chain Management (GSCM) is explained by the predictors by 70.9% (green supply chain), Green Technology Adoption (GTA) by 23.1%, IT Capability by 42.4%, and Supply Chain Transparency by 48.6%. Such strong explanatory power confirms the structural model's explanatory power and predictive applicability. In general, the findings are very strong in supporting hypothesised direct, mediating, and moderating relationships, as well as the importance of fintech adoption and organisational capabilities in stimulating green supply chain management across different levels of environmental uncertainty.

Table 4. Path Analysis (Direct Effects)

	Beta	(STDEV)	T Statistics	P Values	LL	UL
Environmental uncertainty -> Green supply chain management	0.168	0.047	3.542	0.000	0.088	0.245
Fintech Adoption -> Green supply chain management	0.339	0.048	7.131	0.000	0.264	0.419
Fintech Adoption -> Green technology adoption	0.483	0.034	14.126	0.000	0.420	0.533
Fintech Adoption -> IT capability	0.652	0.030	22.023	0.000	0.603	0.697
Fintech Adoption -> Supply chain transparency	0.698	0.028	24.949	0.000	0.648	0.742
GTA>EU>GCM -> Green supply chain management	0.083	0.028	2.995	0.001	0.040	0.129
Green technology adoption -> Green supply chain management	0.031	0.031	0.984	0.004	0.021	0.081
IT capability -> Green supply chain management	0.321	0.049	6.548	0.000	0.225	0.385
ITC>EU>GCM -> Green supply chain management	0.100	0.053	1.902	0.029	0.025	0.194
SCT>EU>GCM -> Green supply chain management	0.202	0.052	3.898	0.000	-0.287	-0.118
Supply chain transparency -> Green supply chain management	0.092	0.039	2.383	0.009	0.021	0.149

Table 5. R Square

R Square
GSCM
GTA
ITC
SCT

Table 6. Path Analysis (Indirect Effects)

	Beta	(STDEV)	T Statistics	P Values	LL	UL
Fintech Adoption -> Green technology adoption -> Green supply chain management	0.015	0.015	0.982	0.004	0.010	0.039
Fintech Adoption -> IT capability -> Green supply chain management	0.209	0.035	5.958	0.000	0.147	0.262
Fintech Adoption -> Supply chain transparency -> Green supply chain management	0.065	0.027	2.370	0.009	0.017	0.107

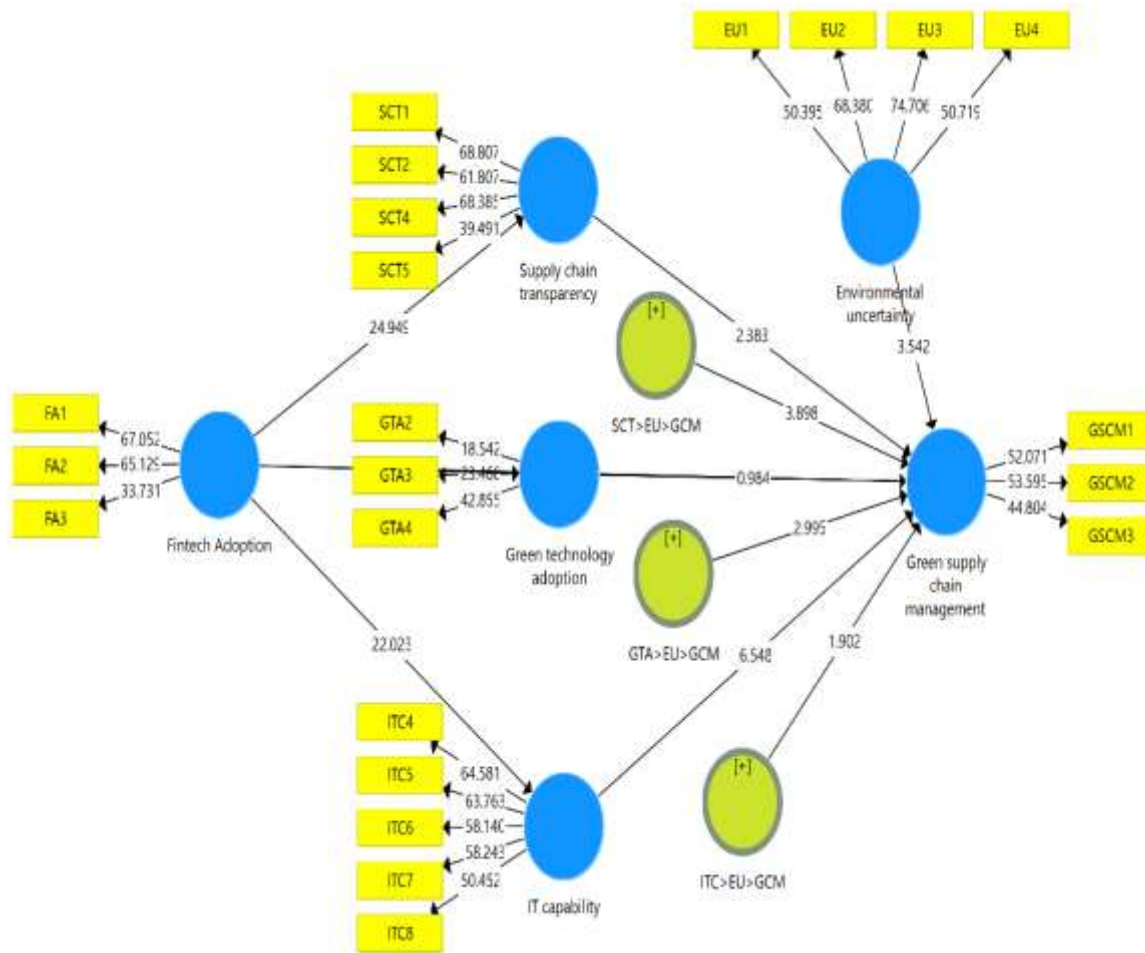


Figure 3. Structural Model Assessment
Source: SmartPLS

Moderation analysis: The findings in Figure 4 demonstrate the important moderating effect of environmental uncertainty (EU) on the relationship between green technology adoption (GTA) and green supply chain management (GSCM). In particular, the correlation between GTA and GSCM is significant under high environmental uncertainty (+1 SD), indicating that greater uptake of green technologies would significantly improve green practices within the supply chain. The relationship is also positive, though less strong, at the mean level of environmental uncertainty and at low environmental uncertainty (less than one SD); it is negative, meaning that higher GTA does not positively impact GSCM; instead, it may negatively affect GSCM. This result suggests that environmental uncertainty enhances the adaptability of green technology adoption in improving green supply chain management, probably because uncertain environmental conditions raise the strategic profile of adaptable, agile green technologies.

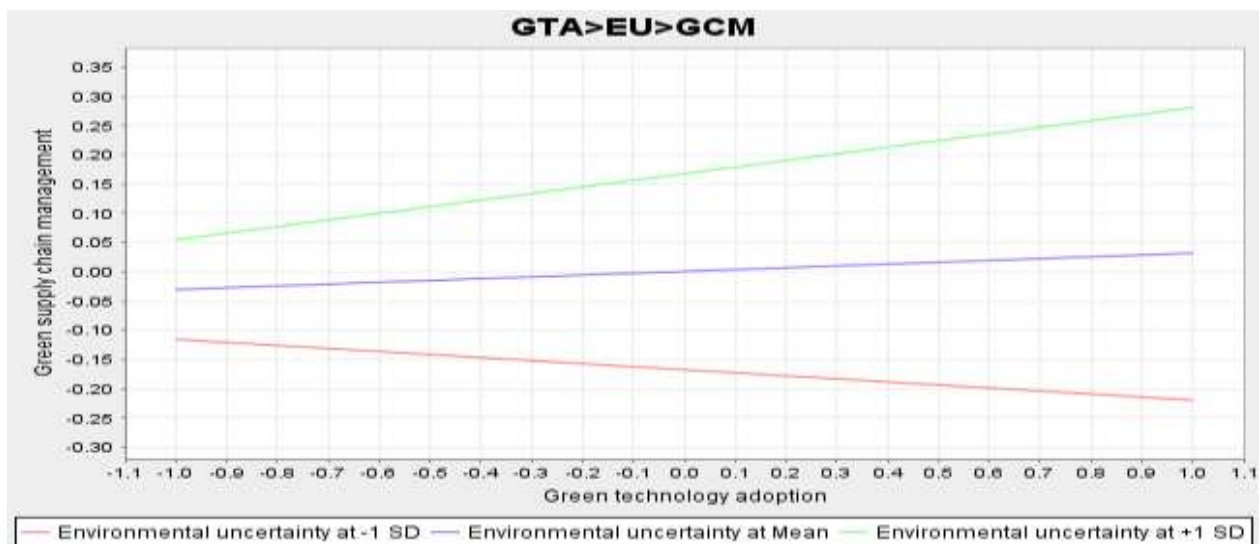


Figure 4. Moderation Effect 1
Source: SmartPLS

According to the results demonstrated in Figure 5, environmental uncertainty (EU) plays a crucial role in easing the relationship between IT capability (ITC) and green supply chain management (GSCM). In high environmental uncertainty (+1 SD), the effect of IT capability on GSCM is very strong, indicating that robust IT systems under volatile conditions are essential. The relationship will be positive but with moderate uncertainty. At low environmental uncertainty (−1 SD), IT capability will also have a positive effect on GSCM, but the impact is significantly lower. These findings imply that environmental uncertainty increases the efficacy of IT capabilities in supporting green supply chain management, and that advanced IT tools are especially useful in uncertain settings where real-time data processing, coordination, and information integration are critical to sustainable supply chain operations.

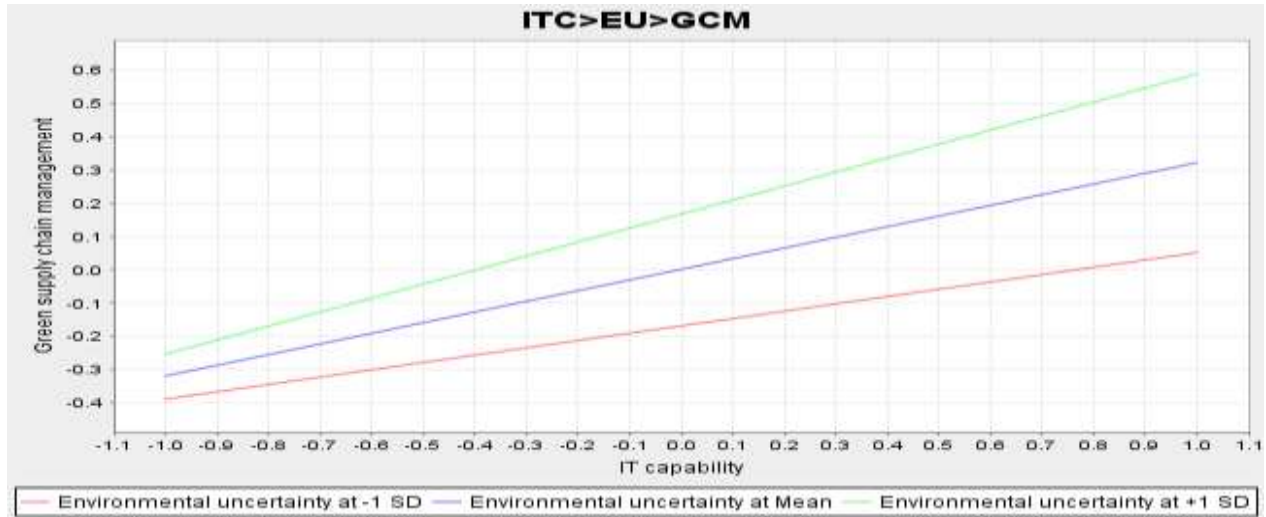


Figure 5. Moderation Effect 2

Source: SmartPLS

The findings in Figure 6 indicate that environmental uncertainty (EU) plays a major moderating role in the negative relationship between supply chain transparency (SCT) and green supply chain management (GSCM). SCT has a significant positive impact on GSCM in a low-uncertainty environment (−1 SD), indicating that transparency promotes successful green supply chain practices under stable conditions. The strength of the relationship between them at the average level of uncertainty is weakly positive, with a negative slope at high environmental uncertainty (+1 SD), indicating that higher transparency is associated with worse GSCM performance. This result suggests that environmental uncertainty reduces the efficacy of supply chain transparency in advancing green supply chain management, likely because undue transparency in uncertain settings may create coordination congestion, information misdisclosure, or strategic risk, thereby diminishing the success of GSCM projects.

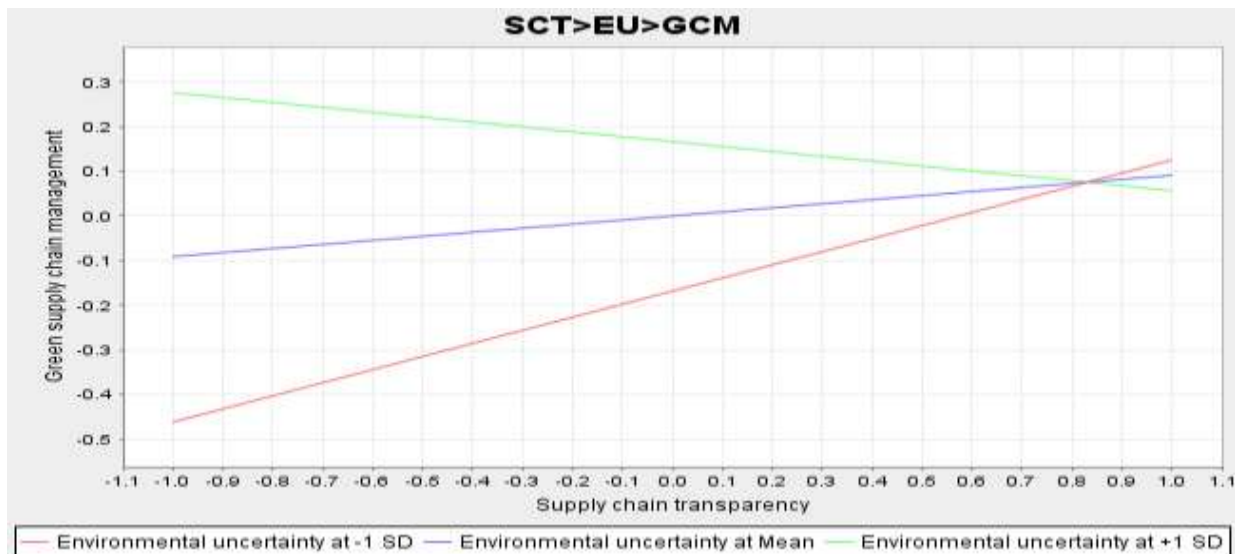


Figure 6. Moderation Effect 3

Source: SmartPLS

DISCUSSIONS

This study shows that fintech adoption is the key factor in facilitating green supply chain management (GSCM) among small and medium enterprises (SMEs), either directly or indirectly through organisational capabilities. In line with the Resource-Based View, fintech adoption would greatly boost IT capabilities, supply chain transparency, and the adoption of

green technologies, all of which are important tools for enhancing GSCM. Of these, IT capability and supply chain transparency turned out to be the most powerful mediators, meaning that the technological infrastructure and the efficient system of information management can be among the channels through which the adoption of Fintech can be transformed into sustainable supply chain results. In turn, the adoption of green technology, though important, had a somewhat smaller mediating influence, which implies that the availability of green technologies alone might be insufficient without associated IT technologies and open procedures.

Environmental uncertainty plays a moderating role, offering additional insight into the contextual dynamics of these relationships. The positive relationships between IT capability and green technology adoption, and between GSCM and the environmental uncertainty factor, reinforced the fact that adaptive technologies and well-functioning IT systems are more advantageous to firms in fluctuating or unpredictable market conditions. By contrast, the negative moderating effect of supply chain transparency implies that excessive transparency at high levels of uncertainty may lead to information overload or coordination issues, thereby reducing its effectiveness in bolstering GSCM. These results highlight the need to align organisational strategies with environmental conditions to maximise the impact of capabilities on sustainability outcomes.

In practical terms, the study can provide SME managers and policymakers with helpful guidance. To promote IT capability and green technology adoption, managers must focus on Fintech as a key investment to improve supply chain transparency initiatives, tailored to environmental conditions to prevent inefficiencies. Policymakers and industry associations could assist SMEs by providing fintech-based solutions, training to develop IT and green technology expertise, and encouraging the adoption of adaptive green technologies that work well in uncertain environments. Through a balanced approach to Fintech and capability-environmental alignment, companies can enhance the sustainability, resilience, and competitiveness of their supply chains in evolving markets.

Theoretical contribution: The research has several critical theoretical implications for the literature on fintech adoption, organisational capabilities, and green supply chain management (GSCM). First, it builds upon the Resource-Based View (RBV) by positioning the adoption of Fintech as a strategic digital resource that enhances financial and operational processes and promotes environmental sustainability. The study also demonstrates how digital financial resources can translate into green supply chain outcomes by empirically showing that fintech adoption can improve supply chain transparency, IT capability, and green technology adoption, which in turn drive GSCM, addressing a gap in the literature that has emphasised the direct impact of technological adoption.

Second, the research incorporates Contingency Theory to demonstrate how environmental uncertainty influences the performance of organisational capabilities in promoting GSCM. The results indicate that IT capability and green technology adoption have stronger effects under high environmental uncertainty. Supply chain transparency might be less effective in unstable situations. This adds to theory by indicating the situational specificity of digital organisational resources, whereby the external environmental circumstances may promote or limit their success in achieving sustainability outcomes.

Third, the study takes a step forward by developing a comprehensive framework that considers several simultaneous mediators (supply chain transparency, green technology adoption, and IT capability) and a moderator (environmental uncertainty) to address the complexity of fintech adoption and its relationship with organisational capabilities and environmental conditions. This combination provides a more sensitive theoretical insight into how SMEs can enable sustainable supply chain performance through Fintech and digital means, addressing a substantial void in the literature, where the adoption of digital technologies, the development of capabilities, and contingent environmental forces had remained unexplored. Overall, the work makes a strong theoretical contribution by explaining how and under what conditions the adoption of Fintech can affect GSCM, thereby contributing to research in digital finance and green supply chain management.

Practical implications: The research results provide several recommendations for managers, policymakers, and practitioners seeking to improve green supply chain management (GSCM) by adopting Fintech and strengthening organisational capabilities. First, the adoption of Fintech is a strategic investment that should be considered by SME managers to enhance IT capability and supply chain transparency. By implementing digital financial tools in operational and supply chain processes, companies can enhance real-time data processing, information exchange, and coordination among supply chain partners, ultimately leading to more sustainable supply chain practices.

Second, managers are advised to be sensitive to the context within which these capabilities are implemented. The paper indicates that environmental ambiguity enhances the usefulness of IT capabilities and green technology adoption; thus, it is reasonable to conclude that companies operating in unstable markets or under rules and regulations ought to leverage such capabilities more decisively to ensure and improve GSCM performance. On the other hand, the negative moderation effect of supply chain transparency is very strong under high uncertainty, indicating that excessive transparency overwhelms or obscures coordination issues. Transparency initiatives should thus be tuned by managers to provide only enough information that can be acted upon.

Third, small and medium enterprises (SMEs) can be assisted by policymakers and industry associations by opening the door to fintech solutions and encouraging the development of IT and green technology skills. Firms can adopt sustainable practices through training programs, financial incentives, and technology adoption. Also, the resilience and sustainability of SME supply chains can be improved by encouraging the adoption of adaptive green technologies that perform well in uncertain environments. With proper alignment of fintech adoption and organisational capabilities with environmental conditions, practitioners can achieve substantial gains in the performance of green supply chains without sacrificing competitiveness and responsiveness to market changes.

CONCLUSIONS

This research shows that fintech adoption is crucial for improving green supply chain management (GSCM) among SMEs by directly enhancing green practices and indirectly strengthening capabilities essential to the organisation, such as IT capability, supply chain transparency, and green technology adoption. The results indicate that environmental uncertainty is a moderating variable that intensifies the positive impacts of IT capability and the adoption of green technologies and reduces the influence of supply chain transparency under high uncertainty. Theoretically, the paper combines the Resource-Based View and Contingency Theory to demonstrate that Fintech can be discussed as a strategic digital resource whose efficiency is conditioned by internal resources and external environmental factors. In practice, the focus of SME managers is to make use of Fintech as a strategic tool, establish effective IT and green technology competencies, and tailor transparency efforts in response to the cyclical nature of the environment. The policymaking community can contribute to sustainability by making fintech solutions more accessible and by encouraging the adoption of adaptive green technologies. In general, the research offers a comprehensive view of the interplay among digital financial organisational capabilities and environmental conditions in stimulating sustainable supply chain performance, with practical implications for both researchers and practitioners.

Author contributions: Conceptualisation, M.U. M.I. and B.R.; Methodology, M.I., B.R. and M.U.; Software, M.U. and B.R.; Validation, B.R.; Formal Analysis, B.R. and M.I.; Investigation, B.R. and M.I.; Resources, B.R. and M.U. and M.I.; Data Curation, M.I. and B.R.; Writing – Original Draft Preparation, M.U. and M.I.; Writing – Review & Editing, B.R. and M.U.; Visualisation, B.R. and M.U.; Supervision, B.R.; Project Administration, B.R.; Funding Acquisition, M.I. Authors have read and agreed to the published version of the manuscript.

Institutional Review Board Statement: Ethical review and approval were waived for this study because the research does not involve vulnerable groups or sensitive issues.

Funding: The authors received no direct funding for this research.

Acknowledgements: Gratitude to all concerned persons, departments, and institutes who guided and assisted with this work.

Informed Consent Statement: Informed consent was obtained from all subjects involved in the study.

Data Availability Statement: The data presented in this study are available on request from the corresponding author. The data are not publicly available due to restrictions.

Declaration of Generative AI and AI-Assisted Technologies in the Writing Process: During the preparation of this work, the author(s) used Grammarly for proofreading and spell checking since the Authors are not native speakers. All intellectual content, analysis, and interpretations were produced solely by the authors. After using this AI tool/service, the author(s) reviewed and edited the content as needed, taking full responsibility for the publication's content.

Conflicts of Interest: The authors declare no conflict of interest.

REFERENCES

- Ali, F., Rasoolimanesh, S. M., Sarstedt, M., Ringle, C. M., & Ryu, K. (2018). An assessment of the use of partial least squares structural equation modeling (PLS-SEM) in hospitality research. *International journal of contemporary hospitality management*, 30(1), 514–538. <https://doi.org/10.1108/ijchm-10-2016-0568>
- Bastian, J., & Zentes, J. (2013). Supply chain transparency as a key prerequisite for sustainable agri-food supply chain management. *The International Review of Retail, Distribution and Consumer Research*, 23(5), 553–570. <https://doi.org/10.1080/09593969.2013.834836>
- Bello-Pintado, A., Machuca, J. A., & Danese, P. (2023). Stakeholder pressures and sustainability practices in manufacturing: Consideration of the economic development context. *Business Strategy and the Environment*, 32(7), 4084–4102. <https://doi.org/10.1002/bse.3355>
- Cen, T., & He, R. (2018). Fintech, green finance and sustainable development. *Proceedings of the 2018 International Conference on Management, Economics, Education, Arts and Humanities (MEEAH 2018)*.
- Chatterjee, S., & Chaudhuri, R. (2022). Supply chain sustainability during turbulent environment: Examining the role of firm capabilities and government regulation. *Operations Management Research*, 15(3), 1081–1095.
- D'Amato, A., Mazzanti, M., & Nicolli, F. (2021). Green technologies and environmental policies for sustainable development: Testing direct and indirect impacts. *Journal of cleaner production*, 309, 127060. <https://doi.org/10.1016/j.jclepro.2021.127060>
- Elias, O., Awotunde, O. J., Oladepo, O. I., Azuikpe, P. F., Samson, O. A., Oladele, O. R., & Ogunraku, O. O. (2024). The evolution of green Fintech: Leveraging AI and IoT for sustainable financial services and smart contract implementation. *World Journal of Advanced Research and Reviews*, 23(1), 2710–2723.
- Esfahbodi, A., Zhang, Y., Liu, Y., & Geng, D. (2023). The fallacy of profitable green supply chains: The role of green information systems (GIS) in attenuating the sustainability trade-offs. *International journal of production economics*, 255, 108703. <https://doi.org/10.1016/j.ijpe.2022.108703>
- Hair, Jr, J. F., Sarstedt, M., Matthews, L. M., & Ringle, C. M. (2016). Identifying and treating unobserved heterogeneity with FIMIX-PLS: part I—method. *European Business Review*, 28(1), 63–76. <https://doi.org/10.1108/ebv-09-2015-0094>
- Han, S., Ulhoi, J. P., & Song, H. (2024). Digital trust in supply chain finance: the role of innovative fintech service provision. *Journal of Enterprise Information Management*, 37(6), 1737–1762. <https://doi.org/10.1108/jeim-07-2022-0238>
- Henseler, J., Ringle, C. M., & Sarstedt, M. (2012). Using partial least squares path modeling in advertising research: Basic concepts and recent issues. *Handbook of Research on International Advertising*. Edward Elgar Publishing. <https://doi.org/10.4337/9781781001042.00023>
- Hidayat-ur-Rehman, I. (2025). The role of financial literacy in enhancing firm's sustainable performance through Fintech adoption: a moderated mediation analysis. *International Journal of Innovation Science*, 17(4), 754–785. <https://doi.org/10.1108/ijis-03-2024-0056>

- Hidayat-ur-Rehman, I., & Hossain, M. N. (2025). The impacts of Fintech adoption, green finance and competitiveness on banks' sustainable performance: digital transformation as moderator. *Asia-Pacific Journal of Business Administration*, 17(4), 987–1020. <https://doi.org/10.1108/apjba-10-2023-0497>
- Holloway, S. (2025). *Impact of disruptive events on supply chain resilience: A systematic review of strategies and learnings*. Elsevier BV. <https://doi.org/10.2139/ssrn.5046789>
- Inman, R. A., & Green, K. W. (2022). Environmental uncertainty and supply chain performance: the effect of agility. *Journal of Manufacturing Technology Management*, 33(2), 239-258. <https://doi.org/10.1108/jmtm-03-2021-0097>
- Ioannou, I., & Demirel, G. (2022). Blockchain and supply chain finance: a critical literature review at the intersection of operations, finance and law. *Journal of Banking and Financial Technology*, 6(1), 83–107. <https://doi.org/10.1007/s42786-022-00040-1>
- Ionescu, S.-A., & Diaconita, V. (2023). Transforming financial decision-making: the interplay of AI, cloud computing and advanced data management technologies. *International Journal of Computers Communications & Control*, 18(6), 5735. <https://doi.org/10.15837/ijccc.2023.6.5735>
- Jayalath, J., & Premaratne, S. (2021). Analysis of key digital technology infrastructure and cyber security consideration factors for fintech companies. *International Journal of Research Publications*, 84(1), 128–135. <https://doi.org/10.47119/ijrp100841920212246>
- Jelonek, D. (2023). Environmental uncertainty and changes in digital innovation strategy. *Procedia Computer Science*, 225, 1468-1477. <https://doi.org/10.1016/j.procs.2023.10.135>
- Jia, F., Guo, J., Chen, L., & Islam, N. (2025). Does fintech adoption improve sustainable supply chain management? An innovation-intensive environment perspective. *IEEE Transactions on Engineering Management*, 72, 210–226. <https://doi.org/10.1109/tem.2024.3515471>
- Kafetzopoulos, D., Psomas, E., & Skalkos, D. (2019). Innovation dimensions and business performance under environmental uncertainty. *European Journal of Innovation Management*, 23(5), 856–876. <https://doi.org/10.1108/ejim-07-2019-0197>
- Kareem, S., Fehrer, J. A., Shalpegin, T., & Stringer, C. (2025). Navigating tensions of sustainable supply chains in times of multiple crises: A systematic literature review. *Business Strategy and the Environment*, 34(1), 316-337. <https://doi.org/10.1002/bse.3990>
- Khan, M. T., Idrees, M. D., Rauf, M., Sami, A., Ansari, A., & Jamil, A. (2022). Green supply chain management practices' impact on operational performance with the mediation of technological innovation. *Sustainability*, 14(6), 3362. <https://doi.org/10.3390/su14063362>
- Khan, T., Emon, M. M. H., & Siam, S. A. J. (2024). Impact of green supply chain practices on sustainable development in Bangladesh. *Malaysian Business Management Journal*, 3(2), 73–83. <https://doi.org/10.26480/mbmj.02.2024.73.83>
- Letunovska, N., Offei, F. A., Junior, P. A., Lyulyov, O., Pimonenko, T., & Kwilinski, A. (2023). Green supply chain management: The effect of procurement sustainability on reverse logistics. *Logistics*, 7(3), 47. <https://doi.org/10.3390/logistics7030047>
- Li, C., & Huang, M. (2023). Environmental sustainability in the age of big data: opportunities and challenges for business and industry. *Environmental Science and Pollution Research*, 30(56), 119001-119015. <https://doi.org/10.1007/s11356-023-30301-5>
- Liu, L., Zhang, J. Z., He, W., & Li, W. (2021). Mitigating information asymmetry in inventory pledge financing through the Internet of things and blockchain. *Journal of Enterprise Information Management*, 34(5), 1429–1451. <https://doi.org/10.1108/jeim-12-2020-0510>
- Lubis, N. W. (2022). Resource based view (RBV) in improving company strategic capacity. *Research Horizon*, 2(6), 587-596. <https://doi.org/10.54518/rh.2.6.2022.587-596>
- Mahmud, M., Soetanto, D., & Jack, S. (2021). A contingency theory perspective of environmental management: Empirical evidence from entrepreneurial firms. *Journal of General Management*, 47(1), 3–17. <https://doi.org/10.1177/0306307021991489>
- Mao, H., Liu, S., & Zhang, J. (2015). How the effects of IT and knowledge capability on organisational agility are contingent on environmental uncertainty and information intensity. *Information Development*, 31(4), 358-382. <https://doi.org/10.1177/0266666913518059>
- Maryam, S. Z., Saleem, M., Ahmad, A., & Shaheen, W. A. (2025). Leveraging information systems for competitive advantage: a study of Islamic financial institutions' innovativeness and agility for Fintech financing. *Journal of Islamic Marketing*, 16(12), 3711–3735. <https://doi.org/10.1108/jima-07-2024-0299>
- Meng, C., Peng, Y., Zhang, J., & Chen, J. (2025). How Fintech Impacts Enterprises' Digital–Green Synergy. *Sustainability*, 17(12), 5473. <https://doi.org/10.3390/su17125473>
- Moreira-Santos, D., Au-Yong-Oliveira, M., & Palma-Moreira, A. (2022). Fintech services and the drivers of their implementation in small and medium enterprises. *Information*, 13(9), 409. <https://doi.org/10.3390/info13090409>
- Morgan, T. R., Gabler, C. B., & Manhart, P. S. (2023). Supply chain transparency: theoretical perspectives for future research. *The International Journal of Logistics Management*, 34(5), 1422–1445. <https://doi.org/10.1108/ijlm-02-2021-0115>
- Pazouki, S., Jamshidi, M. B., Jalali, M., & Tafreshi, A. (2025). The integration of big data in Fintech: review of enhancing financial services through advanced technologies. *World Journal of Advanced Research and Reviews*, 25(1), 546-556
- Rahman, S., Ahsan, A., & Sharma, R. (2025). Impact of Green Technology Transmission on Sustainable Development. *Sustainability*, 17(5), 1981. <https://doi.org/10.3390/su17051981>

- Roh, T., Noh, J., Oh, Y., & Park, K.-S. (2022). Structural relationships of a firm's green strategies for environmental performance: The roles of green supply chain management and green marketing innovation. *Journal of cleaner production*, 356, 131877. <https://doi.org/10.1016/j.jclepro.2022.131877>
- Setiawan, B., Nugraha, D. P., Irawan, A., Nathan, R. J., & Zoltan, Z. (2021). User innovativeness and fintech adoption in Indonesia. *Journal of Open Innovation: Technology, Market, and Complexity*, 7(3), 188. <https://doi.org/10.3390/joitmc7030188>
- Shafizadeh, H. (2024). Decision-Making Under Uncertainty: Organizations Adapt to Environmental Changes? *Journal of Resource Management and Decision Engineering*, 3(1), 4–10. <https://doi.org/10.61838/kman.jrmde.3.1.2>
- Shahid, O. B. (2025). Fin Tech Innovation and Sustainable Supply Chains: Leveraging Digital Finance Innovation for ESG-Based Procurement, Supplier Risk Assessment, and Environmental Performance Monitoring. *ACADEMIA International Journal for Social Sciences*, 4(2), 177–188. <https://doi.org/10.63056/acad.004.02.0166>
- Sun, Y., Chen, J., Kong, C., Zheng, X., & Zhang, X. (2025). What factors influence the motivation of logistics enterprises to adopt green technology? An empirical study based on the TOE model. *British Food Journal*, 127(12), 4742–4766. <https://doi.org/10.1108/bfj-01-2025-0061>
- Tosi Jr, H. L., & Slocum Jr, J. W. (1984). Contingency theory: Some suggested directions. *Journal of Management*, 10(1), 9-26. <https://doi.org/10.1177/014920638401000103>
- Turkulainen, V. (2022). Contingency theory and the information processing view. In *Handbook of theories for purchasing, supply chain and management research* (pp. 248-266). Edward Elgar Publishing. <https://doi.org/10.4337/9781839104503.00020>
- Vangeri, A. K., Bathrinath, S., Anand, M. C. J., Shanmugathai, M., Meenatchi, N., & Boopathi, S. (2024). Green Supply Chain Management in Eco-Friendly Sustainable Manufacturing Industries. In *Environmental Applications of Carbon-Based Materials* (pp. 253–287). IGI Global. <https://doi.org/10.4018/979-8-3693-3625-0.ch010>
- Wang, G., & Zhang, H. (2025). FinTech-driven corporate sustainability: A technoloorganization–environment framework analysis. *Sustainability*, 17(19), 8748. <https://doi.org/10.3390/su17198748>
- Wang, J., Duan, K., & Zheng, Y. (2025). Green supply chain management, green technology innovation and firms' energy consumption intensity. *Energy Economics*, 141, 108133. <https://doi.org/10.1016/j.eneco.2024.108133>
- Wu, G. C. (2013). The influence of green supply chain integration and environmental uncertainty on green innovation in Taiwan's IT industry. *Supply Chain Management: An International Journal*, 18(5), 539–552. <https://doi.org/10.1108/scm-06-2012-0201>
- Wu, S., Ding, X., Liu, R., & Gao, H. (2021). How does IT capability affect open innovation performance? The mediating effect of absorptive capacity. *European Journal of Innovation Management*, 24(1), 43–65. <https://doi.org/10.1108/ejim-02-2019-0043>
- Wu, Y., Mehmood, K., Mangla, S. K., & Jabeen, F. (2026). A Dynamic Capability View to Evaluate the Role of FinTech in Green Supply Chain Performance: Moderating Role of Data-Driven Lean and Green Practices. *Business Strategy and the Environment*, 35(4), 5841–5858. <https://doi.org/10.1002/bse.70459>
- Yan, C., Siddik, A. B., Yong, L., Dong, Q., Zheng, G.-W., & Rahman, M. N. (2022). A two-staged SEM-artificial neural network approach Analyze the impact of FinTech adoption on the sustainability performance of banking firms: the mediating effect of green finance and innovation. *Systems*, 10(5), 148. <https://doi.org/10.3390/systems10050148>
- Yu, Z., Waqas, M., Tabish, M., Tanveer, M., Haq, I. U., & Khan, S. A. R. (2022). Sustainable supply chain management and green technologies: a bibliometric review of literature. *Environmental Science and Pollution Research*, 29(39), 58454–58470. <https://doi.org/10.1007/s11356-022-21544-9>

Publisher's Note: CRIBFB stays neutral about jurisdictional claims in published maps and institutional affiliations.



© 2026 by the author. Licensee CRIBFB, USA. This open-access article is distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license (<http://creativecommons.org/licenses/by/4.0/>).

International Journal of Small and Medium Enterprises (P-ISSN 2576-7712 E-ISSN 2576-7720) by CRIBFB is licensed under a Creative Commons Attribution 4.0 International License.