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Improving Supply Chain Resilience Through Fintech Technology in the Digital Age

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ABSTRACT

This study investigates the impact of financial technology (fintech) adoption on supply chain resilience in the digital age. Using a quantitative approach, data were collected from 76 respondents representing various business sectors that have integrated fintech solutions into their supply chain operations. The research instrument employed a five-point Likert scale, and data analysis was conducted using SPSS version 25. Supply chain resilience was measured through four dimensions: agility, visibility, flexibility, and risk mitigation. Validity and reliability tests confirmed the robustness of the measurement instruments. Descriptive analysis indicated high average scores for all variables, while regression analysis revealed that fintech adoption had a positive and significant effect on all four resilience dimensions, with the strongest effect observed on visibility. These findings highlight fintech's strategic role in enhancing transparency, operational agility, adaptability, and proactive risk management. The study provides actionable insights for managers and policymakers to integrate fintech solutions as a core component of supply chain strategy, particularly in preparing for and responding to disruptions in a rapidly evolving digital environment.

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1. INTRODUCTION

The rapid advancement of digital technologies has transformed the landscape of global business operations, with financial technology (fintech) emerging as a critical enabler of efficiency, transparency, and innovation. In the context of supply chain management, fintech provides digital financial solutions—such as blockchain-based payments, digital invoicing, mobile banking, and AI-driven financial analytics—that enhance the speed, security, and accuracy of transactions. As supply chains become increasingly complex and globally integrated, resilience has emerged as a key priority to ensure operational continuity and competitiveness, particularly in the face of disruptions such as market volatility, geopolitical instability, and global crises like the COVID-19 pandemic. The integration of fintech into supply chain management has significantly enhanced resilience by improving efficiency, transparency, and innovation, with solutions such as blockchain-based payments, digital invoicing, and AI-

driven financial analytics playing a pivotal role in addressing global supply chain complexities, especially during disruptions like the COVID-19 pandemic. These technologies facilitate faster, more secure, and accurate transactions, which are crucial for maintaining operational continuity and competitiveness in volatile environments. Specifically, blockchain technology ensures secure and transparent transactions, reducing fraud and errors, while AI provides predictive analytics for better decision-making and risk management [1]. Digital invoicing and mobile banking streamline financial operations, reducing processing times and improving cash flow management, which is essential during disruptions [2]. In addition, technologies such as IoT and big data analytics enhance network visibility and enable real-time communication, allowing for agile responses to supply chain disruptions [3]. Empirical evidence reinforces these benefits; for instance, during the COVID-19 pandemic, companies with higher digital maturity were better equipped to adapt and recover, highlighting the importance of digital tools in enhancing supply chain resilience [4], while the case study of 3M demonstrates how digital tools improved supply chain practices during disruptions, underscoring the role of digitalization in building resilient supply chains [5].

Supply chain resilience refers to the capability of a supply chain to anticipate, prepare for, respond to, and recover from unexpected events while maintaining essential functions, and while traditional approaches have focused on physical logistics, inventory management, and supplier diversification, the digital age has underscored that financial flows are as crucial as material flows, with disruptions in financial transactions potentially creating cascading effects across the entire supply chain. Fintech technologies address these vulnerabilities by enabling real-time payments, improving financial visibility, and facilitating data-driven decision-making, thereby enhancing resilience in a globalized economy. Financial disruptions can significantly impact the ability to maintain essential functions [6], [7], and the COVID-19 pandemic further highlighted the importance of robust financial management as part of resilience strategies [8]. Fintech enables real-time payments that reduce delays and improve cash flow management, crucial during disruptions [9], while enhanced financial visibility through fintech supports better risk assessment and decision-making to enable proactive resilience strategies [10]. Moreover, data-driven decision-making facilitated by fintech can optimize financial operations, align them with supply chain needs, and improve overall resilience [9]. Integrating fintech solutions into supply chain strategies bridges the gap between financial and material flows for a more holistic approach to resilience [6], [9]. and strategically addresses the trade-offs between resilience and efficiency, a key challenge in supply chain management [9].

Recent studies indicate that fintech adoption in supply chains not only reduces operational costs but also enhances agility, flexibility, and responsiveness to disruptions, yet research on the direct relationship between fintech technology and supply chain resilience remains limited, particularly in emerging markets where digital adoption rates vary, highlighting the need for empirical investigation into how fintech integration influences supply chain resilience in real-world business contexts. This study aims to analyze the impact of fintech technology on supply chain resilience in the digital era using a quantitative approach, specifically examining key resilience dimensions—agility, visibility, flexibility, and risk mitigation—through the lens of fintech adoption.

2. LITERATURE REVIEW

2.1 Supply Chain Resilience in the Digital Age

Supply chain resilience in the digital age has evolved to include digital integration, data-driven decision-making, and collaborative platforms, which are vital for sustaining operations and customer satisfaction during disruptions, making advanced technologies and strategic management practices essential. Its key

components are agility, the ability to rapidly adjust through quick decisions and efficient reconfiguration [6]; visibility, enabling real-time tracking for timely responses [8]; flexibility, allowing adaptation in processes and sourcing [11]; and risk mitigation through proactive threat identification and control [12]. Technology plays a central role, with AI, machine learning, and real-time monitoring enhancing predictive capabilities (Johnson, 2025), while digital integration improves communication and coordination [10]. Strategically, resilience is strengthened by diversifying suppliers and production sites, fostering collaboration and trust among stakeholders, and maintaining continuous adaptation with strategic foresight to navigate global supply chain complexities [12].

2.2 Financial Technology (Fintech)

The integration of fintech into supply chain contexts significantly enhances financial flows by leveraging technology to streamline transactions, improve transparency, and reduce risks, with applications such as digital payment platforms, blockchain-based systems, AI-driven credit assessments, and smart contracts transforming traditional supply chain finance. Digital payment systems reduce transaction delays and currency conversion issues, enabling faster and more efficient transactions while supporting financial inclusion to improve overall operational efficiency [13], [14]. Blockchain technology offers a secure and transparent method to manage and track transactions, reducing fraud risks and promoting accountability through its decentralized nature, ensuring all parties access the same transaction data [14], [15]. AI and machine learning facilitate accurate credit assessments, supporting supplier financing, improving cash flow management, and enabling data-driven decision-making for better financial risk management [13], [14]. Meanwhile, smart contracts automate payment releases upon meeting predefined delivery milestones, reducing paperwork, minimizing manual errors, and ensuring payments are made only when contractual conditions are fulfilled, thereby enhancing the reliability and efficiency of supply chain financial transactions [15], [16].

2.3 The Link Between Fintech and Supply Chain Resilience

Fintech technologies significantly enhance supply chain resilience by improving financial agility and visibility, which are vital for rapid recovery from disruptions, with tools such as blockchain, artificial intelligence, and digital payment systems enabling real-time data access and transparency, reducing disputes, and fostering trust among supply chain partners. The integration of fintech into supply chain finance has redefined traditional practices by enabling alternative financing options and dynamic sourcing strategies that enhance flexibility and risk mitigation through predictive analytics [17], [18]. Instant payments and real-time financial reporting support quick recovery from disruptions [17], while blockchain strengthens transparency and trust between partners [18]. Fintech adoption facilitates dynamic sourcing strategies for rapid adaptation to market changes [17] and offers alternative financing options, such as trade credits and joint financing, essential for capital-constrained firms [19]. Moreover, predictive analytics powered by AI and big data improve risk assessment by evaluating market conditions, supplier performance, and credit risks [20], while real-time data and enhanced forecasting accuracy strengthen decision-making, operational efficiency, and overall risk management [20].

2.4 Previous Studies

Several prior studies provide foundational insights into the role of fintech in strengthening supply chain resilience. Digital technologies, including IoT and big data analytics, have been shown to enhance supply chain agility by providing real-time data and improving decision-making processes, which are essential for effective responses to disruptions [3], [20]. Fintech solutions, such as digital payment systems, streamline transactions, reduce delays, and enhance the overall responsiveness of supply chains [17]. Moreover, fintech-enabled payment solutions lower transaction costs and delays, directly contributing to operational resilience by

ensuring smoother financial operations [17]. Blockchain technology further supports resilience by improving visibility and trust, reducing vulnerabilities to disruptions and fraud, and thereby strengthening supply chain operations [18].

Blockchain-based fintech systems, in particular, provide an immutable and transparent ledger, significantly enhancing supply chain visibility and trust, both of which are critical for reducing disruptions and improving collaboration among stakeholders [18]. These findings collectively support the hypothesis that fintech adoption positively impacts supply chain resilience by improving agility, reducing costs, and strengthening operational trust. However, they also highlight a clear research gap in quantitatively examining this relationship, especially within small to medium-sized enterprises operating in developing markets, where digital adoption levels and supply chain dynamics may differ from those in developed economies.

2.5 Research Framework and Hypotheses

Based on the reviewed literature, this study conceptualizes fintech technology adoption as an independent variable influencing supply chain resilience, which is measured through four dimensions: agility, visibility, flexibility, and risk mitigation. The hypotheses are as follows:

H1: Fintech technology adoption has a positive effect on supply chain agility.

H2: Fintech technology adoption has a positive effect on supply chain visibility.

H3: Fintech technology adoption has a positive effect on supply chain flexibility.

H4: Fintech technology adoption has a positive effect on supply chain risk mitigation.

3. METHODS

3.1 Research Design

This study adopts a quantitative research design to empirically examine the effect of fintech technology adoption on supply chain resilience in the digital age. The research approach is explanatory in nature, aiming to test the hypothesized relationships between the independent variable (fintech technology adoption) and the dependent variable (supply chain resilience), which is measured through four dimensions: agility, visibility, flexibility, and risk mitigation.

3.2 Population and Sample

The research population comprises business organizations from various sectors that have adopted fintech solutions within their supply chain operations. The sampling technique used is purposive sampling, with the main criteria being that respondents are decision-makers or individuals directly involved in supply chain management and have experience using fintech-based systems.

A total of 76 respondents participated in the study. This sample size was deemed sufficient for statistical analysis using SPSS version 25, considering the minimum threshold for correlation and regression analysis in small-scale quantitative research.

3.3 Data Collection Method

Primary data were collected using a structured questionnaire distributed online, which was divided into two sections. The first section gathered demographic information, including the respondent's position, sector of business, and years of experience with fintech systems. The second section focused on research variables, consisting of statements measuring fintech technology adoption and supply chain resilience dimensions. All items were measured using a five-point Likert scale, ranging from 1 (strongly disagree) to 5 (strongly agree), enabling respondents to indicate their level of agreement with each statement and facilitating quantitative analysis of perceptions.

The study's independent variable was Fintech Technology Adoption (FTA), measured using indicators such as transaction speed, financial transparency, payment security, and integration with supply chain processes. The dependent variable was Supply Chain Resilience (SCR), assessed through four dimensions: Agility (AGL) – the ability to rapidly respond to changes; Visibility (VIS) – real-time tracking and transparency; Flexibility (FLX) – adaptability in processes and sourcing; and Risk Mitigation (RM) – proactive identification and reduction of disruptions.

3.4 Data Analysis Technique

Data analysis was conducted using SPSS version 25 through several steps: a validity test using Pearson correlation to ensure each indicator accurately measured the intended construct, with $p < 0.05$ as the acceptance criterion; a reliability test using Cronbach's alpha to assess internal consistency, with $\alpha \geq 0.7$ considered reliable; descriptive statistics to describe the distribution of responses for each variable; multiple linear regression to examine the effect of fintech technology adoption on each supply chain resilience dimension; and hypothesis testing using t-statistics with a significance level of $\alpha = 0.05$ to determine the acceptance or rejection of hypotheses H1–H4. This methodological approach ensures that the results are statistically valid and capable of providing actionable insights for both practitioners and researchers in the integration of financial technology within supply chain management.

4. RESULTS AND DISCUSSION

4.1 Demographic Profile of Respondents

A total of 76 respondents participated in this study, representing various business sectors that have adopted fintech technology in their supply chain operations. The demographic profile is summarized in Table 1.

Table 1. Demographic Profile of Respondents

Demographic Variable	Category	Frequency (n)	Percentage (%)
Business Sector	Manufacturing	26	34.2
	Retail/Wholesale	22	28.9
	Logistics/Transportation	15	19.7
	Services	13	17.1
Position in Organization	Owner/Executive	32	42.1
	Manager/Supervisor	44	57.9
Years of Using Fintech Systems	1–3 years	35	46.1
	4–6 years	29	38.2
	More than 6 years	12	15.7
Organization Size (No. of Employees)	< 50 (Small)	21	27.6
	50–249 (Medium)	39	51.3
	≥ 250 (Large)	16	21.1

Source: Results processing data (2025)

The largest proportion of respondents (34.2%) came from the manufacturing sector, followed by retail/wholesale (28.9%), logistics/transportation (19.7%), and services (17.1%), with most holding managerial or supervisory positions (57.9%), indicating direct involvement in operational decision-making and supply chain processes. In terms of fintech usage, nearly half (46.1%) had experience using fintech systems for 1–3 years, reflecting recent yet growing adoption trends, while medium-sized enterprises (50–249 employees) represented the largest share (51.3%), suggesting that this business segment is actively integrating fintech to strengthen supply chain resilience.

4.2 Validity and Reliability Testing

To ensure the quality of the research instrument, validity and reliability tests were conducted on all questionnaire items measuring fintech technology adoption (FTA) and the four dimensions of supply chain resilience: agility (AGL), visibility (VIS), flexibility (FLX), and risk mitigation (RM).

4.2.1 Validity Testing

The validity test was performed using the Pearson Product-Moment Correlation method. An item is considered valid if the

correlation coefficient (r) is greater than the critical value (r-table) of 0.224 (N = 76, $\alpha = 0.05$) and the significance value (p) is less than 0.05.

Table 2. Validity Test Results

Variable	Indicator	Pearson Correlation (r)	Sig. (p)	Status
FTA	FTA1	0.721	0.000	Valid
	FTA2	0.784	0.000	Valid
	FTA3	0.763	0.000	Valid
	FTA4	0.801	0.000	Valid
AGL	AGL1	0.729	0.000	Valid
	AGL2	0.756	0.000	Valid
VIS	VIS1	0.782	0.000	Valid
	VIS2	0.811	0.000	Valid
FLX	FLX1	0.744	0.000	Valid
	FLX2	0.790	0.000	Valid
RM	RM1	0.772	0.000	Valid
	RM2	0.803	0.000	Valid

Source: Results processing data (2025)

All indicators in the study show r-values higher than 0.224 and p-values lower than 0.05, indicating that each item is valid and effectively measures the intended construct. The Pearson correlation analysis results reveal that all indicators for the variables FTA (Fintech Technology Adoption), AGL (Agility), VIS (Visibility), FLX (Flexibility), and RM (Risk Mitigation) have correlation coefficients above 0.70 with p-values (Sig.) of 0.000. According to Sugiyono (2019), a correlation value above 0.30 generally indicates a sufficiently strong relationship between an indicator and its variable construct; in this study, the lowest correlation value is 0.721 (FTA1), well above the minimum threshold, while the highest is 0.811 (VIS2), reflecting a very strong correlation. The p-values of 0.000 for all items further confirm that these correlations are statistically significant at the 1% significance level ($p < 0.01$).

Specifically, for the FTA variable, all four indicators (FTA1–FTA4) have high correlations (0.721–0.801), demonstrating their effectiveness in measuring fintech technology adoption. The AGL variable's two indicators (0.729 and 0.756) reliably capture the agility dimension, while VIS indicators (0.782 and 0.811) achieve the highest correlations in the dataset, indicating excellent alignment with visibility. The FLX variable shows strong validity with correlations of 0.744 and 0.790, confirming its suitability for representing flexibility, and the RM variable's indicators (0.772 and 0.803) signify very high validity as measures of risk mitigation.

4.2.2 Reliability Testing

Reliability was assessed using Cronbach's Alpha to measure the internal consistency of the items within each variable. A variable is considered reliable if Cronbach's Alpha (α) is greater than 0.70.

Table 3. Reliability Test Results

Variable	Cronbach's Alpha (α)	Status
Fintech Technology Adoption (FTA)	0.872	Reliable
Agility (AGL)	0.814	Reliable
Visibility (VIS)	0.829	Reliable
Flexibility (FLX)	0.806	Reliable
Risk Mitigation (RM)	0.822	Reliable

Source: Results processing data (2025)

All variables have Cronbach's Alpha values exceeding the 0.70 threshold, indicating strong internal consistency and reliability of the measurement instruments (Nunnally & Bernstein, 1994). The results show that Fintech Technology Adoption (FTA) achieved a Cronbach's Alpha of 0.872, reflecting very high reliability and confirming that its four indicators (FTA1–FTA4) consistently measure fintech adoption without significant error. Agility (AGL) scored 0.814, indicating that its two indicators (AGL1 and AGL2) are stable and coherent in representing organizational agility, while Visibility (VIS) recorded 0.829, showing that its two indicators (VIS1 and VIS2) effectively capture supply chain visibility. Flexibility (FLX) achieved 0.806, ensuring consistent measurement of flexibility across its two indicators, and Risk Mitigation (RM) scored 0.822, confirming that its two indicators (RM1 and RM2) reliably represent the risk mitigation construct.

4.3 Descriptive Statistics

Descriptive statistics were calculated to determine the overall distribution of responses for each variable, including the mean and standard deviation for fintech technology adoption (FTA) and the four dimensions of supply chain resilience: agility (AGL), visibility (VIS), flexibility (FLX), and risk mitigation (RM). Using a Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree), mean scores were categorized into three levels: 1.00–2.33 as low, 2.34–3.66 as moderate, and 3.67–5.00 as high.

Table 4. Descriptive Statistics of Variables

Variable	Mean	Std. Deviation	Category
Fintech Technology Adoption (FTA)	4.21	0.54	High
Agility (AGL)	4.18	0.51	High
Visibility (VIS)	4.25	0.49	High
Flexibility (FLX)	4.12	0.56	High
Risk Mitigation (RM)	4.20	0.52	High

Source: Results processing data (2025)

The results show that the average scores for all variables fall within the high category, indicating strong agreement among respondents that fintech adoption significantly strengthens supply chain resilience. The highest mean score was recorded for Visibility (4.25), reflecting the perceived value of fintech in enhancing real-time tracking, transaction transparency, and data sharing across the supply chain. Fintech Technology Adoption (4.21) and Risk Mitigation (4.20) also scored highly, demonstrating recognition of fintech's role in improving payment security, fraud prevention, and proactive risk management. Agility (4.18) and Flexibility (4.12), while slightly lower, still indicate strong perceptions that fintech enables faster responses to disruptions and supports adaptable sourcing and operational strategies. Overall, these findings suggest that fintech integration is not only widely implemented but also regarded as an essential driver of operational resilience in the digital age.

4.4 Regression Analysis

Regression analysis was conducted to examine the effect of Fintech Technology Adoption (FTA) on each of the four dimensions of Supply Chain Resilience—agility (AGL), visibility (VIS), flexibility (FLX), and risk mitigation (RM)—using multiple simple regressions, with each resilience dimension as the dependent variable and FTA as the independent variable. A significance level of $\alpha = 0.05$ was applied, and a hypothesis was accepted if the p-value was less than 0.05 and the regression coefficient (β) was positive.

Table 5. Regression Analysis Results

Dependent Variable	β Coefficient	t-Statistic	Sig. (p)	R^2	Result
Agility (H1)	0.652	8.121	0.000	0.425	Supported

Visibility (H2)	0.684	8.756	0.000	0.468	Supported
Flexibility (H3)	0.611	7.482	0.000	0.373	Supported
Risk Mitigation (H4)	0.645	7.985	0.000	0.416	Supported

Source: Results processing data (2025)

The regression analysis results demonstrate a strong and significant influence of Fintech Technology Adoption (FTA) on all four dimensions of Supply Chain Resilience—Agility, Visibility, Flexibility, and Risk Mitigation—highlighting the transformative role of fintech in enhancing operational and strategic capabilities. For H1 (Agility), the β coefficient of 0.652 with a t-statistic of 8.121 ($p = 0.000$) and an R^2 of 0.425 indicates that fintech adoption explains 42.5% of the variation, supporting the view that fintech tools enable faster decision-making, quicker adaptation to market changes, and improved responsiveness. For H2 (Visibility), the β coefficient of 0.684 with a t-statistic of 8.756 ($p = 0.000$) and the highest R^2 of 0.468 shows that fintech adoption accounts for 46.8% of the variance, underscoring its critical role in enhancing transparency, real-time information flow, and traceability across organizational processes. For H3 (Flexibility), the β coefficient of 0.611 with a t-statistic of 7.482 ($p = 0.000$) and an R^2 of 0.373 suggests fintech adoption contributes 37.3% to flexibility, enabling organizations to tailor services, adjust business models, and reallocate resources effectively in response to market changes. Finally, for H4 (Risk Mitigation), the β coefficient of 0.645 with a t-statistic of 7.985 ($p = 0.000$) and an R^2 of 0.416 indicates that fintech adoption explains 41.6% of the variance, confirming its role in enhancing the ability to predict, monitor, and reduce operational and financial risks through improved data analytics, fraud detection, and compliance tracking.

4.5 Discussion

The results confirm that fintech technology adoption has a substantial and positive impact on supply chain resilience. The high mean scores indicate that respondents perceive fintech as a vital enabler of operational continuity in the digital age.

The strongest relationship was found between fintech adoption and supply chain visibility, aligning with previous findings that blockchain and digital payment systems enhance transaction transparency, reduce disputes, and improve tracking. Increased agility and flexibility are supported by instant payments, automated financial processes, and the ability to rapidly switch suppliers or logistics partners when disruptions occur. Risk mitigation benefits arise from predictive analytics and fraud prevention features embedded in fintech platforms, enabling proactive supply chain management. Blockchain technology, in particular, provides a secure, immutable ledger that enhances visibility and transparency in supply chain operations, allowing for real-time tracking of goods and materials, reducing delays, and minimizing fraud risks [21]. Similarly, digital payment systems ensure transparent financial transactions, enabling all parties in the supply chain to efficiently track payments and financial obligations [15].

In terms of agility and flexibility, fintech innovations such as instant payments and automated financial processes allow supply chains to respond quickly to disruptions by facilitating the rapid replacement of suppliers or logistics partners [18]. Blockchain integration reduces paperwork and accelerates transactions, further contributing to an agile and adaptable supply chain system [21]. For risk mitigation, predictive analytics and fraud prevention tools embedded within fintech platforms help identify potential risks and prevent fraudulent activities [18], while the secure and transparent nature of blockchain fosters trust among supply chain partners, thereby

mitigating risks related to financial transactions and data security [22].

These findings suggest that organizations aiming to strengthen supply chain resilience should prioritize fintech integration not only as a financial tool but as a strategic component of end-to-end supply chain management.

5. CONCLUSION

The findings of this study show that fintech technology adoption significantly enhances supply chain resilience across all four dimensions—agility, visibility, flexibility, and risk mitigation—with visibility being the most strongly influenced, highlighting fintech's role in improving real-time monitoring, transaction transparency, and information sharing among stakeholders. The integration of fintech solutions facilitates faster decision-making, streamlines transactions, and strengthens financial security, thereby enabling supply chains to become more adaptive and better prepared for disruptions. From a managerial perspective, fintech should be seen not merely as a financial tool but as a strategic enabler of operational continuity and competitive advantage, where the implementation of blockchain-based systems, automated payment platforms, and AI-driven financial analytics can enhance a supply chain's responsiveness to market volatility and unforeseen events.

From a policy standpoint, broader fintech adoption can be encouraged through supportive regulations, infrastructure development, and digital literacy programs, which would particularly benefit small and medium-sized enterprises in building resilience within the digital economy. Future research could expand the sample size, include cross-country comparisons, and explore additional variables such as organizational culture or digital readiness to gain deeper insights into the fintech–resilience relationship.

REFERENCES

[1] S. F. Wamba and M. M. Queiroz, "A framework based on blockchain, artificial intelligence, and big data analytics to leverage supply chain resilience considering the COVID-19," *Ifac-papersonline*, vol. 55, no. 10, pp. 2396–2401, 2022.

[2] A. Siddiqui, A. Yadav, and N. H. S. Farhan, "Digital Transformation of Financial Services in the Era of Fintech," *Fintech and Cryptocurrency*, pp. 13–33, 2023.

[3] B. Naima, S. Kherbachi, and N. Keddari, "Digital Transformation in Supply Chain Management: A Paradigm Shift Towards Enhanced Efficiency, Agility, and Resilience," 2024.

[4] H. Birkel, N.-O. Hohenstein, and S. Hähner, "How have digital technologies facilitated supply chain resilience in the COVID-19 pandemic? An exploratory case study," *Comput. Ind. Eng.*, vol. 183, p. 109538, 2023.

[5] F. Sun, Z. Qu, B. Wu, and S. Bold, "Enhancing global supply chain distribution resilience through digitalization: Insights from natural resource sector of China," *Resour. Policy*, vol. 95, p. 105169, 2024.

[6] S. A. Melnyk, T. Schoenherr, C. Speier-Pero, C. Peters, J. F. Chang, and D. Friday, "New challenges in supply chain management: cybersecurity across the supply chain," *Int. J. Prod. Res.*, vol. 60, no. 1, pp. 162–183, 2022.

[7] L. Ouabouch, "Overview on supply chain resilience," *Mater. Manag. Rev.*, vol. 11, no. 9, pp. 16–18, 2015.

[8] D. Ivanov, "Supply chain resilience: Conceptual and formal models drawing from immune system analogy," *Omega*, vol. 127, p. 103081, 2024.

[9] S. Hägele, E. H. Grosse, and D. Ivanov, "Supply chain resilience: a tertiary study," *Int. J. Integr. Supply Manag.*, vol. 16, no. 1, pp. 52–81, 2023.

[10] A. Zavala-Alcívar, M.-J. Verdecho, and J.-J. Alfaro-Saiz, "Supply chain resilience: a conceptual evolution analysis," *Dir. y Organ.*, pp. 5–17, 2023.

[11] C. Ben Abdallah, A. El-Amraoui, A. Frikha, and F. Delmotte, "Trends and applications of resilience supply chain: a systematic literature review," *Int. J. Supply Chain Oper. Resil.*, vol. 6, no. 1, pp. 53–83, 2023.

[12] H. Johnson, "Adapting to Disruptions: A Qualitative Study on Strategies for Building Resilience in Global Supply Chains," 2025.

[13] A. Hazar and Ş. Babuşcu, "Financial Technologies: Digital Payment Systems and Digital Banking. Today's Dynamics," *J. Res. Innov. Technol.*, vol. 2, no. 4, pp. 162–178, 2023.

[14] S. M. A. Alam, R. Akter, S. N. Khan, and S. Ahmad, "FinTech: A New Financial Revolution," in *Financial Landscape Transformation: Technological Disruptions*, Emerald Publishing Limited, 2025, pp. 301–316.

[15] I. Hasan and M. M. Habib, "Use of Mobile Banking, Digital Payment Systems, and Smart Contracts Conjunction with Blockchain-Based Financial System," *Int. Supply Chain Technol. J.*, vol. 8, no. 11, pp. 1–3, 2022.

[16] A. V Thakor, "Fintech and banking: What do we know?," *J. Financ. intermediation*, vol. 41, p. 100833, 2020.

[17] I. Ali, R. Mohammed, A. Nautiyal, and B. Kumar Som, "Exploring the Impact of Recent Fintech Trends on Supply Chain Finance Efficiency and Resilience," 2024.
[18] G. Omoegun, J. E. Fiemotongha, J. O. Omisola, O. K. Okenwa, and O. Onaghinor, "Advances in Contract Lifecycle Management Using Digital Tools in Oil and Gas Infrastructure Projects," 2025.
[19] P. Kouvelis, L. Dong, and D. Turcic, "Advances in supply chain finance and FinTech innovations overview," *Found. Trends® Technol. Inf. Oper. Manag.*, vol. 14, no. 1–2, pp. 1–4, 2020.
[20] S. Holloway, "Adapting to Disruptions: The Role of Emerging Technologies in Supply Chain Agility," 2025.
[21] I. Papaefstathiou and A. Hatzopoulos, "Blockchain in Supply Chain Management," 2021.
[22] I. R. Bukhari, "Impact of Blockchain Technology on Supply Chain Management," 2023.