



Article

Supply Chain Digitalization, Resilience, and Performance: A Literature Review and Conceptual Framework

Yunqi Huang^{1, 2*}, Liangyuan Yu^{1, 2}, Qi Pang^{1, 2}

¹Graduate School of Business, SEGi University, Selangor, Malaysia

²School of Economics and Management, Chongqing Vocational and Technical University of Mechatronics, Chongqing, China

Correspondence: Yunqi Huang, Graduate School of Business, SEGi University, Selangor, Malaysia; School of Economics and Management, Chongqing Vocational and Technical University of Mechatronics, Chongqing, China

Email: huang_yunqi@163.com

Copyright: © 2025 by the authors. Submitted for possible open access publication under the terms and conditions of the Creative Commons Attribution (CC BY) license (<https://creativecommons.org/licenses/by/4.0/>).

Abstract: Supply chain digitalization has become a central response to disruption, market volatility, and rising coordination complexity, yet the mechanisms through which digitalization produces resilience and performance remain fragmented across the literature. This narrative review synthesizes recent conceptual and empirical studies on supply chain digitalization, supply chain resilience, and supply chain performance. The evidence indicates that digitalization should not be treated as a stand-alone technological input or as an automatic source of performance improvement. Its value is realized through information transparency, real-time visibility, supply chain integration, collaboration, risk management, analytical capability, and resource reconfiguration. These mechanisms strengthen resilience before, during, and after disruption through absorption, response, and recovery capabilities. Resilience, in turn, translates digital investments into cost, quality, delivery, service-continuity, innovation, and sustainability outcomes. However, findings also show that the digitalization – resilience – performance relationship depends on supply chain dynamism, environmental uncertainty, disruption intensity, digital maturity, formal governance, top management commitment, and industry context. Digitalization can also create new vulnerabilities through cybersecurity exposure, system failure, data fragmentation, and technological dependence. An integrated conceptual framework is therefore proposed in which resilience is the central conversion mechanism between digitalization and performance, while contextual and governance factors shape the strength and direction of the relationship. The review concludes with propositions, a future research agenda, and managerial implications for building digitally enabled but risk-aware supply chains.

Keywords: supply chain digitalization; supply chain resilience; supply chain performance; digital transformation; dynamic capabilities; supply chain integration; environmental uncertainty

1. Introduction

Supply chains are increasingly exposed to intertwined disruptions originating in geopolitics, public-health crises, extreme weather, technological dependence, logistics congestion, and rapid demand shifts. These conditions have intensified interest in two strategic responses: the digitalization of supply chain processes and the development of supply chain resilience. Digital technologies promise end-to-end visibility, faster information exchange, predictive risk sensing, automated coordination, and more adaptive resource allocation. Resilience promises the ability to anticipate disruption, maintain critical functions, respond rapidly, recover operations, and adapt to a changed environment. The central managerial question is therefore not whether digitalization and resilience matter separately, but how they interact to produce reliable performance under uncertainty.

Recent research generally reports a positive association between supply chain digitalization and performance, but the empirical picture is more complex than a simple direct relationship. Studies have shown that digitalization improves performance through supply chain integration and efficiency (Salamah et al., 2024), through cost and operational mechanisms (Chatterjee et al., 2024), and through risk-management capabilities such as responsiveness, resilience, and restoration (Zhou et al., 2023). Other research finds that digital technology does not directly improve resilience unless it first improves integration (Shi et al., 2023), or that digital process maturity requires effective information sharing and supply chain risk management to generate resilience benefits (Harju et al., 2023). These findings suggest that digitalization is primarily an enabling infrastructure whose value depends on organizational and interorganizational conversion mechanisms.

Supply chain resilience has consequently emerged as a key bridge between digitalization and performance. Zhao et al. (2023) distinguish absorptive capability before disruption, response capability during disruption, and recovery capability after disruption, demonstrating that all three mediate the effect of digitalization on performance. Zhou et al. (2023) similarly show that responsiveness, resilience, and restoration transmit digitalization effects to supply chain performance, with resilience providing the strongest pathway. More recent evidence based on Chinese listed companies identifies information transparency, collaborative efficiency, and resource flexibility as three systematic channels through which digitalization strengthens resilience (Hu & Ma, 2026).

At the same time, the literature contains important qualifications. Supply chain dynamism can strengthen the effect of digitalization on integration while weakening its effect on efficiency (Salamah et al., 2024). Formal contracts may strengthen one digitalization–resilience pathway but weaken collaboration-based resilience (Li et al., 2023). Environmental uncertainty can increase the strategic value of digital capabilities, but high volatility may also intensify coordination burdens, implementation costs, and data requirements. Digitalization itself can create cybersecurity exposure, system failures, data-integration problems, and technological lock-in (Nath & Sulthana, 2026). Consequently, more digitalization is not necessarily equivalent to more resilience or better performance.

This article develops a narrative synthesis of the recent literature on supply chain digitalization, resilience, and performance. It has four objectives. First, it clarifies the three focal

constructs and their multidimensional nature. Second, it integrates the theoretical explanations used across the literature, particularly the resource-based view, dynamic capability theory, and organizational information processing theory. Third, it synthesizes evidence on direct effects, mediating mechanisms, boundary conditions, and the potential dark side of digitalization. Fourth, it proposes an integrated conceptual framework and a set of propositions that can guide future empirical research, especially in underexamined service and e-commerce supply chains.

2. Review Approach

This article adopts a narrative literature-review approach rather than a systematic review or meta-analysis. The synthesis is based on a purposive set of conceptual and empirical studies addressing at least two of the following domains: supply chain digitalization, supply chain resilience, supply chain integration or collaboration, supply chain risk management, and supply chain performance. The reviewed materials include manufacturing, procurement, logistics, banking-enabled e-commerce services, and cross-industry studies conducted in China, Finland, Turkey, Pakistan, Saudi Arabia, Romania, the United Kingdom, and other settings.

The review gives greatest interpretive weight to peer-reviewed journal studies with clearly reported theoretical models, samples, methods, and findings. Conceptual studies are used to clarify mechanisms and organize the technology–process–performance relationship, while newer archival and text-analytical research is used to extend the evidence beyond cross-sectional survey designs. Preprints and lower-tier studies are treated as supplementary rather than decisive evidence. Because the source set was purposively assembled, the article does not claim exhaustive coverage of the field; its purpose is theoretical integration and conceptual development.

3. Conceptualizing Digitalization, Resilience, and Performance

3.1 Supply chain digitalization

Supply chain digitalization refers to the systematic use and integration of digital technologies across supply chain activities, relationships, and decision processes. It is broader than digitization, which converts analog information into digital form, and broader than the isolated adoption of a single technology. Digitalization involves the redesign of planning, procurement, production, delivery, service, coordination, and governance through digital platforms, data analytics, automation, artificial intelligence, the Internet of Things, blockchain, cloud systems, and digital twins.

Perano et al. (2023) demonstrate the breadth of this construct by organizing digitalization around technologies, supply chain business processes, and performance impacts. Their framework identifies numerous combinations of digital technologies and operational practices, implying that the effect of digitalization depends on where and how technology is embedded. Hu and Ma (2026) similarly define supply chain digitalization as a systemic transformation covering planning, procurement, production, delivery, and service. This holistic view is important because a firm may possess advanced digital tools while still lacking cross-process integration, partner connectivity, or data-driven decision routines.

Digital maturity is therefore conceptually distinct from technology adoption. Zouari et al. (2021) find that both digital maturity and digital-tool adoption improve resilience, but digital

maturity has the stronger effect, particularly among smaller firms. Digital maturity captures the extent to which technologies are integrated with processes, competencies, governance, and organizational routines. In the e-commerce service context, Zaman et al. (2023) likewise identify performance expectancy, electronic cost effectiveness, trust, ease of use, risk management, market sensitivity, and collaboration as critical adoption and resilience factors. These results indicate that digitalization is simultaneously technological, organizational, and relational.

3.2 Supply chain resilience

Supply chain resilience is the capacity of a supply chain to prepare for, withstand, respond to, recover from, and adapt after disruptions while maintaining or restoring critical functions. The literature increasingly treats resilience as a process rather than a single static outcome. Zhao et al. (2023) distinguish absorptive capability before disruption, response capability during disruption, and recovery capability after disruption. Nath and Sulthana (2026) adopt the same stage-based structure and show how real-time visibility, predictive analysis, agile decision-making, and resource reconfiguration support these capabilities.

Alternative conceptualizations emphasize resistance and recovery (Hu & Ma, 2026), proactive and reactive resilience, or related capabilities such as robustness, agility, survivability, restoration, and adaptation. These constructs overlap but should not be treated as interchangeable. Robustness focuses on maintaining function under shock, agility emphasizes speed and flexibility, and recovery concerns the restoration or redesign of operations. A stage-sensitive conceptualization is useful because the same digital capability may have different effects before, during, and after disruption. Predictive analytics may strengthen anticipation, real-time platforms may support response, and digital twins or historical-data learning may improve recovery and adaptation.

3.3 Supply chain performance

Supply chain performance is also multidimensional. Common outcomes include cost efficiency, quality, delivery speed, service reliability, flexibility, inventory performance, customer satisfaction, innovation, sustainability, and disruption-handling performance. Some studies focus on general supply chain performance, while others examine operational performance, firm performance, logistics performance, innovation performance, or sustainable business performance.

This variation helps explain why findings are not always consistent. A digital initiative may improve visibility and quality while increasing short-term cost; resilience investments may reduce disruption losses while lowering lean efficiency under normal conditions. Chatterjee et al. (2024) show that cost and operational mechanisms connect digitalization with firm performance, while Sharma et al. (2025) find that smart supply chains, agility, resilience, and green practices jointly support sustainable business performance. Performance should therefore be modeled as a portfolio of outcomes rather than as a single undifferentiated index.

4. Theoretical Foundations

4.1 Resource-based view and dynamic capabilities

The resource-based view explains why digital assets, data, analytical skills, integrated platforms, and partner relationships can become strategically valuable resources when they are difficult to imitate and embedded in organizational routines (Barney, 1991). However, possession of digital resources alone does not explain adaptation under disruption. Dynamic capability theory extends the argument by emphasizing the capacity to sense changes, seize opportunities or responses, and reconfigure resources as conditions evolve (Teece et al., 1997).

Within this perspective, digitalization provides sensing and coordination infrastructure, while resilience represents a higher-order capability that mobilizes and reconfigures resources under disturbance. Digital data and platforms support risk sensing; integration and collaboration support coordinated response; and flexible assets, suppliers, and processes support recovery. This logic is consistent with Zhao et al. (2023), who model absorptive, response, and recovery capabilities as mediators, and with Hu and Ma (2026), who identify information, collaboration, and resource channels.

4.2 Organizational information processing theory

Organizational information processing theory provides a second explanation. Uncertainty increases the amount, speed, and diversity of information that organizations must process. Digitalization increases information-processing capacity through real-time data, analytics, shared platforms, automated alerts, and cross-organizational communication. When information-processing capacity is aligned with uncertainty, firms can identify risks earlier, coordinate decisions, and respond more accurately.

Harju et al. (2023) apply this logic to procurement digitalization and show that data analytics, process digitalization, information sharing, and risk management must operate together to strengthen resilience. Shi et al. (2023) similarly find that supply chain integration completely mediates the relationship between digital technology and resilience. These studies demonstrate that data availability is insufficient unless information is shared, interpreted, and converted into coordinated action.

4.3 Contingency, technology adoption, and complex systems perspectives

Contingency reasoning explains why the same level of digitalization can yield different outcomes across environments. Supply chain dynamism, disruption intensity, technology turbulence, marketization, ownership, industry technology intensity, and organizational size shape the value and difficulty of digital initiatives. Salamah et al. (2024) report that dynamism strengthens digitalization's effect on integration but attenuates its effect on efficiency. Chatterjee et al. (2024) identify technology turbulence and top management commitment as important moderators, while Hu and Ma (2026) show stronger effects in highly marketized regions, non-state-owned firms, and high-technology industries.

Technology-adoption logic is particularly relevant to service and e-commerce supply chains. Zaman et al. (2023) show that perceived usefulness, trust, cost effectiveness, ease of use, collaboration, and risk management influence the resilience value of digital banking for e-commerce services. A complex-systems perspective further emphasizes that resilience emerges from interactions among multiple supply chain actors rather than from any single firm. Digitalization reshapes these interactions by changing information visibility, coordination costs, and the speed of resource reconfiguration.

5. Synthesis of Empirical Evidence

Study	Context/sample	Method	Focal mechanism	Main conclusion
Zouari et al. (2021)	300 supply chain managers	OLS regression	Digital maturity and tool adoption	Both improve resilience; digital maturity is the stronger predictor.
Shi et al. (2023)	96 Chinese manufacturers	SEM	Integration as mediator	Digital technology affects resilience indirectly through complete mediation by integration.
Li et al. (2023)	Chinese manufacturing firms	SEM	Collaboration and formal contracts	Collaboration mediates digitalization effects; formal contracts create mixed boundary effects.
Zhao et al. (2023)	210 Chinese manufacturers	Survey and mediation analysis	Absorption, response, recovery	All three resilience capabilities mediate digitalization–performance relationships.
Zhou et al. (2023)	215 Chinese companies	Moderated mediation	Responsiveness, resilience, restoration	The three capabilities mediate performance effects; resilience is the strongest pathway.
Harju et al. (2023)	147 Finnish firms	PLS path modeling	Analytics, process maturity, information sharing, risk management	Digital procurement improves resilience when information sharing and risk management are effective.
Salamah et al. (2024)	293 Turkish manufacturers	SEM	Integration, efficiency, dynamism	Integration and efficiency mediate performance; dynamism strengthens integration but weakens efficiency effects.
Chatterjee et al. (2024)	712 service and manufacturing firms	SEM and multigroup analysis	Cost, operational performance, technology turbulence, management commitment	Digitalization improves performance through cost and operational mechanisms; contextual moderators matter.
Sharma et al. (2025)	234 UK respondents	SEM and ANN	Smart supply chains, agility, resilience, green practices	Digitalization-related capabilities jointly enhance sustainable business performance.

Study	Context/sample	Method	Focal mechanism	Main conclusion
Türkes (2025)	420 Romanian supply chain practitioners	PLS-SEM	Sustainability, resilience, risk management, integration	Digitalization positively influences intermediate capabilities and overall performance.
Hu & Ma (2026)	Chinese A-share firms, 2011–2024	Text analysis and panel regressions	Information, collaboration, resource flexibility	Digitalization robustly strengthens resilience through three multi-level mechanisms.
Zaman et al. (2023)	Pakistan e-commerce service context	ISM and DEMATEL	Technology adoption and digital banking	Performance expectancy, cost effectiveness, and trust are critical drivers of service supply chain resilience.

Table 1. Selected studies on supply chain digitalization, resilience, and performance

5.1 Digitalization and supply chain performance

The dominant finding is that digitalization supports performance, but the direct path is neither universal nor sufficient. Perano et al. (2023) show conceptually that performance effects arise from specific combinations of technologies and supply chain processes. Salamah et al. (2024) provide empirical evidence that integration and efficiency mediate the relationship, implying that digitalization improves performance when it creates coordinated information flows and streamlined processes. Chatterjee et al. (2024) similarly identify cost and operational performance as important transmission mechanisms.

Digitalization affects several performance dimensions through different mechanisms. Real-time data can reduce delays and improve delivery reliability; automation can lower transaction and processing costs; integrated platforms can reduce duplication and improve coordination; analytics can support forecasting and inventory decisions; and digital traceability can strengthen quality assurance and customer confidence. However, digital investments also involve implementation costs, learning requirements, partner dependence, and cybersecurity exposure. The performance payoff therefore depends on the extent to which digital tools are integrated with processes, people, and governance.

The evidence also suggests that direct effects may mask important trade-offs. Digitalization can improve quality and visibility while having weaker effects on time or cost in the short term. Sustainable performance may require the simultaneous development of smart supply chain capabilities, agility, resilience, and green practices rather than technology alone (Sharma et al., 2025). The appropriate conclusion is not that digitalization directly improves every performance metric, but that it increases the potential for performance improvement when complementary capabilities are present.

5.2 Digitalization and supply chain resilience

Evidence for a positive digitalization–resilience relationship is strong, although the pathway differs across studies. Zouari et al. (2021) show that digital maturity and digital-tool

adoption both enhance resilience. Li et al. (2023) find that digitalization has a direct effect on resilience and an additional indirect effect through supply chain collaboration. Harju et al. (2023) show that procurement digitalization increases information-processing capacity and reduces uncertainty, but effective information sharing and risk management are necessary to convert this capacity into resilience.

Shi et al. (2023) provide a particularly important qualification: enterprise digitalization is not directly associated with resilience in their sample, but it improves supply chain integration, which then improves resilience. This result suggests that resilience is not generated by technology ownership; it emerges from coordinated use across internal functions, suppliers, and customers. Hu and Ma (2026) reinforce this view using a large longitudinal corporate dataset. They identify information transparency, lower collaboration costs, and resource flexibility as three mechanisms through which digitalization strengthens resistance and recovery.

The service-sector evidence is narrower but strategically important. Zaman et al. (2023) show that resilient e-commerce service supply chains depend on technology-adoption factors such as performance expectancy, electronic cost effectiveness, trust, perceived ease of use, market sensitivity, collaboration, and risk management. This indicates that service resilience depends not only on operational technologies but also on customer-facing digital infrastructure, financial transactions, and platform trust.

5.3 Resilience as a performance mechanism

The strongest integrative conclusion across the literature is that resilience converts digital potential into performance. Zhao et al. (2023) demonstrate that absorptive, response, and recovery capabilities each mediate the relationship between digitalization and supply chain performance. Absorptive capability supports anticipation, redundancy, and continuity before disruption; response capability supports fast coordination and adjustment during disruption; and recovery capability supports restoration and resource reconfiguration after disruption.

Zhou et al. (2023) reach a similar conclusion using responsiveness, resilience, and restoration as mediators. Their post hoc analysis indicates that the resilience pathway is stronger than responsiveness and restoration, suggesting that the broad capacity to sustain and adapt may be more consequential than any single reaction or recovery mechanism. Nath and Sulthana (2026) further show that the three resilience capabilities partially mediate digitalization's effect on disruption-handling performance under environmental uncertainty.

These findings imply that performance during normal operations and performance during disruption should be distinguished. Digitalization may improve routine efficiency directly, while resilience becomes particularly important when the supply chain is exposed to shocks. Resilience reduces downtime, protects service levels, stabilizes customer outcomes, and supports recovery. It can therefore be understood as an insurance-like capability that preserves the value created by digitalization when environmental conditions deteriorate.

5.4 Core enabling mechanisms

Four mechanisms recur across the literature. First, information transparency and visibility allow firms to detect disruptions, reduce information asymmetry, monitor operations, and anticipate changes. Digital platforms, sensors, analytics, and shared data make risks visible earlier and support fact-based decisions. Hu and Ma (2026) identify information transparency as

a statistically supported mechanism, while Harju et al. (2023) show that data analytics and information sharing increase supply chain information-processing capacity.

Second, integration and collaboration convert information into coordinated action. Integration links internal functions, suppliers, customers, systems, and operational processes. Collaboration supports joint planning, problem solving, and resource mobilization. Shi et al. (2023) find complete mediation through integration, and Li et al. (2023) identify collaboration as a complementary mediator of digitalization and resilience.

Third, digitalization strengthens risk management and analytical capability. Predictive models, scenario analysis, and automated monitoring allow firms to identify vulnerabilities and evaluate alternative responses. Zhou et al. (2023) position digitalization within supply chain risk management and show that risk-related capabilities transmit effects to performance. Procurement evidence likewise shows that risk management is necessary to convert digital process maturity into resilience (Harju et al., 2023).

Fourth, digitalization can improve resource flexibility and reconfiguration. Digital platforms provide information on available capacity, suppliers, inventory, transport options, and customer demand. This supports switching, redistribution, rescheduling, and recovery. Hu and Ma (2026) identify resource flexibility as a central channel, while the dynamic-capability literature explains how sensing and coordination are converted into reconfiguration.

5.5 Boundary conditions and contradictory evidence

The effect of digitalization is contingent on environmental and organizational conditions. Supply chain dynamism is one of the most frequently examined moderators, but its effect is not uniform. Salamah et al. (2024) find that dynamism strengthens the effect of digitalization on integration, does not significantly alter the direct digitalization–performance relationship, and weakens the digitalization–efficiency relationship. This pattern suggests that volatile environments increase the value of integration while simultaneously making efficiency harder to realize.

Governance also matters. Li et al. (2023) show that formal contracts strengthen the digitalization–resilience relationship but weaken the collaboration–resilience relationship. Formalization can clarify obligations, data-sharing rules, and response responsibilities, yet excessive contractual dependence may reduce relational flexibility. Chatterjee et al. (2024) identify top management commitment and technology turbulence as moderators, reinforcing the argument that digital infrastructure requires managerial sponsorship and continuous adaptation.

Industry and institutional context further shape results. Hu and Ma (2026) report stronger digitalization effects among firms in highly marketized regions, non-state-owned firms, and high-technology industries. Service and e-commerce settings introduce additional dependencies on digital payment, platform trust, customer interaction, and service continuity (Zaman et al., 2023). These differences caution against transferring manufacturing-based conclusions directly to service ecosystems without contextual testing.

5.6 The dual effect and potential dark side of digitalization

Although most studies emphasize positive effects, digitalization can simultaneously create new vulnerabilities. Nath and Sulthana (2026) explicitly describe this dual role: digital

technologies improve visibility, responsiveness, and predictive capability, but they can also generate cybersecurity risks, system failures, data-integration difficulties, and operational complexity. Increased connectivity expands the number of interdependent nodes and potential points of failure. Automated decision systems may also propagate poor-quality data or model errors more quickly.

The dark side is especially relevant when digital maturity is low, partner systems are incompatible, responsibilities are unclear, or firms lack backup procedures. Under these conditions, technology may reduce redundancy, centralize risk, and create dependence on platforms or service providers. The relationship between digitalization and resilience may therefore be nonlinear: early digital investments may create complexity before complementary capabilities mature, while excessive integration without cybersecurity and fallback capacity may increase systemic exposure.

A balanced framework must therefore distinguish digitally enabled resilience from technology dependence. Resilience requires not only connected and intelligent systems but also governance, human judgment, redundant communication, recovery protocols, and the ability to operate when digital infrastructure is degraded.

6. Proposed Conceptual Framework

The integrated framework in Figure 1 positions supply chain resilience as the central conversion mechanism between digitalization and performance. Supply chain digitalization creates data, connectivity, automation, and analytical capacity. These resources influence resilience through information transparency, supply chain integration, collaboration, risk sensing, and resource flexibility. Resilience then protects and enhances cost, quality, delivery, service continuity, innovation, and sustainability performance. A direct digitalization–performance path remains in the framework because automation and process redesign can improve routine efficiency without a disruption event. However, the principal theoretical pathway is indirect.

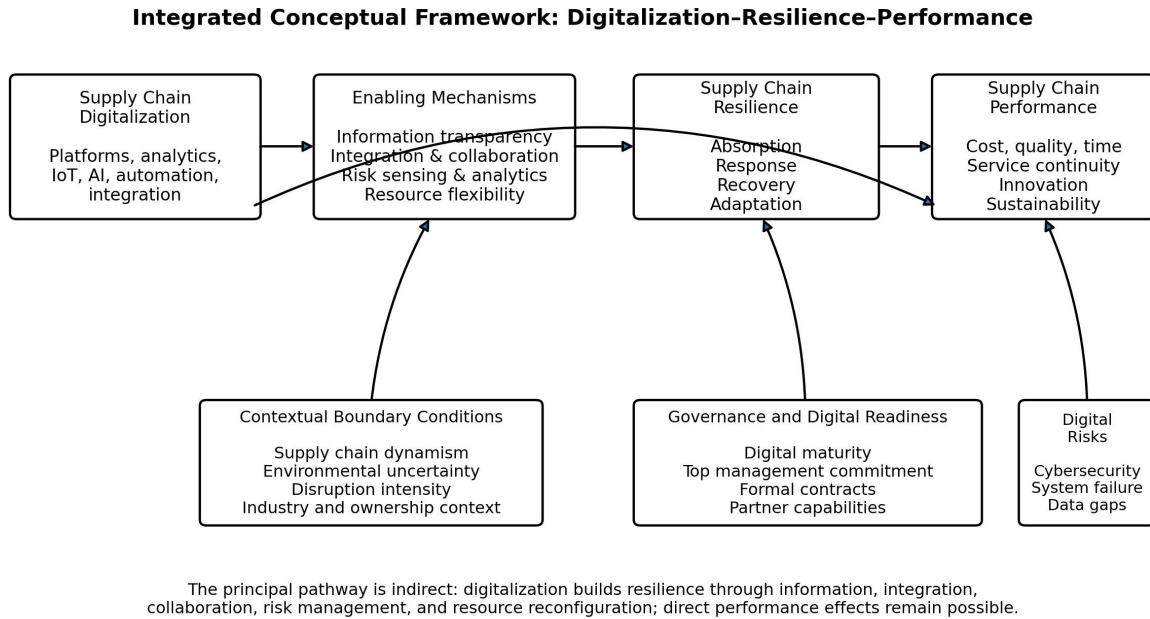


Figure 1. Integrated conceptual framework for supply chain digitalization, resilience, and performance.

6.1 Research propositions

Proposition 1. Supply chain digitalization has a positive direct effect on supply chain performance, but the strength and performance dimension of this effect depend on digital maturity and complementary organizational capabilities.

Proposition 2. Supply chain digitalization positively influences supply chain resilience through information transparency, integration, collaboration, analytical risk management, and resource flexibility.

Proposition 3. Supply chain resilience mediates the relationship between supply chain digitalization and supply chain performance.

Proposition 4. Absorption, response, and recovery capabilities provide distinct mediating pathways, and their relative importance varies by disruption stage and performance outcome.

Proposition 5. Supply chain dynamism, environmental uncertainty, and disruption intensity increase the strategic relevance of digitalization and resilience, but excessive dynamism can attenuate efficiency gains.

Proposition 6. Digital maturity, top management commitment, formal governance, and partner digital capability strengthen the conversion of digitalization into resilience and performance.

Proposition 7. Cybersecurity exposure, system failure, data fragmentation, and technological dependence weaken the digitalization–resilience relationship and may produce nonlinear or negative effects when governance and fallback capacity are insufficient.

7. Future Research Agenda

First, future research should move beyond cross-sectional perceptual surveys. Longitudinal designs, matched buyer–supplier data, archival measures, digital trace data, field experiments,

and quasi-experimental approaches are needed to establish temporal order and causal mechanisms. The text-analytical panel approach used by Hu and Ma (2026) demonstrates one promising direction, although additional validation of digitalization and resilience measures remains necessary.

Second, service and e-commerce supply chains require substantially more attention. Most evidence comes from manufacturing firms, yet e-commerce resilience depends on payment infrastructure, cloud services, digital platforms, last-mile logistics, customer data, marketplace governance, and service partners. The banking-enabled service model developed by Zaman et al. (2023) identifies relevant adoption factors, but large-sample empirical tests are needed to connect these factors with resilience and performance.

Third, researchers should disaggregate digitalization. Artificial intelligence, blockchain, digital twins, IoT systems, enterprise platforms, and automation have different functions, costs, risks, and temporal effects. Future work should compare technology portfolios and investigate complementarities rather than combining all technologies into a single index.

Fourth, resilience measures should be stage-specific and outcome-specific. Absorption, response, recovery, adaptation, robustness, and survivability should be distinguished conceptually and empirically. Performance should likewise be separated into routine efficiency, disruption performance, financial outcomes, service continuity, innovation, and sustainability. This will clarify why digitalization improves some outcomes but not others.

Fifth, the field should examine the dark side of digitalization directly. Cyber incidents, algorithmic errors, cloud outages, data-quality problems, interoperability failures, platform concentration, and employee skill gaps should be modeled as mechanisms rather than listed only as limitations. Nonlinear models may reveal thresholds beyond which connectivity and centralization reduce resilience.

Sixth, multilevel and network research is needed. Supply chain resilience is not produced solely within a focal firm; it emerges from supplier, customer, logistics, financial, and platform relationships. Future studies should examine how digital asymmetry between partners, network position, governance, and resource dependence shape system-level resilience.

Finally, comparative research should test institutional and industry heterogeneity. The stronger effects identified among high-technology and non-state-owned firms in China (Hu & Ma, 2026) indicate that national institutions, marketization, firm ownership, regulation, and digital infrastructure can influence results. Cross-country and cross-sector designs would improve generalizability and inform differentiated policy and managerial strategies.

8. Managerial Implications

Managers should treat supply chain digitalization as a capability-building program rather than a technology-purchasing program. Investments should be linked to specific resilience and performance objectives: early warning, supplier visibility, rapid response, alternative sourcing, capacity reallocation, recovery speed, or service continuity. Each digital initiative should therefore be accompanied by a process owner, decision protocol, partner-integration plan, data-quality standard, and performance metric.

Digital maturity deserves greater attention than the number of tools adopted. Firms should integrate platforms with operational routines, employee skills, supplier relationships, and crisis

procedures. Information visibility must be converted into coordinated action through shared dashboards, escalation rules, scenario exercises, and cross-functional decision rights. Procurement digitalization should be accompanied by partner information sharing and risk management, consistent with Harju et al. (2023).

Managers should also build layered resilience. Absorptive capability requires monitoring, redundancy, early warning, and contingency planning. Response capability requires rapid communication, authority, and flexible coordination. Recovery capability requires resource reconfiguration, learning, and post-disruption redesign. Digital systems should support all three stages rather than concentrating only on routine efficiency.

Finally, digital resilience requires protection against digital failure. Cybersecurity, backup communication, offline procedures, vendor diversification, data governance, and system-recovery testing should be designed together with digital integration. A highly connected supply chain without fallback capacity may be efficient in normal conditions but fragile during technology-related disruptions.

9. Conclusion

The literature supports a broad positive relationship among supply chain digitalization, resilience, and performance, but the relationship is indirect, conditional, and multidimensional. Digitalization improves the capacity to collect, process, and share information; integrate processes and partners; manage risk; and reconfigure resources. These mechanisms strengthen absorption, response, and recovery capabilities, which preserve and enhance performance under disruption. Direct performance effects remain possible through automation and efficiency, but they do not capture the full strategic value of digitalization. The proposed framework therefore places resilience at the center of the digitalization–performance relationship while recognizing the influence of dynamism, uncertainty, governance, digital maturity, and technology-related vulnerabilities. Future research should test this framework with longitudinal, multi-source, technology-specific, and network-level designs, particularly in service and e-commerce ecosystems.

AUTHOR CONTRIBUTIONS

Yunqi Huang: Conceptualization, Methodology, Literature review, Writing–original draft, Writing–review & editing, and Project administration.

Liangyuan Yu: Literature search, Resources, Formal analysis, Writing–review & editing, and Validation.

Qi Pang: Literature search, Visualization, Validation, Writing–review & editing, and Supervision.

ACKNOWLEDGEMENTS

The authors gratefully acknowledge the academic support provided by SEGi University and Chongqing Vocational and Technical University of Mechatronics during the preparation of this manuscript.

CONFLICT OF INTEREST STATEMENT

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

DATA AVAILABILITY STATEMENT

No new empirical data were generated or analyzed in this study. All information used in this literature review was obtained from publicly available scholarly sources cited in the manuscript.

Reference

- 1.Abourobah, S. H., Mashat, R. M., & Salam, M. A. (2023). Role of absorptive capacity, digital capability, agility, and resilience in supply chain innovation performance. *Sustainability*, 15(4), 3636. <https://doi.org/10.3390/su15043636>
- 2.Atieh Ali, A. A., Sharabati, A.-A. A., Allahham, M., & Nasereddin, A. Y. (2024). The relationship between supply chain resilience and digital supply chain and the impact on sustainability: Supply chain dynamism as a moderator. *Sustainability*, 16(7), 3082. <https://doi.org/10.3390/su16073082>
- 3.Barney, J. (1991). Firm resources and sustained competitive advantage. *Journal of Management*, 17(1), 99 – 120.
- 4.Chatterjee, S., Mariani, M., & Ferraris, A. (2024). Digitalization of supply chain and its impact on cost, firm performance, and resilience: Technology turbulence and top management commitment as moderator. *IEEE Transactions on Engineering Management*, 71, 10469 – 10484. <https://doi.org/10.1109/TEM.2023.3297251>
- 5.Harju, A., Hallikas, J., Immonen, M., & Lintukangas, K. (2023). The impact of procurement digitalization on supply chain resilience: Empirical evidence from Finland. *Supply Chain Management: An International Journal*, 28(7), 62 – 76. <https://doi.org/10.1108/SCM-08-2022-0312>
- 6.Hu, J., & Ma, J. (2026). Supply chain digitalization and its resilience: A systematic framework and empirical evidence. *Systems*, 14(2), 194. <https://doi.org/10.3390/systems14020194>
- 7.Li, Y., Li, D., Liu, Y., & Shou, Y. (2023). Digitalization for supply chain resilience and robustness: The roles of collaboration and formal contracts. *Frontiers of Engineering Management*, 10(1), 5 – 19. <https://doi.org/10.1007/s42524-022-0229-x>
- 8.Nath, A., & Sulthana, M. N. (2026). Leveraging digitalization to strengthen supply chain resilience: Mitigating disruptions for enhanced performance. *Journal of Advanced Manufacturing Systems*, 1 – 26. <https://doi.org/10.1142/S0219686727500259>
- 9.Perano, M., Cammarano, A., Varriale, V., Del Regno, C., Michelino, F., & Caputo, M. (2023). Embracing supply chain digitalization and unphysicalization to enhance supply chain performance: A conceptual framework. *International Journal of Physical Distribution & Logistics Management*, 53(5/6), 628 – 659. <https://doi.org/10.1108/IJPDLM-06-2022-0201>
- 10.Salamah, E., Alzubi, A., & Yinal, A. (2024). Unveiling the impact of digitalization on supply chain performance in the post-COVID-19 era: The mediating role of supply chain integration and efficiency. *Sustainability*, 16(1), 304. <https://doi.org/10.3390/su16010304>
- 11.Sharma, M., Antony, R., Sharma, A., & Daim, T. (2025). Can smart supply chain bring agility and resilience for enhanced sustainable business performance? *The International Journal of Logistics Management*, 36(2), 501 – 555. <https://doi.org/10.1108/IJLM-09-2023-0381>

12. Shi, Y., Zheng, X., Venkatesh, V. G., Humdan, E. A., & Paul, S. K. (2023). The impact of digitalization on supply chain resilience: An empirical study of the Chinese manufacturing industry. *Journal of Business & Industrial Marketing*, 38, 1 – 11. <https://doi.org/10.1108/JBIM-09-2021-0456>
13. Teece, D. J., Pisano, G., & Shuen, A. (1997). Dynamic capabilities and strategic management. *Strategic Management Journal*, 18(7), 509 – 533.
14. Türkes, M. C. (2025). How digitalization drives supply chain performance in the Romanian industry: The roles of sustainability, resilience, risk management, and integration. *Sustainability*, 17(21), 9895. <https://doi.org/10.3390/su17219895>
15. Zaman, S. I., Khan, S. A., Qabool, S., & Gupta, H. (2023). How digitalization in banking improve service supply chain resilience of e-commerce sector? A technological adoption model approach. *Operations Management Research*. <https://doi.org/10.1007/s12063-022-00341-0>
16. Zhao, N., Hong, J., & Lau, K. H. (2023). Impact of supply chain digitalization on supply chain resilience and performance: A multi-mediation model. *International Journal of Production Economics*, 259, 108817. <https://doi.org/10.1016/j.ijpe.2023.108817>
17. Zhou, H., Wang, Q., & Yang, Q. (2023). How does digitalisation influence supply chain performance? Evidence from a supply chain risk management perspective. *International Journal of Logistics Research and Applications*, 1 – 19. <https://doi.org/10.1080/13675567.2023.2169667>
18. Zouari, D., Ruel, S., & Viale, L. (2021). Does digitalising the supply chain contribute to its resilience? *International Journal of Physical Distribution & Logistics Management*, 51(2), 149 – 180. <https://doi.org/10.1108/IJPDLM-01-2020-0038>

Disclaimer/Publisher’s Note: The statements, opinions, and data contained in all publications are solely those of the individual author(s) and contributor(s) and not of *Journal of Contemporary Economics and Management* (JCEM) and/or its editor(s). JCEM and/or the editor(s) disclaim any responsibility for harm to persons or property resulting from any ideas, methods, instructions, or products referred to in the content.