



Strategic and Cultural Antecedents of Supply Chain Digitalization and Supply Chain Performance: The Mediating Role of Supply Chain Resilience in Chinese B2C E-Commerce

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ARTICLE INFO

Keywords

digital transformation
strategy
digital culture
supply chain digitalization
supply chain resilience
supply chain performance
Chinese e-commerce
industry

Published

02 December 2026

ABSTRACT

Supply chain digitalization has become central to e-commerce operations, but digital investment does not automatically translate into superior supply chain performance. This study develops a streamlined model that explains how two organizational antecedents digital transformation strategy and digital culture support supply chain digitalization and how digitalization contributes to supply chain performance through supply chain resilience. Drawing on the Resource-Based View and Dynamic Capabilities Theory, the model treats digital transformation strategy and digital culture as complementary organizational resources, supply chain digitalization as an integrated operational capability, and supply chain resilience as an adaptive capability that converts digital visibility and coordination into stable performance under disruption. Six hypotheses are proposed: digital transformation strategy and digital culture are expected to enhance supply chain digitalization; supply chain digitalization is expected to improve both supply chain resilience and supply chain performance; supply chain resilience is expected to improve supply chain performance and mediate the relationship between supply chain digitalization and supply chain performance. The empirical design adopts a quantitative cross-sectional survey of small and medium-sized B2C e-commerce merchants in mainland China and proposes PLS-SEM for measurement and structural model assessment. By focusing on a concise five-construct framework, the study offers a clearer explanation of the resource–capability–performance mechanism in a platform-based e-commerce context while preserving the original academic constructs of digital transformation strategy, digital culture, supply chain digitalization, supply chain resilience, and supply chain performance.

1. Introduction

Digital technologies have reshaped supply chain management by enabling faster information

Citation: Huang, Y. (2026). Strategic and Cultural Antecedents of Supply Chain Digitalization and Supply Chain Performance: The Mediating Role of Supply Chain Resilience in Chinese B2C E-Commerce. *The Journal of Interactive Social Sciences*, 2(4), 60–70.

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exchange, real-time visibility, process automation, and data-driven decision-making. In e-commerce, these capabilities are especially important because customer orders, inventory updates, logistics movements, and platform interactions occur continuously. Supply chain digitalization therefore extends beyond the adoption of individual digital tools. It concerns the integration of digital information and systems across supply chain activities so that firms can coordinate procurement, inventory, warehousing, fulfilment, logistics, and customer service more effectively (Liu & Chiu, 2021; Salamah et al., 2023).

Chinese B2C e-commerce provides a relevant context for examining this process. Platform-based merchants operate in an environment characterised by large transaction volumes, short product cycles, rapid demand shifts, frequent promotions, intensive logistics coordination, and strong customer expectations for speed and accuracy. The operational value of digitalization is therefore potentially high. However, access to digital infrastructure alone does not explain why some firms develop more integrated digital supply chains than others. Digital systems must be guided by strategic priorities and supported by organizational values that encourage data use, learning, collaboration, and openness to change.

This issue points to an important limitation in technology-centred explanations of supply chain digitalization. Existing research has often focused on digital technology adoption or technological readiness, yet digitalization is also shaped by organizational conditions. A firm may possess sophisticated digital systems while still experiencing fragmented processes if its digital initiatives are not aligned with business goals or if employees operate in functional silos. Conversely, a clear digital transformation strategy and a supportive digital culture can help firms integrate platform data, operational processes, and supply chain decisions. These two antecedents represent a concise strategic and cultural explanation of how supply chain digitalization is built.

A second unresolved issue concerns how supply chain digitalization contributes to supply chain performance. Digitalization can improve information visibility, coordination, responsiveness, and operational efficiency, but performance gains are not automatic. Firms must still be able to absorb operational shocks, respond to disruption, and recover while maintaining service continuity. This adaptive capacity is captured by supply chain resilience. In highly time-sensitive e-commerce operations, resilience may represent the mechanism through which digital information and coordination are transformed into stable delivery, inventory responsiveness, return handling, and customer fulfilment.

The present study therefore proposes a streamlined five-construct model. Digital transformation strategy and digital culture are positioned as antecedents of supply chain digitalization. Supply chain digitalization is expected to influence supply chain performance both directly and indirectly through supply chain resilience. The model is grounded in two theories. The Resource-Based View (RBV) explains why strategy and culture function as complementary organizational resources for building supply chain digitalization (Barney, 1991). Dynamic Capabilities Theory (DCT) explains how supply chain digitalization can support supply chain resilience and how resilience helps preserve supply chain performance under changing operating conditions (Teece et al., 1997).

The study makes three intended contributions. First, it provides a more focused antecedent model by concentrating on digital transformation strategy and digital culture rather than combining a large number of overlapping organizational and technological predictors. Second, it distinguishes

supply chain digitalization from supply chain resilience, clarifying the movement from an integrated digital operating capability to an adaptive capability. Third, it tests a direct and mediated route to supply chain performance within Chinese B2C e-commerce, a context in which digital connectivity and operational disruption coexist. The simplified model is theoretically parsimonious and empirically manageable while retaining the core academic constructs of the original research.

2. Theoretical Foundation and Hypothesis Development

2.1 Resource-Based View and Dynamic Capabilities Theory

The Resource-Based View argues that firms differ in performance because they possess heterogeneous resources and capabilities that vary in value, rarity, imitability, and substitutability (Barney, 1991). In digital transformation research, the RBV is useful because digital outcomes rarely depend on technology alone. Organizational resources such as strategic direction, culture, routines, managerial attention, and knowledge determine whether available digital technologies become integrated capabilities. Within the present model, digital transformation strategy and digital culture are treated as two complementary resources that support supply chain digitalization.

Digital transformation strategy provides direction for the allocation and coordination of digital resources. It links digital initiatives with business priorities and clarifies how processes should be redesigned. Digital culture, by contrast, provides the social and behavioural conditions for implementation. It shapes whether employees are willing to use data, collaborate across functions, experiment with new approaches, and accept changes in established routines. These resources are conceptually distinct but complementary. Strategic plans are difficult to implement in an unsupportive culture, while a digitally oriented culture may lack operational coherence without strategic direction.

Dynamic Capabilities Theory extends the RBV by emphasizing the ability of firms to integrate, reconfigure, and renew resources in response to changing conditions (Teece et al., 1997). This perspective is particularly useful for explaining the relationship between supply chain digitalization and supply chain resilience. Supply chain digitalization improves information availability, connectivity, and coordination. Supply chain resilience captures the ability to anticipate, absorb, respond to, and recover from disruptions. Digitalization can therefore be understood as an enabling capability, whereas resilience represents a higher-order adaptive capability that becomes especially important when firms must respond to operational shocks.

Combining the two theories produces a sequential logic. Strategic and cultural resources support the formation of supply chain digitalization; digitalization improves the firm's capacity to sense and coordinate; supply chain resilience transforms these advantages into adaptive responses; and both digitalization and resilience contribute to supply chain performance. This integrated resource–capability–performance sequence provides the theoretical basis for the six hypotheses developed below.

2.2 Digital Transformation Strategy and Supply Chain Digitalization

Digital transformation strategy refers to an organizational approach that guides the use of digital resources to redesign processes, improve coordination, and create value. In supply chain settings, digitalization affects multiple activities at the same time, including procurement, inventory management, warehousing, logistics, customer service, and platform operations. Without strategic alignment, different departments may adopt disconnected systems or rely on incompatible data

practices, limiting end-to-end visibility and integration. A coherent digital transformation strategy can reduce this fragmentation by defining priorities, investment directions, responsibilities, and expected operational outcomes (Tsou & Chen, 2023).

From an RBV perspective, digital transformation strategy is valuable because it coordinates other resources rather than operating as an isolated plan. For small and medium-sized B2C e-commerce merchants, where financial and managerial resources are often constrained, strategic clarity can determine whether digital initiatives remain piecemeal or become part of an integrated supply chain capability. A firm with a clearer digital transformation strategy should therefore be better positioned to connect platform data, supply chain processes, and managerial decisions.

H1: Digital transformation strategy has a positive impact on supply chain digitalization.

2.3 Digital Culture and Supply Chain Digitalization

Digital culture refers to shared organizational values and work practices that support the use of digital technologies, data-driven decision-making, collaboration, experimentation, and continuous learning (Proksch et al., 2024). It is distinct from digital technology because it reflects the social environment in which technology is interpreted and used. Firms may possess similar systems but obtain different outcomes depending on whether employees trust data, share information, learn from implementation problems, and cooperate across functional boundaries.

Supply chain digitalization requires such behaviours because supply chain processes extend across departments and external partners. Digital information creates value only when it is exchanged and acted upon. A culture that encourages transparency, cross-functional coordination, and learning can therefore make it easier to integrate digital systems into routine supply chain work. In Chinese B2C e-commerce, where operational decisions must frequently respond to changes in demand, promotions, fulfilment pressure, and platform requirements, a supportive digital culture should help firms use digital information more consistently and adaptively.

RBV treats organizational culture as a socially complex and path-dependent resource that may be difficult for competitors to imitate. This makes digital culture particularly relevant as an antecedent of supply chain digitalization because it affects not merely whether technology is adopted, but whether digital practices become embedded in everyday routines.

H2: Digital culture has a positive impact on supply chain digitalization.

2.4 Supply Chain Digitalization and Supply Chain Resilience

Supply chain digitalization is the systematic integration of digital technologies and information into supply chain processes. It includes the use of connected systems for real-time data capture, information sharing, process automation, tracking, analytics, and coordination across internal functions and external partners (Salamah et al., 2023). A capability-oriented understanding is important because firms gain value not from isolated digital tools but from the way those tools are embedded in routines and linked across operational activities.

Supply chain resilience refers to the ability of a supply chain to prepare for, absorb, respond to, and recover from disruptions while maintaining critical functions (Ponomarev & Holcomb, 2009). Digitalization can strengthen resilience by reducing information delays and improving the speed and quality of response. Real-time inventory data can reveal shortages earlier; logistics tracking can identify delays; customer and platform data can signal demand changes; and connected

systems can support faster coordination across functions.

This relationship is consistent with DCT because resilience depends on sensing, seizing, and reconfiguring. Digitalized supply chains improve sensing by providing timely information and improve reconfiguration by making coordination more immediate. In Chinese B2C e-commerce, where supply chains face demand surges, high return volumes, logistics delays, and platform changes, digital visibility can help firms recognize and respond to operational problems before they become more severe.

H3: Supply chain digitalization has a positive impact on supply chain resilience.

2.5 Supply Chain Resilience and Supply Chain Performance

Supply chain performance refers to the operational and strategic outcomes generated by supply chain activities, including responsiveness, order fulfilment, delivery reliability, inventory efficiency, service quality, and overall effectiveness. In e-commerce, these outcomes are closely connected because customers experience supply chain performance directly through product availability, delivery speed, order accuracy, return processing, and service continuity.

Resilience contributes to performance by reducing the operational consequences of disruption. A resilient supply chain is better able to reallocate resources, adjust inventory decisions, coordinate alternative responses, and restore normal operations. This ability is particularly important in e-commerce because disruptions can quickly affect customer satisfaction, platform ratings, and fulfilment costs. Firms with stronger supply chain resilience should therefore be better able to maintain stable performance when operating conditions change unexpectedly.

H4: Supply chain resilience has a positive impact on supply chain performance.

2.6 Supply Chain Digitalization and Supply Chain Performance

Supply chain digitalization may also contribute directly to supply chain performance. Integrated digital systems reduce information asymmetry and shorten the time between events and managerial responses. They can improve inventory accuracy, automate repetitive processes, increase order visibility, strengthen coordination, and support more consistent decision-making. These benefits are relevant even when firms are not experiencing major disruptions.

Prior research has associated digital supply chain integration with higher operational efficiency, stronger coordination, and improved performance (Liu & Chiu, 2021; Salamah et al., 2023). In B2C e-commerce, digitally connected orders, inventory, warehouses, logistics providers, and customer service functions can reduce errors and improve fulfilment speed. Therefore, supply chain digitalization is expected to have a direct positive relationship with supply chain performance in addition to its indirect effect through resilience.

H5: Supply chain digitalization has a positive impact on supply chain performance.

2.7 Mediating Role of Supply Chain Resilience

Although digitalization can directly improve routine efficiency, part of its performance value may emerge through the development of resilience. Digital systems make supply chain conditions more visible and allow faster information exchange, but firms still need adaptive capabilities to transform information into effective action. Supply chain resilience performs this bridging function by enabling firms to use digital information to absorb shocks, reorganize activities, and recover

from operational interruption.

This mediation argument also clarifies the distinction between information capability and adaptive capability. Digitalization can alert a firm to an inventory shortage or logistics delay, but resilience determines whether the firm can coordinate alternative sourcing, adjust fulfilment plans, communicate with customers, and restore service. The indirect route is therefore consistent with DCT because performance depends on the firm's ability to reconfigure resources rather than on the possession of information alone. In Chinese B2C e-commerce, where disruption and rapid change are common, the mediating role of supply chain resilience should be particularly relevant.

H6: Supply chain resilience mediates the relationship between supply chain digitalization and supply chain performance.

Table 1. Summary of Hypotheses

Hypothesis	Relationship	Expected effect
H1	Digital transformation strategy → Supply chain digitalization	Positive direct effect
H2	Digital culture → Supply chain digitalization	Positive direct effect
H3	Supply chain digitalization → Supply chain resilience	Positive direct effect
H4	Supply chain resilience → Supply chain performance	Positive direct effect
H5	Supply chain digitalization → Supply chain performance	Positive direct effect
H6	Supply chain digitalization → Supply chain resilience → Supply chain performance	Mediation

3. Methodology

3.1 Research Design and Population

The study adopts a quantitative, explanatory, cross-sectional survey design to examine the relationships among digital transformation strategy, digital culture, supply chain digitalization, supply chain resilience, and supply chain performance. A quantitative approach is appropriate because the model contains latent constructs measured through multiple indicators and specifies theoretically derived structural relationships that can be tested using PLS-SEM (Hair et al., 2022). Because the data are collected at one point in time, the structural relationships should be interpreted as empirical associations rather than definitive causal effects.

The unit of analysis is the firm-level supply chain operation of domestic B2C e-commerce merchants in mainland China. The study focuses on small and medium-sized merchants operating on major platforms such as Alibaba, JD.com, and Pinduoduo. B2B e-commerce, cross-border e-commerce, and traditional offline retail are excluded because their transaction structures and supply chain configurations differ from the platform-based domestic B2C context.

Eligible respondents are knowledgeable key informants who participate directly in supply chain or digital operations. They may include business owners, founders, senior managers, operations managers, supply chain managers, logistics managers, platform operations managers, warehouse or fulfilment managers, and IT or digital transformation managers. General employees

without direct involvement in supply chain or digital decision-making are excluded. The study targets approximately 300–400 valid responses, which provides an appropriate basis for evaluating a five-construct PLS-SEM model with direct and mediated relationships.

3.2 Measurement

All constructs are measured using multi-item scales adapted from established studies and revised to fit Chinese B2C e-commerce. The questionnaire uses a five-point Likert scale ranging from 1 = strongly disagree to 5 = strongly agree. The academic names of the constructs are retained without substitution: digital transformation strategy, digital culture, supply chain digitalization, supply chain resilience, and supply chain performance. If the questionnaire is administered in Chinese, translation and back-translation should be used to maintain semantic equivalence (Brislin, 1980).

Table 2. Construct Measurement Summary

Construct	Items	Primary source
Digital transformation strategy	3	Tsou & Chen (2023)
Digital culture	5	Proksch et al. (2024)
Supply chain digitalization	4	Salamah et al. (2023)
Supply chain resilience	3	Arif et al. (2023)
Supply chain performance	4	Salamah et al. (2023)

Digital transformation strategy captures the extent to which the firm has clearly defined digital priorities and aligned digital initiatives with organizational goals. Digital culture measures shared values that encourage data use, learning, experimentation, collaboration, and openness to digital change. Supply chain digitalization assesses the integration of digital information and systems across supply chain activities. Supply chain resilience measures the ability to anticipate, absorb, respond to, and recover from disruption. Supply chain performance reflects operational effectiveness, including responsiveness, fulfilment, reliability, inventory-related outcomes, and overall supply chain effectiveness.

The original questionnaire items should be retained as closely as possible when the empirical instrument is finalized because the validity of the constructs depends on preserving their conceptual meaning. Contextual wording can be adjusted to refer to platform operations, inventory, logistics, fulfilment, and digital coordination, but the construct names and underlying dimensions should remain unchanged.

3.3 Pilot Study and Data Collection

A pilot study was conducted with 35 respondents who met the general eligibility criteria of the target population. The pilot assessed item clarity, contextual relevance, and preliminary internal consistency. Cronbach's alpha values exceeded the commonly used 0.70 benchmark, providing initial support for the reliability of the adapted measures. Minor wording adjustments were used to improve clarity for the Chinese B2C e-commerce context.

For the main study, the questionnaire is distributed online to eligible respondents. Screening questions confirm that participating firms operate in domestic B2C e-commerce in mainland China

and that respondents have sufficient knowledge of supply chain and digital operations. Participation is voluntary. Responses with substantial missing data, implausibly short completion times, invariant response patterns, or other indicators of careless responding should be excluded before statistical analysis.

3.4 Data Analysis

PLS-SEM is proposed as the primary analytical method because the model contains multiple latent variables, several direct effects, and one mediating relationship. SmartPLS may be used for the measurement and structural model analysis, while SPSS may support initial data screening and descriptive statistics. The analysis begins with examination of missing values, response quality, outliers, descriptive statistics, and correlations among the main constructs.

For the reflective measurement model, indicator reliability is assessed through outer loadings. Internal consistency is evaluated using Cronbach's alpha and composite reliability. Convergent validity is assessed through average variance extracted (AVE), while discriminant validity is evaluated primarily using the heterotrait-monotrait ratio (HTMT), with the Fornell-Larcker criterion and cross-loadings used as supplementary evidence where appropriate (Fornell & Larcker, 1981; Hair et al., 2022).

The structural model is evaluated using collinearity diagnostics, path coefficients, coefficient of determination (R^2), effect size (f^2), and predictive relevance (Q^2). Bootstrapping with 10,000 resamples is used to generate t-values, p-values, and confidence intervals for the direct and indirect effects. H1–H5 are examined through the corresponding structural paths. H6 is assessed through the indirect effect from supply chain digitalization to supply chain performance via supply chain resilience. Mediation is supported when the bootstrapped confidence interval for the indirect effect excludes zero. Because the design is cross-sectional, a statistically significant indirect effect should be described as evidence of an indirect association rather than proof of temporal causal mediation.

Common method bias is considered because the variables are collected from the same respondent in a single survey. Procedural remedies include anonymity, clear instructions, separation of construct sections, and the use of knowledgeable key informants. Statistical diagnostics may include Harman's single-factor test and full-collinearity VIF assessment. These procedures provide evidence about the likelihood of common method bias but should not be treated as conclusive proof that method bias is absent.

4. Expected Theoretical Contributions

The simplified model offers a more parsimonious explanation of supply chain digitalization. Rather than combining a large number of antecedents, it focuses on two organizational resources that represent different but complementary mechanisms: digital transformation strategy provides direction and alignment, while digital culture provides the behavioural environment for implementation. This design allows the study to test whether strategic and cultural resources help explain variation in supply chain digitalization without overloading the model with conceptually adjacent predictors.

The model also contributes by separating supply chain digitalization from supply chain resilience. Digitalization improves information visibility and coordination, whereas resilience concerns the ability to adapt and recover. Treating these as different capabilities clarifies how digital

resources can be transformed into performance outcomes. The direct path from supply chain digitalization to supply chain performance captures routine operational benefits, while the mediated path through resilience captures an adaptive performance mechanism.

Finally, the model contextualizes the resource–capability–performance sequence in Chinese B2C e-commerce. This setting is theoretically useful because platform-based merchants rely heavily on digital information while simultaneously facing operational volatility. The proposed framework therefore provides a focused test of whether strategic alignment and digital culture support integrated supply chain digitalization and whether resilience helps convert that capability into performance.

5. Practical Implications

For managers, the model implies that improving supply chain digitalization should begin with organizational alignment rather than technology acquisition alone. Firms need a clear digital transformation strategy that defines how digital initiatives support supply chain objectives. At the same time, managers need to cultivate a digital culture that encourages data use, cross-functional coordination, learning, and openness to process change. The two conditions are complementary: strategy without cultural support may remain symbolic, while culture without strategic direction may produce fragmented initiatives.

The model also suggests that digitalization projects should be evaluated partly in terms of their contribution to supply chain resilience. Real-time dashboards, integrated order and inventory data, logistics tracking, and connected decision processes are most valuable when they improve a firm's ability to respond to disruptions and maintain continuity. Managers should therefore assess whether digitalization helps the firm detect risks earlier, coordinate responses faster, and recover with less impact on fulfilment and service.

For platform operators and policymakers, the framework indicates that support for small and medium-sized e-commerce merchants should extend beyond access to digital infrastructure. Training in strategic digital planning, data-based coordination, and resilience-oriented operations may help firms obtain greater value from existing platform tools and digital systems.

6. Limitations and Future Research

The study has several limitations. First, the cross-sectional design limits causal inference. Longitudinal research could examine whether improvements in digital transformation strategy and digital culture precede changes in supply chain digitalization and resilience. Second, the use of a single key informant may introduce perceptual bias. Future studies could combine survey data with objective performance measures or collect information from multiple respondents within the same firm.

Third, the model is intentionally parsimonious and focuses on five constructs. Future research may extend the framework by introducing additional organizational resources or contextual boundary conditions when theory and sample size justify a more complex specification. Fourth, the focus on domestic B2C merchants in mainland China limits direct generalization to B2B, cross-border e-commerce, large enterprises, or other national contexts. Comparative studies could test whether the five-construct model remains stable across platforms, industries, and countries.

7. Conclusion

This study proposes a concise five-construct framework for explaining supply chain digitalization and supply chain performance in Chinese B2C e-commerce. Digital transformation strategy and digital culture are positioned as organizational antecedents of supply chain digitalization. Supply chain digitalization is expected to improve supply chain performance directly and indirectly through supply chain resilience. The framework is grounded in the Resource-Based View and Dynamic Capabilities Theory and is operationalized through six hypotheses. By removing additional technological, human-resource, and environmental variables, the model becomes more theoretically focused and empirically manageable while preserving the original academic terminology of the retained constructs. The resulting design provides a clear basis for testing how strategic and cultural resources are converted into digital supply chain capability, adaptive resilience, and performance.

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