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Enterprise Informatics Capability and Manufacturing Supply Chain Resilience in the Digital Economy: The Roles of Information Transparency and Environmental Dynamism

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Abstract. This study examines how enterprise informatics capability influences manufacturing supply chain resilience in the context of the digital economy. Drawing on organizational information processing theory and contingency theory, a moderated mediation model is developed to investigate the mediating role of information transparency and the moderating role of environmental dynamism. Survey data collected from 316 supply chain managers and senior executives in Chinese manufacturing firms are analyzed using partial least squares structural equation modeling. The findings indicate that enterprise informatics capability has a significant positive effect on manufacturing supply chain resilience both directly and indirectly through information transparency. Information transparency partially mediates this relationship by serving as a key information-transmission mechanism. Environmental dynamism does not significantly moderate the direct effect of enterprise informatics capability on supply chain resilience; however, it positively moderates the indirect effect through information transparency, such that the mediating pathway becomes stronger in highly dynamic environments. The findings contribute to the enterprise informatics literature by clarifying the information-processing pathways through which informatics capability translates into supply chain resilience, and by identifying the boundary conditions under which these pathways operate. Practical implications for manufacturing managers seeking to strengthen supply chain resilience through informatics investment are discussed.

Keywords: Enterprise informatics, Supply chain resilience, Information transparency, Environmental dynamism, Manufacturing, Digital economy

1. Introduction

Manufacturing supply chains operate in an era defined by escalating uncertainty. Trade disputes, pandemic-induced disruptions, geopolitical tensions, and rapid technological change have exposed the fragility of global production networks, prompting both scholars and practitioners to seek mechanisms that enable supply chains to anticipate, withstand, and recover from adverse events. Sector-level evidence from BRICS fats and oils trade further shows that diversified sourcing, resilient trade corridors, and digitalized supply chain monitoring are needed to reduce supply chain security risks created by structural dependence and environmental pressures (Chu et al., 2025). Supply chain resilience, understood as the adaptive capability of a supply chain to prepare for, respond to, and recover from disruptions while maintaining continuity of operations, has thus emerged as a central concern in operations management and logistics research (Ponomarov and Holcomb, 2009; Chowdhury and Quaddus, 2017). Within the field of enterprise informatics and logistics science, a growing body of work recognizes that information technology constitutes a foundational enabler of such resilience, yet the specific pathways through which enterprise-level informatics capability strengthens supply chain resilience remain insufficiently understood.

The digital economy has accelerated manufacturing firms' adoption of enterprise information systems, data analytics platforms, and integrated supply chain management technologies. The combined technologies constitute what this study terms enterprise informatics capability: the organizational ability to acquire, process, integrate, and disseminate supply chain information through digital infrastructure. Prior studies have established that supply chain digitalization positively affects supply chain performance and agility (Zhao et al., 2023; Zhou et al., 2023; Tetteh and Kwateng, 2026). Several investigations have further linked information technology capability to supply chain resilience (Jayasinghe et al., 2026; Pan et al., 2025). Three gaps in this literature, however, motivate the present research. Existing studies predominantly examine the direct relationship between digitalization and resilience without unpacking the intermediate mechanisms through which informatics capability is converted into resilient outcomes. A related enterprise informatics study of Chinese technology-based firms shows that process quality partly explains how informatics capabilities are converted into innovation management effectiveness, which supports the need to examine conversion mechanisms beyond direct effects (Xue et al., 2026). A related gap concerns information transparency. The degree to which supply chain partners can access accurate and timely information about material flows, demand signals, and risk indicators represents a theoretically plausible but empirically underexplored mediating mechanism in this relationship. The boundary conditions that amplify or attenuate the informatics-resilience link have also received limited empirical attention, particularly the role of environmental dynamism as a contingency factor. Related evidence from UAE firms shows that supply chain complexity weakens the resilience effect of insurance adequacy, reinforcing the view that resilience mechanisms depend on structural conditions (AlSheikh and Morshed, 2025).

To address these gaps, this study examines the direct effect of enterprise informatics capability on manufacturing supply chain resilience, tests whether information transparency mediates this relationship by functioning as an information-transmission mechanism, and investigates whether environmental dynamism moderates both the direct effect and the indirect effect through information transparency. Organizational information processing theory provides the primary theoretical lens: it posits that organizational effectiveness depends on the fit between information-processing demands imposed by the environment and the information-processing capacity supplied by organizational structures and technologies (Galbraith, 1974; Tushman and Nadler, 1978). Contingency theory complements this perspective by specifying that the strength of the informatics-resilience relationship is contingent on the level of environmental dynamism firms face (Donaldson, 2001). A survey-based research design is employed, collecting data from supply chain managers and senior executives in Chinese manufacturing firms and analyzing the proposed model with partial least squares structural equation modeling.

The study contributes to the enterprise informatics and supply chain management literature in three ways. The theoretical understanding of information-processing pathways linking enterprise informatics capability to supply chain resilience is advanced by extending organizational information processing theory into the supply chain resilience domain. Information transparency is identified as a key mediating mechanism, clarifying how informatics capability translates into resilient supply chain outcomes rather than simply coexisting with them. The contingent role of environmental dynamism is also examined, and the finding that the indirect pathway through information transparency is more salient in volatile environments provides differentiated guidance for managers operating under varying levels of external uncertainty.

2. Literature Review and Hypotheses

2.1 Enterprise Informatics Capability and Supply Chain Resilience

Enterprise informatics capability refers to a firm's integrated ability to apply information technologies for acquiring, processing, storing, and sharing supply chain-related data and knowledge across organizational boundaries. Enterprise informatics capability encompasses the technological infrastructure, including enterprise resource planning systems, supply chain management platforms, and real-time data analytics tools. It also encompasses the organizational routines that enable effective utilization of these technologies in supply chain decision-making (Lu and Ramamurthy, 2011). Majali et al. (2026) provide supply chain evidence from Jordanian firms that information technology capability improves supply chain performance and mediates the effect of green HRM practices, indicating that digital capability can convert organizational routines into operational outcomes. Unlike narrower constructs such as IT investment or digital adoption, enterprise informatics capability captures the systemic integration of technology, processes, and human expertise that collectively determine an organization's information-processing power in supply chain contexts. Simanjuntak et al. (2025) similarly show that digital environmental management accounting systems operate as informatics-enabled service platforms that improve environmental service performance and logistics efficiency in manufacturing supply chains.

Supply chain resilience in the manufacturing sector denotes the capacity of a manufacturing supply chain to anticipate potential disruptions, adapt rapidly when disruptions occur, and recover to its original or improved operational state (Ponomarov and Holcomb, 2009). Manufacturing supply chains are particularly susceptible to disruptions because of their reliance on complex, multi-tier supplier networks and just-in-time production philosophies, making resilience a strategic imperative for manufacturing firms operating in the digital economy.

Organizational information processing theory offers a coherent explanation for why enterprise informatics capability should enhance supply chain resilience. According to this theory, organizations must match their information-processing capacity to the information-processing demands generated by task uncertainty and interdependence (Galbraith, 1974). In supply chain contexts, disruptions create sudden spikes in information-processing demands: firms must rapidly identify the source and scope of the disruption, assess its cascading effects across the supply network, and coordinate response actions with multiple partners. Enterprise informatics capability directly augments a firm's capacity to meet these demands by enabling real-time visibility into supply chain operations, facilitating rapid data aggregation and analysis, and supporting coordinated decision-making across supply chain nodes (Pan et al., 2025). Empirical evidence supports this reasoning. Zhao et al. (2023) found that supply chain digitalization enhances resilience through absorptive, response, and recovery capabilities in Chinese manufacturing firms. Jum'a et al. (2025) showed that supply chain digitalization positively influences supply chain resilience among Jordanian manufacturers. Jayasinghe et al. (2026) reported that IT capability is a significant predictor of supply chain resilience in the apparel manufacturing sector. Ahmed et al. (2025) found that both digital technologies and digital capabilities positively affect supply

chain resilience through digital agility in small and medium-sized manufacturing enterprises. In a study of 408 Portuguese manufacturing firms, Gomes and Silva (2025) showed that supply chain digitalization contributes to resilience through triple-A capabilities of adaptability and alignment. Stentoft et al. (2025) further confirmed the positive association between digitalized manufacturing and operational performance, with supply chain resilience mediating this relationship among Danish manufacturers. Kumar et al. (2024) showed that supply chain digitalization and viability provide necessary resources to develop capabilities for managing risk and resilience in manufacturing contexts. Singh et al. (2023) reported that digital twins have a considerable positive effect on supply chain sustainability through the mediating role of supply chain resilience and performance in the manufacturing sector.

Based on the above discussion, this study proposes the following hypothesis:

H1: Enterprise informatics capability has a significant positive effect on manufacturing supply chain resilience.

2.2 The Mediating Role of Information Transparency

Information transparency refers to the extent to which supply chain members have access to and share accurate, timely, and comprehensive information regarding demand forecasts, inventory levels, production schedules, logistics status, and risk indicators across the supply chain network (Williams et al., 2013). A transparent information environment is one in which relevant data flows freely among supply chain partners, reducing information asymmetry and enabling collective sense-making. Amoako et al. (2026) further conceptualize digital and AI-enabled supply chain transparency as a mechanism that reduces information asymmetry and builds trust in service ecosystems.

Enterprise informatics capability is expected to enhance information transparency through several interconnected mechanisms. Information systems such as enterprise resource planning platforms, supply chain control towers, and cloud-based data-sharing portals create standardized channels for information exchange among supply chain partners. Real-time monitoring and tracking technologies increase the visibility of material and information flows throughout the supply network. Data integration capabilities enable firms to consolidate fragmented information from multiple sources into coherent, accessible formats that support inter-organizational transparency (Zhou et al., 2023). Firms with stronger informatics capability are therefore better positioned to establish and maintain high levels of information transparency across their supply chains.

Based on the above discussion, this study proposes the following hypothesis:

H2a: Enterprise informatics capability has a significant positive effect on information transparency.

Information transparency, in turn, is expected to strengthen supply chain resilience. When supply chain partners operate in a transparent information environment, they can detect early warning signals of potential disruptions more effectively, reducing the time lag between disruption onset and organizational response. Transparent information flows also facilitate coordinated decision-making during disruptions: partners who share real-time information about inventory positions, capacity constraints, and alternative sourcing options can jointly develop and execute recovery plans more efficiently than partners operating under information asymmetry (Scholten and Schilder, 2015). Zhang and Ma (2026) provided empirical evidence that information transparency serves as a significant channel through which data assets improve supply chain resilience among Chinese listed companies. Zhou et al. (2023) showed that supply chain traceability, a closely related construct capturing information visibility across supply chain tiers, mediates the relationship between supply chain digitalization and supply chain performance. Latan et al. (2024) found that supply chain transparency mediates the relationship between blockchain technology adoption and supply chain performance in Indonesian manufacturing firms. Wang et al. (2026) examined the role of supply chain transparency in UK manufacturing firms and found that transparency mediates the relationship between supply chain

digitalization and resilience; notably, their study also identified a negative moderating effect of transparency, indicating that the role of transparency in the digitalization-resilience link can be more complex than a simple positive mediation. Al Tera et al. (2024) reported that supply chain visibility, a concept closely related to information transparency, mediates the effect of supply chain digitalization on firm performance among Turkish manufacturers, with the mediation effect being stronger under conditions of high supply chain survivability.

Based on the above discussion, this study proposes the following hypothesis:

H2b: Information transparency has a significant positive effect on manufacturing supply chain resilience.

Integrating H2a and H2b within the organizational information processing framework yields a mediation argument. Enterprise informatics capability represents the input side of the information-processing equation, providing the technological and organizational infrastructure for generating, processing, and distributing supply chain information. Information transparency represents the output side: the realized state of information accessibility and visibility that results from effective information processing. Supply chain resilience is the organizational outcome that benefits from this enhanced information state. The mediating pathway thus follows the logic that informatics capability enables transparency, and transparency in turn enables resilience. This information-transmission mechanism suggests that enterprise informatics capability does not enhance resilience solely through direct operational improvements; rather, a substantial portion of its resilience-enhancing effect operates through the creation of a more transparent information environment.

Based on the above discussion, this study proposes the following hypothesis:

H2c: Information transparency mediates the relationship between enterprise informatics capability and manufacturing supply chain resilience.

2.3 The Moderating Role of Environmental Dynamism

Environmental dynamism refers to the rate and unpredictability of change in a firm's external environment, encompassing shifts in technology, customer preferences, competitive actions, and regulatory conditions (Dess and Beard, 1984; Jaworski and Kohli, 1993). In highly dynamic environments, the frequency and magnitude of supply chain disruptions tend to increase, and the nature of disruptions becomes less predictable, intensifying the information-processing demands placed on supply chain participants. Qualitative evidence from Malaysian manufacturers shows that freight-rate volatility has become a structural feature of maritime logistics and that AI forecasting and blockchain documentation support more proactive service coordination under such volatility (Weerasekara et al., 2026).

Contingency theory posits that the effectiveness of organizational capabilities is contingent upon the environmental context in which they operate (Donaldson, 2001). Applied to the present research model, this theoretical perspective suggests that the strength of the relationship between enterprise informatics capability and supply chain resilience may vary across different levels of environmental dynamism. In stable environments, supply chain disruptions are relatively infrequent and predictable, and firms can rely on established routines and buffer inventories to maintain resilience. Under such conditions, the marginal contribution of enterprise informatics capability to resilience may be limited because information-processing demands remain within manageable bounds. In highly dynamic environments, by contrast, the volume, velocity, and variety of information that firms must process to maintain supply chain resilience increase substantially. Firms with strong informatics capability are better equipped to meet these elevated demands, suggesting that the resilience-enhancing effect of informatics capability should be more pronounced under high environmental dynamism. Jum'a et al. (2025) found that environmental dynamism significantly moderates the relationship between supply chain digitalization and supply chain performance in manufacturing firms. Stentoft et al. (2025)

identified a positive moderating effect of demand uncertainty on the relationship between digitalized manufacturing and operational performance, providing additional evidence that environmental volatility conditions shape the effectiveness of digital capabilities. Song et al. (2022), drawing on dynamic capability perspective and contingency theory, identified government policies, risk management culture, and trust as contingency factors that moderate the logistics capability-supply chain resilience relationship, reinforcing the theoretical argument that environmental and institutional conditions serve as boundary factors for capability-resilience links.

Based on the above discussion, this study proposes the following hypothesis:

H3: Environmental dynamism positively moderates the relationship between enterprise informatics capability and manufacturing supply chain resilience, such that the positive effect is stronger under high environmental dynamism.

2.4 The Moderated Mediation Effect

Combining the mediation and moderation arguments yields a moderated mediation hypothesis. The indirect effect of enterprise informatics capability on supply chain resilience through information transparency is expected to vary across levels of environmental dynamism. In highly dynamic environments, the value of information transparency for supply chain resilience is amplified: when market conditions shift rapidly and unpredictably, the ability to access and share real-time, accurate information across the supply chain becomes a more decisive factor in enabling collective sense-making, coordinated response, and rapid recovery. The information-processing demands generated by environmental dynamism elevate the importance of the transparency mechanism. Under low dynamism, by contrast, the baseline level of information exchange may suffice for maintaining resilience, reducing the incremental contribution of the informatics-capability-to-transparency pathway.

Organizational information processing theory and contingency theory jointly support this reasoning. Environmental dynamism increases the gap between information-processing demands and the capacity provided by routine organizational mechanisms. Enterprise informatics capability closes this gap by producing higher information transparency, and the resilience benefit of that transparency grows as the information-processing gap widens. The conditional indirect effect should therefore be stronger at higher levels of environmental dynamism.

Based on the above discussion, this study proposes the following hypothesis:

H4: Environmental dynamism positively moderates the indirect effect of enterprise informatics capability on manufacturing supply chain resilience through information transparency, such that the indirect effect is stronger under high environmental dynamism.

The complete research model integrating all hypothesized relationships is presented in Figure 1.

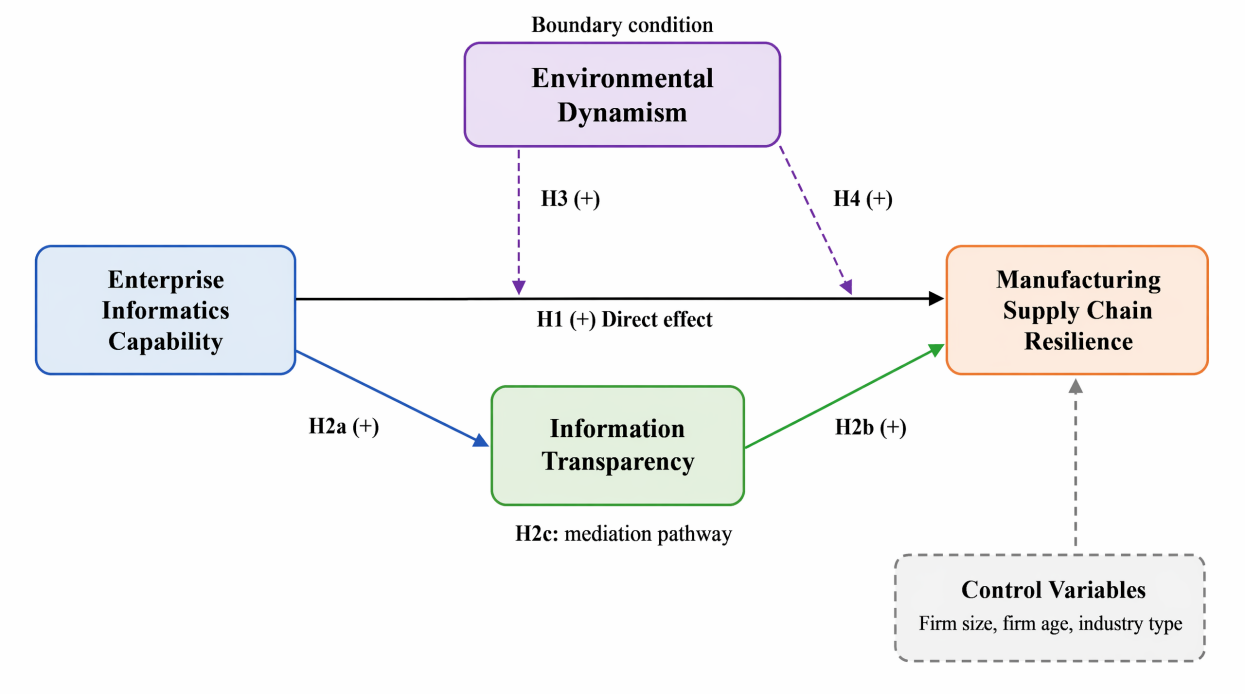


Fig.1: Research Model

The research model depicts enterprise informatics capability as the independent variable, manufacturing supply chain resilience as the dependent variable, information transparency as the mediating variable, and environmental dynamism as the moderating variable. H1 represents the direct path from enterprise informatics capability to supply chain resilience. H2a represents the path from enterprise informatics capability to information transparency, and H2b represents the path from information transparency to supply chain resilience; together they form the mediated pathway tested in H2c. H3 represents the moderating effect of environmental dynamism on the direct path. H4 represents the moderating effect of environmental dynamism on the indirect path through information transparency. Control variables including firm size, firm age, and industry type are linked to the dependent variable.

3. Research Methodology

3.1 Research Design

This study adopts a quantitative research design based on a cross-sectional survey. The target population consists of middle and senior managers, supply chain directors, and information technology managers in Chinese manufacturing firms. China represents an appropriate research context for three reasons: it is the largest manufacturing economy worldwide and hosts extensive, multi-tier supply chain networks that face significant disruption risks; its digital economy has expanded rapidly, with enterprise informatics adoption accelerating across the manufacturing sector; and the diversity of its manufacturing industries, ranging from electronics and automotive to machinery and textiles, provides sufficient variation in both informatics capability and environmental conditions to test the proposed model.

3.2 Sample and Data Collection

Data were collected through a structured online questionnaire distributed between September and November 2025. The questionnaire was administered via the Wenjuanxing platform and supplemented by targeted distribution through industry associations and professional networks in manufacturing clusters in the Yangtze River Delta, Pearl River Delta, and Bohai Economic Rim regions. Respondents were required to hold managerial positions with direct involvement in or oversight of supply chain

operations or information systems management, ensuring that they possessed sufficient knowledge to evaluate the constructs under investigation.

A total of 412 questionnaires were distributed. After removing responses with excessive missing data, uniform response patterns, or completion times below three minutes, 316 valid responses were retained, yielding an effective response rate of 76.7 percent. Table 1 summarizes the sample demographics.

Table 1. Sample Demographics (N = 316)

Characteristic	Category	Frequency	Percentage
Industry type	Electronics and electrical equipment	78	24.7
	Automotive and transportation equipment	52	16.5
	Machinery and metal products	61	19.3
	Chemical and pharmaceutical	43	13.6
	Textile and apparel	35	11.1
	Food and beverage	27	8.5
	Other manufacturing	20	6.3
Firm size (employees)	Fewer than 100	38	12.0
	100 to 499	97	30.7
	500 to 999	84	26.6
	1000 to 4999	62	19.6
	5000 or more	35	11.1
Firm age (years)	Fewer than 5	29	9.2
	5 to 10	68	21.5
	11 to 20	112	35.4
	More than 20	107	33.9
Respondent position	Senior executive or general manager	41	13.0
	Supply chain or logistics director	89	28.2
	Operations or production manager	72	22.8
	IT or information systems manager	67	21.2
	Other managerial role	47	14.9

The sample covers a broad range of manufacturing sub-industries, firm sizes, and respondent positions. The majority of respondent firms have been established for more than ten years (69.3 percent) and employ between 100 and 4999 workers (76.9 percent), indicating that the sample primarily captures established manufacturing enterprises with meaningful supply chain operations. Nonresponse bias was assessed by comparing early and late respondents on key demographic variables using independent-sample t-tests; no significant differences were found, suggesting that nonresponse bias is unlikely to be a substantial concern.

3.3 Measurement

All constructs were measured using multi-item scales adapted from established instruments in the supply chain management and information systems literature. A seven-point Likert scale ranging from 1 (strongly disagree) to 7 (strongly agree) was used for all reflective items. The questionnaire was originally developed in English, translated into Chinese by two bilingual researchers, and back-translated by an independent translator to verify semantic equivalence. A pilot study with 45

respondents from manufacturing firms was conducted to assess item clarity and preliminary reliability; minor wording adjustments were made based on pilot feedback.

Enterprise informatics capability was measured with six items adapted from Lu and Ramamurthy (2011) and Bharadwaj (2000). The items assess the firm's capability in data integration across supply chain partners, real-time information monitoring of supply chain operations, analytical processing of supply chain data for decision support, digital infrastructure supporting inter-organizational information exchange, systematic management of supply chain knowledge and information assets, and responsiveness of information systems to emerging supply chain information needs.

Information transparency was measured with five items adapted from Williams et al. (2013) and Zhu and Sarkis (2004). The items capture the extent to which the firm and its supply chain partners share accurate demand and supply information in a timely manner, maintain visibility of inventory levels and logistics status across the network, provide open access to relevant production and quality data, exchange risk-related information proactively, and use standardized formats and systems for cross-organizational information sharing.

Environmental dynamism was measured with four items adapted from Jaworski and Kohli (1993) and Jansen et al. (2006). The items assess the rate of change in customer preferences and demand patterns in the firm's primary market, the frequency of new product or technology introductions by competitors, the speed of change in production technologies and processes in the industry, and the unpredictability of competitive actions and market conditions.

Manufacturing supply chain resilience was measured with six items adapted from Ponomarov and Holcomb (2009) and Chowdhury and Quaddus (2017). The items evaluate the supply chain's ability to anticipate potential disruptions before they occur, respond rapidly to supply chain disruptions when they arise, recover to normal operational performance after a disruption, adapt supply chain configurations to changing circumstances, maintain acceptable service levels during disruption periods, and learn from past disruptions to improve future preparedness.

Control variables included firm size (measured as the natural logarithm of the number of employees), firm age (measured as the number of years since establishment), and industry type (coded as dummy variables representing the seven industry categories in the sample).

Table 2 provides a summary of all measurement items and their sources.

Table 2. Measurement Items and Sources

Construct	Code	Item Description	Source
Enterprise Informatics Capability	EIC1	Our firm effectively integrates data across supply chain partners through digital systems	Lu and Ramamurthy (2011); Bharadwaj (2000)
	EIC2	Our firm monitors supply chain operations in real time using information technology	
	EIC3	Our firm uses analytical tools to process supply chain data for decision support	
	EIC4	Our digital infrastructure supports seamless information exchange with supply chain partners	
	EIC5	Our firm systematically manages supply chain knowledge and information assets	
	EIC6	Our information systems respond quickly to emerging supply chain information needs	
Information Transparency	IT1	Our firm and supply chain partners share accurate demand and supply information in a timely manner	Williams et al. (2013); Zhu and Sarkis (2004)
	IT2	Inventory levels and logistics status are visible across our supply chain network	
	IT3	Relevant production and quality data are openly accessible to supply chain partners	

Environmental Dynamism	IT4	Risk-related information is proactively exchanged among supply chain members	Jaworski and Kohli (1993); Jansen et al. (2006)
	IT5	Standardized formats and systems are used for cross-organizational information sharing	
	ED1	Customer preferences and demand patterns in our market change rapidly	
	ED2	Competitors frequently introduce new products or technologies in our industry	
	ED3	Production technologies and processes in our industry evolve at a fast pace	
	ED4	Competitive actions and market conditions in our industry are difficult to predict	
Supply Chain Resilience	SCR1	Our supply chain can anticipate potential disruptions before they occur	Ponomarov and Holcomb (2009); Chowdhury and Quaddus (2017)
	SCR2	Our supply chain responds rapidly to disruptions when they arise	
	SCR3	Our supply chain recovers to normal performance levels quickly after a disruption	
	SCR4	Our supply chain adapts its configuration to changing circumstances effectively	
	SCR5	Our supply chain maintains acceptable service levels during disruption periods	
	SCR6	Our supply chain learns from past disruptions to improve future preparedness	

3.4 Data Analysis Method

The proposed research model was tested using partial least squares structural equation modeling (PLS-SEM) with SmartPLS 4.0 software. PLS-SEM was selected for several reasons. It accommodates complex models involving mediation and moderation simultaneously. It imposes fewer distributional assumptions on the data compared to covariance-based SEM, making it suitable for survey data that may not follow a multivariate normal distribution. It performs well with moderate sample sizes relative to model complexity. PLS-SEM has also been widely adopted in recent supply chain and information systems research published in journals within the JLISS domain (Ma et al., 2025; Pan et al., 2025; Jum'a et al., 2025).

The analysis followed a two-stage approach recommended by Hair et al. (2019). The first stage evaluated the measurement model by examining indicator reliability (outer loadings), internal consistency reliability (Cronbach's alpha and composite reliability), convergent validity (average variance extracted), and discriminant validity (Fornell-Larcker criterion and heterotrait-monotrait ratio). The second stage assessed the structural model by examining path coefficients, coefficient of determination (R-squared), predictive relevance (Q-squared via blindfolding), and effect sizes (f-squared). Mediation effects were tested using the bootstrap procedure with 5000 resamples to construct bias-corrected confidence intervals for indirect effects. The moderation effect was tested by introducing the interaction term between enterprise informatics capability and environmental dynamism. The moderated mediation effect (H4) was evaluated by comparing conditional indirect effects at one standard deviation above and below the mean of environmental dynamism.

3.5 Common Method Bias

Because data for both independent and dependent variables were collected from the same respondents using the same instrument, common method bias was a potential concern. Several procedural and statistical remedies were employed to mitigate this risk. Procedurally, respondents were assured of anonymity and confidentiality, items for different constructs were presented in randomized order, and the questionnaire included reverse-coded items and attention-check questions. Statistically, Harman's single-factor test was conducted: an unrotated exploratory factor analysis of all measurement items

yielded a first factor that accounted for 31.4 percent of the total variance, well below the 50 percent threshold. In addition, the variance inflation factor values for the inner model were examined following the approach of Kock (2015); all VIF values were below 3.3, indicating that common method bias is unlikely to be a significant issue in the present dataset.

4. Results

4.1 Descriptive Statistics and Correlations

Table 3 presents the means, standard deviations, and Pearson correlation coefficients for all study variables. Enterprise informatics capability, information transparency, environmental dynamism, and supply chain resilience exhibited mean values ranging from 4.23 to 4.87 on the seven-point scale, indicating moderate-to-high levels across the sample. All focal variables were positively and significantly correlated with one another, providing preliminary support for the hypothesized relationships. The correlation between enterprise informatics capability and supply chain resilience was 0.51, and the correlation between information transparency and supply chain resilience was 0.54. These values are below 0.70, suggesting that multicollinearity is not a concern at the construct level.

Table 3. Descriptive Statistics and Correlation Matrix (N = 316)

Variable	Mean	SD	1	2	3	4	5	6
1. Enterprise Informatics Capability	4.72	1.08	0.82					
2. Information Transparency	4.53	1.14	0.49	0.80				
3. Environmental Dynamism	4.87	1.03	0.31	0.28	0.83			
4. Supply Chain Resilience	4.61	1.11	0.51	0.54	0.33	0.81		
5. Firm Size (ln)	6.14	1.52	0.22	0.18	0.09	0.20	—	
6. Firm Age	15.37	8.64	0.16	0.13	0.07	0.14	0.38	—

Note: All correlations between focal variables are significant at the 0.01 level.

4.2 Measurement Model Assessment

The measurement model was evaluated for indicator reliability, internal consistency reliability, convergent validity, and discriminant validity. Table 4 presents the results.

All outer loadings exceeded 0.70, confirming acceptable indicator reliability. Cronbach's alpha values ranged from 0.84 to 0.90, and composite reliability values ranged from 0.88 to 0.92, both surpassing the 0.70 threshold for internal consistency. Average variance extracted values ranged from 0.63 to 0.69, exceeding the 0.50 minimum required for convergent validity (Hair et al., 2019).

Table 4. Measurement Model Results

Construct	Item	Loading	Cronbach's Alpha	CR	AVE
Enterprise Informatics Capability	EIC1	0.81	0.90	0.92	0.67
	EIC2	0.84			
	EIC3	0.82			
	EIC4	0.80			
	EIC5	0.83			

	EIC6	0.81			
	IT1	0.79	0.87	0.90	0.64
	IT2	0.82			
Information Transparency	IT3	0.80			
	IT4	0.78			
	IT5	0.81			
	ED1	0.83	0.86	0.90	0.69
	ED2	0.85			
Environmental Dynamism	ED3	0.82			
	ED4	0.81			
	SCR1	0.79	0.89	0.92	0.65
	SCR2	0.83			
	SCR3	0.81			
Supply Chain Resilience	SCR4	0.80			
	SCR5	0.82			
	SCR6	0.78			

Note: CR = composite reliability. AVE = average variance extracted.

Discriminant validity was evaluated using the Fornell-Larcker criterion and the heterotrait-monotrait (HTMT) ratio. As shown in Table 3, the square root of the AVE for each construct (bold diagonal values) exceeded its correlations with all other constructs, satisfying the Fornell-Larcker criterion. Table 5 reports the HTMT values; all values were below 0.85, confirming adequate discriminant validity (Henseler et al., 2015).

Table 5. Discriminant Validity: Heterotrait-Monotrait Ratio

Construct	1	2	3	4
1. Enterprise Informatics Capability				
2. Information Transparency	0.56			
3. Environmental Dynamism	0.36	0.33		
4. Supply Chain Resilience	0.57	0.62	0.38	

Note: All HTMT values are below the 0.85 threshold.

4.3 Structural Model and Hypothesis Testing

Before assessing the structural model, collinearity among predictor constructs was examined. All inner variance inflation factor values ranged from 1.12 to 1.47, well below the threshold of 5.0, indicating that collinearity does not distort the structural estimates.

The structural model explained 47.3 percent of the variance in supply chain resilience (R-squared = 0.473) and 28.6 percent of the variance in information transparency (R-squared = 0.286). The Stone-Geisser Q-squared values obtained through blindfolding were 0.29 for supply chain resilience and 0.17 for information transparency, both exceeding zero and confirming adequate predictive relevance.

Table 6 presents the path coefficients, standard errors, t-values, and exact p-values for all hypothesized relationships.

Table 6. Structural Model Results

Hypothesis	Path	Beta	SE	t	p	Decision
H1	Enterprise Informatics Capability to Supply Chain Resilience	0.26	0.05	5.20	< .001	Supported
H2a	Enterprise Informatics Capability to Information Transparency	0.47	0.05	9.40	< .001	Supported
H2b	Information Transparency to Supply Chain Resilience	0.36	0.05	7.20	< .001	Supported
H3	Enterprise Informatics Capability x Environmental Dynamism to Supply Chain Resilience	0.06	0.05	1.20	.231	Not supported

Note: N = 316. Bootstrap resamples = 5000. Control variables (firm size, firm age, industry type) are included in the model. Firm size had a significant positive effect on supply chain resilience (beta = 0.09, SE = 0.04, t = 2.25, p = .025). Firm age and industry type did not reach significance.

H1 was supported: enterprise informatics capability exerted a significant positive direct effect on supply chain resilience (beta = 0.26, SE = 0.05, t = 5.20, p less than .001). H2a was supported: enterprise informatics capability had a strong positive effect on information transparency (beta = 0.47, SE = 0.05, t = 9.40, p less than .001). H2b was supported: information transparency positively influenced supply chain resilience (beta = 0.36, SE = 0.05, t = 7.20, p less than .001). H3 was not supported: the interaction between enterprise informatics capability and environmental dynamism did not significantly predict supply chain resilience (beta = 0.06, SE = 0.05, t = 1.20, p = .231), indicating that environmental dynamism does not moderate the direct effect.

4.4 Mediation Analysis

The mediation effect of information transparency (H2c) was tested using the bootstrap procedure with 5000 resamples. Table 7 reports the results.

Table 7. Mediation Analysis Results

Path	Indirect Effect	SE	95 Percent CI Lower	95 Percent CI Upper	Significant
Enterprise Informatics Capability to Information Transparency to Supply Chain Resilience	0.17	0.03	0.11	0.23	Yes

Note: N = 316. Bootstrap resamples = 5000. CI = bias-corrected confidence interval.

The indirect effect of enterprise informatics capability on supply chain resilience through information transparency was 0.17 (SE = 0.03), with a 95 percent bias-corrected confidence interval of [0.11, 0.23] that does not include zero. This result confirms that information transparency significantly mediates the relationship between enterprise informatics capability and supply chain resilience, supporting H2c. Given that the direct effect (beta = 0.26) remains significant after including the mediator, the mediation is partial rather than full. The indirect effect accounts for approximately 39.5 percent of the total effect (0.17 / 0.43), indicating that information transparency serves as a substantive, though not exclusive, information-transmission mechanism.

4.5 Moderation and Moderated Mediation Analysis

Although H3 was not supported, indicating that environmental dynamism does not moderate the direct path, the moderated mediation hypothesis (H4) was tested separately by examining whether environmental dynamism moderates the indirect path through information transparency. Specifically, the interaction between environmental dynamism and information transparency on supply chain

resilience was examined, as the moderated mediation operates through the second stage of the mediation pathway.

The interaction term between information transparency and environmental dynamism had a significant positive effect on supply chain resilience (beta = 0.12, SE = 0.05, t = 2.40, p = .017), indicating that environmental dynamism strengthens the relationship between information transparency and supply chain resilience. Table 8 presents the conditional indirect effects at different levels of environmental dynamism.

Table 8. Conditional Indirect Effects at Different Levels of Environmental Dynamism

Level of Environmental Dynamism	Indirect Effect	SE	95 Percent CI Lower	95 Percent CI Upper	Significant
Low (Mean minus 1 SD)	0.11	0.04	0.04	0.19	Yes
Mean	0.17	0.03	0.11	0.23	Yes
High (Mean plus 1 SD)	0.23	0.04	0.15	0.31	Yes

Note: N = 316. Bootstrap resamples = 5000. CI = bias-corrected confidence interval. The index of moderated mediation was 0.06 (SE = 0.03, 95 percent CI = [0.01, 0.12]), which does not include zero, confirming a significant moderated mediation effect.

The conditional indirect effect was significant at all three levels of environmental dynamism, but its magnitude increased from 0.11 under low dynamism to 0.23 under high dynamism. The index of moderated mediation was 0.06 with a 95 percent confidence interval of [0.01, 0.12] that does not include zero, providing statistical confirmation of the moderated mediation effect. H4 was therefore supported: environmental dynamism positively moderates the indirect effect of enterprise informatics capability on supply chain resilience through information transparency.

Figure 2 illustrates the moderating effect of environmental dynamism on the relationship between information transparency and supply chain resilience. The graph plots supply chain resilience on the vertical axis against information transparency (low versus high) on the horizontal axis, with separate lines for low and high environmental dynamism. The slope for the high dynamism group is steeper than the slope for the low dynamism group, visually confirming that the positive effect of information transparency on supply chain resilience is stronger when environmental dynamism is high.

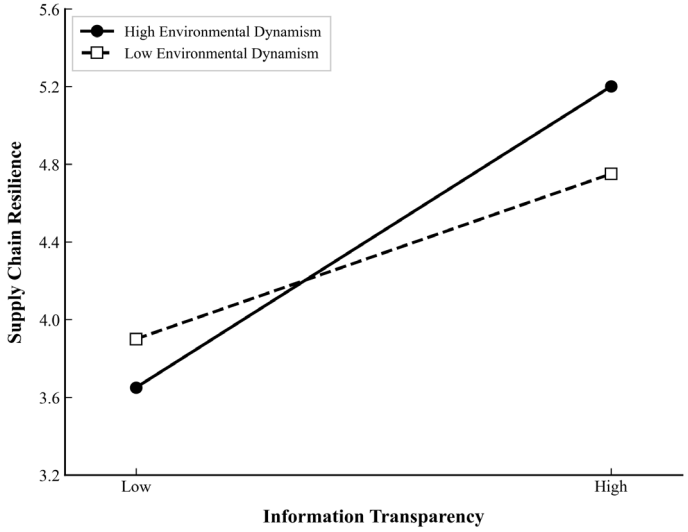


Fig.2: Moderating Effect of Environmental Dynamism on the Relationship between Information Transparency and Supply Chain Resilience

The figure displays two lines representing the relationship between information transparency and supply chain resilience at high (one standard deviation above the mean) and low (one standard deviation below the mean) levels of environmental dynamism. Both lines have positive slopes, but the line for high environmental dynamism has a steeper slope, indicating a stronger positive relationship between information transparency and supply chain resilience under conditions of high environmental dynamism.

A summary of all hypothesis testing results is provided below.

Table 9 Summary of Hypothesis Testing Results

Hypothesis	Result
H1: Enterprise informatics capability has a significant positive effect on supply chain resilience	Supported
H2a: Enterprise informatics capability has a significant positive effect on information transparency	Supported
H2b: Information transparency has a significant positive effect on supply chain resilience	Supported
H2c: Information transparency mediates the relationship between enterprise informatics capability and supply chain resilience	Supported
H3: Environmental dynamism moderates the direct effect of enterprise informatics capability on supply chain resilience	Not supported
H4: Environmental dynamism moderates the indirect effect through information transparency	Supported

5. Discussion

This study set out to examine the relationship between enterprise informatics capability and manufacturing supply chain resilience, the mediating role of information transparency, and the moderating role of environmental dynamism. The empirical results largely support the proposed theoretical model, with five of six hypotheses confirmed. The following discussion interprets each finding in relation to existing literature and the theoretical framework.

5.1 The Direct Effect of Enterprise Informatics Capability

The finding that enterprise informatics capability has a significant positive direct effect on supply chain resilience (H1 supported) is consistent with prior research. Zhao et al. (2023) reported that supply chain digitalization enhances resilience capabilities in Chinese manufacturing firms, and Jayasinghe et al. (2026) identified IT capability as a significant predictor of supply chain resilience in the apparel sector. Ahmed et al. (2025) and Gomes and Silva (2025) similarly confirmed the positive digitalization-resilience link in manufacturing contexts across multiple countries. The present study extends these findings by framing the relationship through the lens of organizational information processing theory. Shi et al. (2023) found that the digitalization level is not directly related to supply chain resilience but operates fully through supply chain integration as a mediator in Chinese manufacturing firms. The present study, by contrast, identifies a significant direct effect alongside the mediated pathway, suggesting that enterprise informatics capability exerts broader influence than digital technology adoption alone. Enterprise informatics capability enhances a firm's capacity to process the volume and velocity of information required during supply chain disruptions. Real-time monitoring systems enable early detection of supply irregularities and rapid assessment of disruption scope across supply chain tiers. Analytical tools built on integrated data further support evidence-based decision-making under time pressure. These information-processing functions directly strengthen the supply chain's ability to anticipate, respond to, and recover from disruptions.

5.2 The Mediating Role of Information Transparency

The confirmation of the mediation hypothesis (H2c supported) represents a central contribution of this study. Information transparency partially mediates the relationship between enterprise informatics capability and supply chain resilience, accounting for approximately 39.5 percent of the total effect. This finding indicates that enterprise informatics capability enhances resilience not only through direct operational improvements but also, to a substantial degree, through the creation of a more transparent information environment across the supply chain.

The strong positive effect of enterprise informatics capability on information transparency (H2a, beta = 0.47) indicates that firms with stronger informatics infrastructure and routines are significantly more effective at establishing and maintaining high levels of inter-organizational information visibility. This finding aligns with Zhou et al. (2023), who reported that supply chain digitalization enhances traceability, a concept closely related to information transparency. The significant positive effect of information transparency on supply chain resilience (H2b, beta = 0.36) is consistent with Zhang and Ma (2026), who identified information transparency as a significant mechanism through which data assets improve supply chain resilience among Chinese firms.

The mediation finding carries theoretical significance for organizational information processing theory. It specifies the information-processing pathway more precisely: informatics capability is the input that generates processing capacity, information transparency is the realized output of that processing, and resilience is the organizational outcome enabled by the transparent information state. Wang et al. (2026) examined a related model in UK manufacturing and found that transparency mediates the digitalization-resilience link, yet also identified a negative moderating effect of transparency, suggesting that excessive information flows may create processing overload. The present study, conducted in the Chinese manufacturing context, identifies a consistently positive mediation effect, a difference that may reflect the earlier stage of information-transparency development in Chinese supply chains relative to UK counterparts. Latan et al. (2024) similarly found that supply chain transparency mediates the effect of blockchain adoption on supply chain performance, reinforcing the generalizability of the transparency-as-mediator mechanism across different digital technology types. The input-output-outcome sequence advances the application of organizational information processing theory in supply chain research by moving beyond the general claim that information processing matters to specifying how it matters.

5.3 The Moderating Role of Environmental Dynamism

The non-significant moderation of the direct effect (H3 not supported) combined with the significant moderation of the indirect effect (H4 supported) presents a nuanced pattern that merits careful interpretation.

The failure of H3 suggests that when enterprise informatics capability influences supply chain resilience through channels other than information transparency, such as through operational automation or resource coordination, environmental dynamism does not meaningfully amplify those direct effects. A plausible explanation is that the direct effect captures resilience gains from internal operational efficiency improvements, and these efficiency-based mechanisms operate relatively independently of external environmental conditions. Firms that invest in informatics infrastructure gain resilience benefits from improved internal coordination regardless of whether the external environment is stable or volatile.

The support for H4, by contrast, indicates that environmental dynamism selectively amplifies the information-transparency pathway. Under high environmental dynamism, the frequency and unpredictability of market changes increase the premium on real-time, accurate information sharing across the supply chain. When customer demand shifts rapidly, competitors introduce new technologies frequently, and market conditions are difficult to predict, the ability to maintain transparent information flows becomes a more decisive factor in enabling collective sense-making and coordinated response

among supply chain partners. The conditional indirect effect nearly doubled from 0.11 under low dynamism to 0.23 under high dynamism, indicating that the mediating role of information transparency is substantially more important in volatile environments.

This finding aligns with the contingency perspective embedded in organizational information processing theory. Galbraith (1974) argued that as task uncertainty increases, organizations must increase their information-processing capacity to maintain effectiveness. Environmental dynamism represents a key source of task uncertainty in supply chain management. The results confirm that the information-transparency mechanism, through which informatics capability enhances resilience, becomes more salient as this uncertainty intensifies. Jum'a et al. (2025) reported a similar moderating role of environmental dynamism in the supply chain digitalization context, though their study did not distinguish between direct and indirect pathways. Stentoft et al. (2025) identified a comparable pattern in which demand uncertainty positively moderates the digitalization-performance relationship but negatively moderates the mediating role of resilience, suggesting that environmental conditions can differentially affect direct and indirect pathways. Al Tera et al. (2024) found that supply chain survivability, a concept related to environmental resilience capacity, moderates the digitalization-visibility-performance mediation chain such that the indirect effect is strongest when survivability is high. The present study complements these findings by showing that environmental dynamism amplifies the information-transparency pathway specifically, providing a more precise understanding of where environmental conditions matter most in the informatics-resilience mechanism.

5.4 Theoretical Contributions

The study makes three contributions to the enterprise informatics and supply chain management literature. Organizational information processing theory is extended to the supply chain resilience domain by specifying the information-processing sequence through which enterprise informatics capability enhances resilience. Prior applications of this theory in supply chain research have primarily addressed performance and agility outcomes; the present study shows that the theory also explains resilience outcomes. By identifying information transparency as a specific mediating mechanism, the analysis moves beyond the general assertion that information technology enables resilience to specify how it does so through the creation of transparent information environments. The asymmetric moderating role of environmental dynamism further refines the contingency perspective in supply chain resilience research, as the results show that volatility selectively amplifies the indirect transparency pathway without meaningfully affecting the direct effect.

5.5 Practical Implications

The findings carry several implications for manufacturing managers. Investments in enterprise informatics infrastructure should be accompanied by deliberate efforts to enhance information transparency across the supply chain. Acquiring advanced information systems is a necessary but insufficient condition for resilience; firms must also ensure that these systems translate into visible, accessible, and accurate information flows among supply chain partners. Manufacturing firms operating in highly dynamic industries, where customer preferences shift rapidly and competitors frequently introduce new technologies, should prioritize information-transparency mechanisms as part of their resilience strategies. In such environments, the resilience payoff from informatics capability is substantially mediated through transparency, meaning that informatics investments without corresponding transparency improvements may yield diminished resilience returns. For firms in relatively stable environments, the direct resilience benefits of informatics capability remain significant, but the additional premium from information transparency is comparatively smaller, suggesting that resource allocation decisions should account for the level of environmental uncertainty the firm faces.

6. Conclusions

This study examined the relationship between enterprise informatics capability and manufacturing supply chain resilience in the digital economy context, with information transparency as a mediating variable and environmental dynamism as a moderating variable. Using survey data from 316 managers in Chinese manufacturing firms and PLS-SEM analysis, the study produced several findings. Enterprise informatics capability positively affects supply chain resilience both directly and indirectly through information transparency. Information transparency partially mediates this relationship, serving as a key information-transmission mechanism that accounts for a substantial portion of the total effect. Environmental dynamism does not moderate the direct effect but significantly strengthens the indirect pathway through information transparency, indicating that the mediating mechanism becomes more important in volatile market conditions.

These findings contribute to research on enterprise informatics by extending organizational information processing theory to the supply chain resilience domain and by specifying the transparency mechanism through which informatics capability translates into resilient outcomes. The identification of the asymmetric moderating role of environmental dynamism provides a more refined contingency perspective than prior studies that treated moderation as uniform across direct and indirect effects.

Several limitations should be acknowledged. The cross-sectional research design precludes causal inference; future research could employ longitudinal or panel data designs to capture the dynamic evolution of informatics capability and its resilience effects over time. The data were collected from a single-country context, and the generalizability of the findings to manufacturing sectors in other economies remains to be established. Self-report measures from single respondents may introduce common method bias despite the procedural and statistical safeguards employed. Future studies could incorporate multi-source data and objective performance metrics to strengthen measurement validity. Subsequent research could also examine how enterprise informatics capability shapes supply chain resilience in logistics service and platform-based supply chain contexts, extending the model to broader service system environments aligned with the informatics and service science research agenda.

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