

Digital Supply-Chain Maturity, Resilience, and Firm Performance: Evidence from Manufacturing Firms in an Emerging Economy

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Abstract. Digital transformation has become a strategic necessity of supply chains especially in the face of growing disruption and environmental instability. This research aims at examining the impact of digital supply-chain maturity on firm performance considering the mediating role of supply-chain resilience and moderating role of environmental uncertainty in Jordanian manufacturing companies. The data was collected among 259 managers who were working in the field of supply-chain, operations, and executive. The data were analyzed using the PLS -SEM method in SmartPLS 4. Results indicate that digital supply-chain maturity has a positive effect on the supply-chain resilience ($p < 0.001$) and firm performance ($p < 0.05$). Also, the impact of the supply-chain resilience on the performance of the firms is positive and significant ($p < 0.001$). In addition, mediation analysis proves that supply-chain resilience mediates the association between digital supply-chain maturity and the performance of firms partially. The findings also show that environmental uncertainty has a statistically significant moderating impact on the direct relationship between digital supply-chain maturity and the performance of the firm ($p < 0.05$), which functions such that the stronger the level of uncertainty, the stronger the effect. The study contributes to the combination of the Resource-Based View and Dynamic Capabilities Theory by clarifying the transformation of digital resources into performance-related capabilities in the situations of emerging economies.

Keywords: Digital supply chain maturity, supply chain resilience, environmental uncertainty, firm performance, digital transformation, manufacturing firms

1. Introduction

The rapid development of digital technologies has reshaped the structure and management of supply chains across industries. Over the past decade, firms have increasingly adopted digital tools such as big data analytics, cloud-based systems, artificial intelligence, blockchain, and real-time tracking technologies to improve operational integration, information visibility, and coordination across procurement, production, logistics, and distribution activities (Alshawabkeh et al., 2024; Jum'a, 2023). In this context, digital supply-chain maturity refers to the extent to which firms systematically integrate digital technologies, data-driven processes, and interoperable information systems into their supply-chain operations. Unlike general digital transformation, which may cover broad organizational change, digital supply-chain maturity focuses specifically on the digitalization of supply-chain processes and the firm's ability to use digital systems for visibility, coordination, and decision-making.

In Jordan, digital transformation within the manufacturing sector remains uneven across firms, as adoption is influenced by organizational readiness, leadership practices, technological capabilities, and organizational culture (Khalayleh et al., 2024). This uneven pattern of adoption provides a relevant empirical context for examining how variation in digital supply-chain maturity is associated with supply-chain resilience and firm performance among manufacturing firms.

The growing use of digital systems has become more critical especially given the recent disruptions in the world (Salam & Bajaba, 2023). Supply crises, transportations, and geopolitical conflicts, and unstable demand curves have revealed structural weaknesses in traditional models of supply chains (Al-Okaily & Al-Okaily, 2025). These are the disruptions that have increased the attention of managers to develop resilient supply chains that can absorb shocks and maintain the continuity of operations (Elnadi et al., 2026; Lemoun et al., 2025). The concept of supply-chain resilience is becoming an important organizational ability and is increasingly being recognized to give organizations the ability to predict disruptive events, react efficiently and rebound quickly to unanticipated events (Al-Shboul, 2024). Whereas digital transformation provides the technological base, resilience refers to the organizational ability to re-arrange and re-utilize resources when there is uncertainty (Modgil et al., 2022).

Theoretically, Resource-Based View (RBV) is based on the assumption that the firm can gain access to sustainable competitive advantage by having valuable, rare, inimitable, and non-substitutable resources as well as the ability to utilize them appropriately (Barney, 1991). The digital supply-chain capabilities can be conceptualized as strategic resources that improve the information visibility, efficiency of the coordination, and quality of the decision making. Nonetheless, the RBV in itself is not complete in terms of understanding the adaptation of such resources in the fast-evolving environments by firms. Dynamic Capabilities Theory is an addition to the RBV since it focuses on the capabilities of a firm to be sensitive to the opportunities and threats, exploit strategic options and realign operational resources in response. In this context, the supply-chain resilience is a dynamic capability that transforms digital maturity into performance results (Khaddam & Alzghoul, 2025; Salah & Alzghoul, 2024).

Although prior studies have examined digital transformation, supply-chain resilience, and firm performance, the relationships among these constructs are often addressed in separate research streams. Some studies emphasize the performance implications of digital technologies, whereas others focus on resilience as a supply-chain capability. However, less attention has been given to how digital supply-chain maturity, as a supply-chain-specific digital capability, is translated into firm performance through resilience mechanisms, particularly under different levels of environmental uncertainty. This limitation is especially relevant in emerging-economy manufacturing contexts, where firms often face resource constraints, supply dependence, and institutional and market volatility. Accordingly, this study examines digital supply-chain maturity, supply-chain resilience, environmental uncertainty, and firm performance within an integrated empirical framework.

There is also the environmental uncertainty that makes organizational decision-making processes more difficult. The effectiveness of digital capabilities might be increased or decreased by the rapid

changes in regulations, turbulent market, and competition. In the highly uncertain environment, companies might be more dependent on digital integration to ensure that performance does not decline. On the other hand, in relatively stable settings, the effects of digital maturity on performance cannot be so significant. Thus, the moderating effect of environmental uncertainty is a crucial topic to understand to explain the boundary conditions in digital supply-chain research.

Jordanian manufacturing firms provide a relevant empirical setting for this study because they operate in a context characterized by exposure to external supply-chain pressures, logistics disruptions, input-cost fluctuations, and uneven levels of digital adoption. These conditions make it important to examine whether digital supply-chain maturity is associated with stronger resilience and improved performance outcomes. In this context, the study contributes to logistics informatics and service science in three ways.

To start with, it expands the concept of digital supply-chain maturity as an informatics potential which boosts the visibility of information, integration of systems and data-based coordination by the logistics networks. Second, it conceptualizes the way these informatics capabilities turn into service and operational results based on supply-chain resilience, thereby connecting digital infrastructure to service continuity and disruption management in logistics. Third, it pinpoints environmental uncertainty as a boundary condition that is crucial in determining how effective digital coordination mechanisms are in dynamic logistics environments.

The research makes a unique contribution to the logistics-informatics discipline since it focuses on the role of digital supply-chain maturity in improving information integration, real-time visibility, and data-driven coordination of supply-chain processes. The study theorizes the concept of performance based on the logistics responsiveness, service continuity, and efficiency in operational coordination as opposed to viewing firm performance as a financial result. Digital transformation, in this case, is perceived as an informatics-based competence that can facilitate coordinated decision-making and enhanced service delivery in the supply-chain systems. Jordan provides a particularly relevant emerging-economy context for examining digital supply-chain maturity, resilience, and firm performance. The manufacturing sector represents a substantial component of the Jordanian economy and contributes significantly to value creation, employment, and export activity. The Jordan Industrial Competitiveness Report indicates that manufacturing value added accounts for approximately 17.7% of GDP, highlighting the sector's macroeconomic importance (Organization & Ministry of Industry, Trade and Supply, 2022). At the same time, Jordanian manufacturing firms operate in a context shaped by exposure to global value chains, imported inputs, logistics constraints, and regional geopolitical pressures. These conditions increase the importance of information visibility, coordination, and adaptive supply-chain capabilities.

Recent national policy documents also emphasize industrial modernization, export upgrading, digital transformation, and stronger private-sector competitiveness as core priorities within Jordan's economic development agenda. The Economic Modernization Vision identifies industry and high-value sectors as important drivers of future growth, while Jordan's energy-efficiency agenda reflects the continuing policy concern with energy dependence and energy-cost pressures. Therefore, Jordanian manufacturing firms provide an appropriate setting for studying whether digital supply-chain maturity is associated with stronger resilience and improved performance under environmental uncertainty (Issa & Khataybeh, 2024).

2. Literature Review and Hypotheses

The digital supply chain maturity concept has been developing in line with the blistering growth of digital transformation projects in industries (Hendijani & Norouzi, 2023; Lee et al., 2024). It represents how well the organizations strategically incorporate digital technologies into supply chain operations

and allow data-based coordination, transparency and automation. Digital maturity is not just about technology usage, it also includes organizational congruence, integration of processes, exchange of information in real-time and the ability to analyse that information to aid strategic decisions (Abdulwili et al., 2025). More digitally mature firms are better situated to align demand forecasting, inventory management, coordination with suppliers and logistics planning by means of related digital platforms. However, much of the existing literature emphasizes the direct performance outcomes of digital supply-chain initiatives, while less attention has been given to the mechanisms through which digital maturity improves logistics information flows, coordination quality, and resilience, particularly in emerging-economy manufacturing contexts (Weerabahu et al., 2023).

According to the Resource-Based View (RBV), digital supply chain capabilities are the strategic organizational resources (Barney, 1991). The capabilities add value in form of operational efficiency, accuracy of information and lessening the cost of coordination (Nyamah et al., 2026). Digital integration allows the companies to capitalize on predictive analysis, automation, and intelligent monitoring technologies that help them become responsive and less uncertain in the supply networks. Such resources can be used to create competitive advantage when well utilized as they enhance cost control, service quality, and reliability in service delivery (Elnadi et al., 2026). Although a great deal has been known about resilience, very few studies describe the role played by digital informatics capabilities in building resilience in the supply-chain systems.

Nevertheless, RBV is not sufficient to explain the adaptation of digital resources by firms in turbulent conditions. The Dynamic Capabilities Theory builds upon this point of view by highlighting the capability of the firm to restructure its resources in reaction to the changes in the environment (Chang et al., 2026). Resilience is a paramount dynamic capability within the setting of the supply chains. The concept of supply chain resilience can be said to be the capability of a firm in predicting the occurrence of disruptions and ensuring that continuity during shocks as well as recovery of operations within a short period of time follows the shock. Strong supply chains have integrated flexibility, redundancy, visibility, and partner collaborative relationships (Al-Melfi, 2026). These resilience mechanisms could be reinforced with the help of digital maturity to a greater extent by means of better early warning systems, more effective communication streams, and adaptive planning processes (Mohsen, 2023). Current literature presents inconclusive evidence on the impact of environmental uncertainty and how this connects to digital supply-chain capabilities is still not clearly understood.

Prior empirical studies suggest that digital technologies can improve supply-chain coordination by enabling faster information exchange, better demand visibility, and more integrated planning among supply-chain partners. Related studies also indicate that resilient supply chains are better able to maintain operational continuity when facing disruptions. However, the relationship between digital maturity and performance should not be treated as only a direct technological effect. Rather, digital systems may improve performance partly by strengthening resilience-related capabilities such as visibility, flexibility, risk anticipation, and recovery capacity. This indicates the need to examine supply-chain resilience as a mediating mechanism between digital supply-chain maturity and firm performance (Ghiats, 2026). Research shows that digital platforms facilitate information exchange between partners, help minimize the lead times, and make forecasting more accurate (Khojasteh et al., 2026). Equally, literature on the concept of resilience has shown that organizations that have the capacity to restructure logistics networks and supplier bases are in a better position to be stable in response to disruptions (Hoque et al., 2026). However, not many papers combine digital maturity and resilience in terms of a single framework of performance (Elnadi et al., 2026). The vast majority of studies consider digitalization to have a direct predictive relationship with performance and ignore the mediating processes by which technological integration will be transformed into practical results.

The performance of firms in the field of supply chain researches is usually quantified by the use of such indicators as sales growth, development of productivity, cost-efficiency, expansion of investments. Digital maturity can positively impact the performance by lowering the operational inefficiencies and introducing proactive risks management (Jafari et al., 2026). Nevertheless, the relationship cannot be direct. Rather, digital systems can be used to develop more robust resilience, which further empowers performance results (Choi et al., 2023; Ngo et al., 2026). That is, resilience can be the driver of digital maturity which can create sustainable competitive advantages. According to the studies, there still exists a gap in application of digital supply-chain maturity, resiliency and environmental uncertainty into a single logistics informatics platform. Specifically, Despite the fact that the digital transformation, analytics capabilities, supply-chain resilience and performance have been considered in previous studies, the current evidence is still quite fragmentary. There are studies which consider the performance implication of digital technologies, as well as those in which the resilience is considered as a singular supply-chain capability. There has been less focus on how digital information integration and coordination are converted to logistics and service-performance outcomes via resilience mechanisms, especially at varying degrees of environmental uncertainty as well as in manufacturing in emerging-economy settings (Khan et al., 2023; Prospect et al., 2015).

The element of uncertainty of environment adds more complexity in this relationship. The uncertainty can be due to a regulatory change, varying demand, competition in the market, or technology change, or it could be due to macroeconomic uncertainty (Gonul Kochan et al., 2026). In situations of high-uncertainty, companies can apply more digital infrastructure to deal with variability and preserve coordination (Chang et al., 2026). As a result, the performance effects of digital maturity can be increased in case of the increase in environmental uncertainty. On the other hand, within comparatively stable settings, digital capabilities can rather moderately influence performance outcomes (Alzghoul et al., 2023).

The emerging economies can be considered an especially useful setting in which to study these dynamics. The companies working in the developing countries tend to encounter the problem of resource constraints, dependence on supplies and institutional volatility. The operational continuity and competitiveness of the functioning of digital tools can be a significant asset in such settings (Mahmoud et al., 2025). The manufacturing companies of Jordan, with different degrees of technological application and susceptibility to foreign upheavals, serve as a significant empirical context in which the relationship between digital maturity, resilience, uncertainty, and performance may be studied. Logistically speaking, digital supply-chain maturity increases the information systems integration within the supply-chain partners to allow real time visibility of the inventory, demand and running of logistics. Such increased visibility enables companies to identify disruption earlier, react more quickly, and coordinate the recovery operations more efficiently. Digitally mature supply chains are therefore more capable of coming up with the resilience aspects including flexibility, adaptability, and quickness in recovery (Abu Lehyeh, S. M., & Alzghoul, 2026). Digital supply-chain maturity enhances decision-making that is driven by data because it provides advanced analytics and real-time and predictive capabilities (Abbas et al., 2025). These informatics-based mechanisms are elevated at logistics, a decrease in the course of coordination and a rise in service dependability. As a result, more digitally attractive firms tend to have better results in the outcome of the operational and logistic performance (Ali et al., 2022). Resilience in supply chain is used to improve supply chain performance through continuity during disruption of logistics operations, service levels and recovery time is minimized. Healthy supply chains can re-allocate resources, re-direct logistics flows and maintain coordination between partners, a fact that directly leads to better service, and service stability. Environmental uncertainty in determining the efficacy of digital supply-chain maturity has a more subtle aspect to it. In moderate and high uncertainty conditions, the value of digital maturity increases due to the capacity to see in real time, make decisions quicker and coordinate between actors in the supply chains in a better

fashion. Such features will improve firms' response to demand variability, supply shocks and regulatory shifts, which will increase the logistic performance delivery.

Digital systems however might not completely offset the turbulence in the environment in case of extreme uncertainty or when the different capabilities of organizations are complementary in nature. Digital maturity might not be effective in such cases. Although this may be a constraint, in most dynamic supply-chain settings, digital maturity will have a beneficial effect by improving responsiveness and integration that will have greater performance outcomes.

As such, the environmental uncertainty will be beneficial in moderating the interrelation between digital supply-chain maturity and firm performance.

Based on the preceding theoretical arguments and empirical insights, the following hypotheses are proposed:

H1: Digital supply chain maturity has a positive impact on supply chain resilience.

H2: Digital supply chain maturity has a positive impact on firm performance.

H3: Supply chain resilience has a positive impact on firm performance.

H4: Supply chain resilience mediates the relationship between digital supply chain maturity and firm performance.

H5: Environmental uncertainty moderates the relationship between digital supply chain maturity and firm performance such that the relationship becomes stronger under high levels of environmental uncertainty.

2.1 Research Model

This paper adheres to the theoretical input based on the Resource-Based View and Dynamic Capabilities Theory, which assumes a conceptual model, interconnecting the digital supply chain maturity, supply chain resilience, environmental uncertainty and the performance of firms. The conceptualization of digital supply chain maturity is applied as a strategic organizational resource that supplements information visibility, coordination effectiveness and decision-making processes of supply-chain processes.

The model supposes that digital supply chain maturity has a direct impact on firm performance, and it has an indirect impact on this phenomenon due to facilitation by supply-chain resilience.

The contextual factor such as environmental uncertainty is taken in order to moderate the relationship between electronic supply chain maturity and firm performance. As such, the effect of digital maturity on performance should be diverse in regard to the degree of environmental uncertainty the firm is exposed to.

Figure 1 describes the conceptual model of the study.

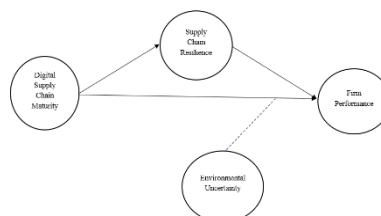


Fig.1: Research Model.

3. Methods

This study examines how digital supply-chain maturity is associated with firm performance among Jordanian manufacturing firms, considering the mediating role of supply-chain resilience and the moderating role of environmental uncertainty. The Jordanian manufacturing context is appropriate for this investigation because manufacturing firms operate under conditions of external supply-chain exposure, cost pressures, and uneven digital transformation. These conditions make it relevant to investigate whether digital supply-chain maturity contributes to resilience-related capabilities and performance outcomes.

The industrial sector in Jordan forms a critical part of the national economy as it plays a significant role in the creation of employment opportunities and also in export business. The manufacturing industry includes chemicals, pharmaceuticals, food processing, engineering products, construction materials and packaging. These industries are extremely dependent on imported raw materials and global logistics channels, which makes them especially vulnerable to disruptions in the supply chain and eco-crises. At the same time, the degree of digital transformation in firms is significantly different, which offers an appropriate environment to sample the disparities in digital supply chain maturity.

The target population will consist of managers of manufacturing companies that are located in Jordan. The sample was chosen by the respondents in the department that has responsibilities in supply chain, operations, logistics, procurement, and information technology. Respondents were also chosen in the executive management roles. The choice of these people was due to their direct participation in the implementation of digital systems and the supply chain decision-making process. The nature of their work career ensures that they are knowledgeable in the practices of digital integration, resilience and performance outcomes.

The questionnaire was structured and was administered to the targeted firms through the electronic and direct distribution method. The total number of questionnaires distributed was 331 and 267 responses were obtained. The responses that were tested to be complete and consistent led to 259 responses that were considered suitable to be statistically analyzed. This is the minimum size required by Partial Least Squares Structural Equation Modeling (PLS -SEM) especially the models with mediation and moderation effects.

Construct measures were done through a five-point Likert scale that ranged between 1 (strongly disagree) and 5 (strongly agree). The research used items related to digital supply chain maturity based on previous research on digital transformation and supply chain integration. The scale bridges such dimensions as digital integration, real-time visibility, utilization of data analytics, and system interoperability. The items of supply chain resilience were based on the existing literature on resilience, including its flexibility, recovery capacity, adaptability, and risk anticipation. Environmental uncertainty was measured with the items that described regulatory instability, market volatility and intensity of competition. Subjective measurement of firm performance was done based on sales growth, improvement of operations and growth of investments, which is aligned with previous studies that confirm reliability on managerial self-reported performance measure in emerging markets. The analysis is based on subjective performance indices, which have broad applications and have been validated in previous studies especially in emerging-market situations where objective performance metrics might not be easily available. It has also been documented in the past, that performance perceptions among managers are highly associated with objective measures. Thus, it is assumed that subjective measurements should be the suitable robustness of the firm in this research. Managerial perception of sales growth, operational improvement and investment growth were subjectively used to measure firm performance. Management research often involves subjective performance indicators, especially where objective financial information may prove challenging to find or firms may not be comparable. Previous methodological studies indicate that subjective measures can effectively give a decent evaluation of the performance of an organization when designed properly and based on the already established

performance dimensions. However, subjective measures are recognized to be a weakness since the perceptual measurements might not completely replace the objective financial ones.

The researcher used SmartPLS4 to test the proposed relations based on PLSSEM. This is because PLS-SEM is specifically utilized in business and management research because it is suitable in predictive models, complex relationships, and a relatively small sample size. PLS-SEM has a higher level of statistical power than covariance-based SEM (CB-SEM), and it is suitable in cases where the major purpose is to develop theories and prediction as opposed to model-confirmation. Besides, PLS-SEM is able to facilitate the mediation and moderation effects in a single analysis model effectively. Supply chain resilience has been placed as a dynamic capability that helps firms to convert digital resources in to responsive actions in the context of disruptive conditions. Since the data were measured by the same survey tool of the same respondents, the threat of common method bias (CMB) was suitably overcome by both procedural and statistical solutions.

Procedurally, a number of measures contributing to a reduction in bias were implemented. Respondent anonymity and confidentiality were guaranteed to minimize the apprehension to evaluation. The items used as the questions in the questionnaires were created in an understandable and condensed way to prevent any ambiguity and the various constructs were also presented in different sections of the questionnaire to minimize the chances of bias in terms of responses patterns.

Statistically, the single-factor test by Harman was performed. The findings showed that none of the factors explained most of the variance, and it seems that common method bias is not dissipating. Further, full collinearity VIF values were also measured and all were lower than the recommended value of 3.3 which further confirms that common method bias does not play a significant role in the results.

The analysis was done in two stages. To test the measurement model, first, indicator loading was tested, second, internal consistency reliability (Cronbach alpha and composite reliability), convergent validity (average variance extracted) and discriminant validity Fornell Larcker criterion and variance inflation factor) were tested. Secondly, structural model has been estimated by path coefficient, bootstrapping methods, mediation, moderation testing and determination of predictive power by R² and Q².

In terms of demographics, the respondents constituted a wide range of managerial jobs in manufacturing companies. Most of them had over five years of professional experience in supply-chain related functions. Education levels included postgraduate to bachelor degrees and this would guarantee sufficient managerial and technical skills among the respondents. This heterogeneity increases the validity of the results and the rest of the representation of the manufacturing industry in Jordan.

4. Results

Measurement items included in the questionnaire were meant to include the digital supply chain maturity, supply-chain resilience, environmental uncertainty, and firm performance. A thorough evaluation of the measurement model was done before testing the structural relationship in order to ascertain the reliability and validity of the constructs. The method of analysis followed was a two-step Partial Least Squares Structural Equation Modelling (PLS-SEM) which was used in SmartPLS 4.

The reason behind the selection of PLS-SEM is that the model is applicable in predictive research models that include mediation and moderation effect. It is especially used when the focus is development and explanation of variance of the theory, as opposed to the rigorous confirmation of model fit. In addition, the PLS-SEM is effective in dealing with complicated models that have several constructs and interaction related effects, particularly where the studies are being done in the emerging-market setting.

The assessment of the measurement model was used to start the evaluation process. The reliability of the indicators was tested by looking at the outer loadings to ensure that each item contributed a substantial part towards its respective construct. Cronbach's alpha and composite reliability (CR) were

used in testing internal consistency reliability. The convergent validity was determined through the variance extracted (AVE), and the average variance had to represent over 50 percent of the variance of the indicators of the construct. The Fornell Larcker criterion was used to evaluate discriminant validity which ensured that each of the constructs is empirically differentiated with the others. Besides this, to determine multicollinearity, the value of variance inflation factor (VIF) was examined to confirm that there was no high correlation between constructs of predictors. An interaction plot was created to gain a more accurate understanding of the moderating effect. The findings show a stronger connection between digital supply-chain maturity and firm performance in case of high levels of uncertainty in the environment. This indicates that digitally mature companies are more capable of leveraging real-time data, coordination, and reaction to the disruptions within unpredictable environments. Conversely, in low uncertainty, digital maturity marginal benefit is not so strong, because the conditions of operations are more predictable.

After establishing that the measurement model is adequate, there was an evaluation of the structural model. To establish the significance of path coefficients, mediation effects, and interaction terms bootstrapping procedures that used 5,000 resamples were done. The model explanatory power was measured with the help of the values of R² of endogenous constructs and the predictive relevance with the help of quantile 2 values. This methodological review made the empirical evidence strong before the hypothesized relationships could be interpreted. Along with Fornell Larcker criterion, Heterotrait Monotrait ratio (HTMT) was used to judge the discriminant validity. All the HTMT values were lower than P.4 (recommended) 0.90 and this showed good discriminant validity of the constructs and the constructs were empirically separate.

Table 1. Descriptive statistics, factor loadings, and collinearity assessment

Construct	Item	Mean	Std. Dev.	Loading	VIF
Digital Supply Chain Maturity	DSCM1	3.61	1.08	0.842	2.413
	DSCM2	3.54	1.12	0.861	2.728
	DSCM3	3.48	1.15	0.833	3.105
	DSCM4	3.57	1.09	0.879	2.964
Supply Chain Resilience	SCR1	3.66	1.11	0.872	3.451
	SCR2	3.59	1.14	0.851	2.994
	SCR3	3.63	1.07	0.884	3.672
Environmental Uncertainty	EU1	3.72	1.16	0.814	2.003
	EU2	3.68	1.09	0.842	2.447
	EU3	3.71	1.12	0.829	2.398
Firm Performance	FP1	3.44	1.18	0.811	1.732
	FP2	3.52	1.20	0.846	1.645
	FP3	3.49	1.17	0.823	1.801

The indicators were found to be reliable as all the outer loadings were above 0.70. The values of Variance Inflation Factor (VIF) were between 1.6 and 3.7, which means that there is no collinearity issue.

The measurement items were modified on the previous validated literature. A back-translation was performed to translate the questionnaire in order to achieve accuracy. To ensure that there was clarity and content validity, a pilot test was carried out with a small section on respondents.

Table 2. Measurement model assessment

Construct	Cronbach's Alpha	Composite Reliability	AVE
Digital Supply Chain Maturity	0.915	0.936	0.708
Supply Chain Resilience	0.902	0.927	0.743
Environmental Uncertainty	0.884	0.920	0.685
Firm Performance	0.781	0.872	0.693

All the values of alpha and composite reliability (CR) were more than 0.70. Values of average variance extracted (AVE) were higher than 0.50 hence supporting convergent validity.

Table 3. Discriminant validity (Fornell–Larcker criterion)

Construct	DSCM	SCR	EU	FP
Digital Supply Chain Maturity	0.842			
Supply Chain Resilience	0.781	0.862		
Environmental Uncertainty	0.614	0.588	0.828	
Firm Performance	0.756	0.793	0.521	0.833

The square root of the average variance extracted (AVE) that was all diagonal values were bigger than the inter-construct correlations and this further confirmed the discriminant validity.

Table 4. Hypotheses testing

Relationship	Path Coefficient	T-value	P-value	Decision
DSCM → SCR	0.812	11.427	0.000	Supported
DSCM → FP	0.238	2.346	0.019	Supported
SCR → FP	0.521	4.912	0.000	Supported

The findings of the structural model reveal that there are a lot of positive relationships between the key constructs.

Table 5. Mediation and moderation analysis

Mediation (Indirect Effect)

Relationship	Indirect Effect	T-value	P-value	Decision
DSCM → SCR → FP	0.423	4.618	0.000	Supported

Moderation

Interaction	Path Coefficient	T-value	P-value	Decision
DSCM × EU → FP	0.167	2.084	0.037	Supported

Environmental uncertainty significantly moderates the relationship between digital supply chain maturity and firm performance.

In addition, effect sizes (f^2) were calculated to assess the strength of relationships, and bootstrap confidence intervals were examined to ensure robustness of the results.

Table 6. R² and Q² predictive relevance

Construct	R ²	Q ²
Supply Chain Resilience	0.659	0.603
Firm Performance	0.682	0.614

The R² values indicate moderate-to-strong predictive power. Q² values greater than zero confirm predictive relevance.

5. Discussion

This study has analyzed how digital supply-chain maturity has influenced firm performance taking into account the mediating effect of supply-chain resilience and moderating effect of environmental uncertainty among the Jordanian manufacturing companies. On the one hand, the results of the study are solid empirical evidence of the proposed framework and give a contribution to the debate on digital transformation and supply-chain capabilities in emerging economies.

To start with, the findings show that, digital supply-chain maturity positively influences supply-chain resilience to a great extent. This observation is in line with previous studies which hold that digital integration increases the visibility, coordination and risk-detection in supply networks. In a study by (Fan et al., 2021), the researchers indicate that digital technologies like analytics and real-time tracking systems enhance the anticipation of disruptions and response systems. In the same way, (Queiroz et al., 2020) state that the digital supply-chain models enhance structural flexibility in cases of uncertainty. The current results support this view because they empirically prove that the digital maturity increases the resilience in an environment of developing countries.

Nonetheless, there is conflicting information on the correlations of digital-resilience reported in some previous research. To provide an example, (Dixit et al., 2026) claim that the adoption of technology per se does not necessarily create resilience, unless it is supported by organizational alignment and networking governance systems. This partial inconsistency underscores the significance of digital maturity, over digital adoption, as a more holistic construct, with respect to depth of integration, as well as, strategic alignment. This gap is closed in the current study as it deals with maturity and not individual technological tools.

Second, the results indicate a positive direct correlation between the digital supply-chain maturity and performances of firms. The finding aligns with the studies conducted by (Chowdhury & Anzum, 2026; Ratanacharoenchai & Jantapoon, 2026) who prove that the digital transformation improves the efficiency of the operations and competitive positioning. On the same note, (Belhadi et al., 2021) state that the analytics capabilities affect the performance of firms positively by enhancing the quality of their decisions. The results also confirm the Resource-Based View (RBV) that confirms that competitive advantage is created by valuable and inimitable digital resources.

However, the relationship between digital and performance is not consistently positive as found in all studies. According to some studies, it could also mean that digital investments do not give returns immediately or regularly as they are complex to implement and organizations are resistant to change (Sambamurthy et al., 2003). In other settings, the impact of spending lots of money and time on technology without strategic planning can decrease the short-term performance through the cost of adjustment. The current evidence indicates that the performance effect of digital maturity is considerably positive in case of a strategic incorporation into the framework of supply-chain operations, with the addition of a resilience capacity.

Third, the findings indicate that the resilience of the supply chain produces a big positive impact on the performance of the firm. This result can be supported by previous researchers, such as (Umar et al., 2017), who state that resilient supply chains ensure the continuity of services and secure financial results in case of disruptions. In addition, (Lerman et al., 2022) stress that resilience acts as a strategic capacity

to enhance the stability in operations and competitiveness in the long term. The present research supports this thesis in the setting of Jordanian manufacturing companies, in which resilience is especially useful due to the exposure of the companies to regional volatility.

Notably, the analysis based on mediation proves that supply-chain resilience partially mediates the association between the digital supply-chain maturity and the performance of the firms. The outcome builds on the existing literature since it provides a clearer understanding of how digital capabilities can be converted to performance outcomes. Although previous research tended to consider digital transformation and resilience as two distinct constructs, the current results are merged in the framework of a single study to explain the phenomenon. This is in line with the Dynamic Capabilities Theory which highlights that the value is created by resources (digital maturity) when they are converted into adaptive capabilities (resilience).

Lastly, the outcomes of the moderation show that environmental uncertainty enhances the relationship between digital supply-chain maturity and firm performance. The result is consistent with contingency-based arguments that propose that the value of digital capabilities increases with turbulent situations. The findings by (Wilden et al., 2013) suggest that dynamic capabilities produce better performance impacts in the uncertain environment. On the same note, (Alfalla-Luque et al., 2023) state that the value of analytics capabilities is more productive in the case of high environmental volatility. This trend is supported by the existing results, which show that the benefits of digital maturity yield better results in the situation when companies have to deal with the regulatory insecurity, market volatility, and competitive threat.

Nevertheless, other authors opine that extreme uncertainty can cause a deterioration of the digital-performance connection in case companies do not have complementary managerial capabilities (Teece, 2018). Even in very chaotic conditions, technology systems might not be sufficient to stabilize performance. The results of the current research indicate that within the Jordanian manufacturing environment, the environmental uncertainty boosts, as opposed to reducing the strategic value of digital maturity, these findings indicate that environmental uncertainty in the Jordanian manufacturing environment is a powerful enhancing factor, as opposed to a disempowering element, of the strategic value of digital maturity. This is possibly due to the fact that companies that work with unstable market, logistics, and governmental circumstances are more dependent on online presence, quicker information handling, and synchronous decisions to safeguard the performance results.

Altogether, the given study adds to the existing debate, as it introduces the concept of digital supply-chain maturity, resilience, and environmental uncertainty into a single empirical framework. It contributes to the development of the RBV by showing the way digital resources create performance benefits and enhances the Dynamic Capabilities Theory by empirically confirming the role of resilience. the results offer empirical evidence of the suggested combination of the Resource-Based View and Dynamic Capabilities Theory. In particular, the findings indicate that digital supply-chain maturity has the potential of being an asset to strategically contribute to the performance of firms both directly and indirectly via supply-chain resilience. Nonetheless, the study data is of cross-sectional and self-reported surveys, which makes the results only evidence of the hypothesized relationships that the data did not prove to be a definite causal transformation process.

As a manager, the results reveal that the digital transformation projects must be planned to be aligned with the resilience-building processes instead of considering them as individual technological improvements. Digital maturity investments can provide more benefits to the managers who are working in uncertain environments, especially when these investments can increase their adaptability and responsiveness to risk.

6. Conclusion

The current research analyzed the effect of digital supply-chain maturity on the performance of firms considering the mediating effect of supply-chain resilience and moderating effect of environmental uncertainty in manufacturing companies in Jordan. The results verify that the digital supply-chain maturity has a direct and indirect positive impact on the performance of firms as it improves the resilience capacity. In addition to that, the positive correlation is enhanced by environmental uncertainty between digital maturity and performance highlighting the contextual applicability of technological capabilities in turbulent environments.

Theoretically, the study adds to existing sources on supply chain and digital transformation by forming the connection between the Resource-Based View (RBV) and the Dynamic Capabilities Theory into a single empirical framework. Although digital transformation or resilience was often considered separately in the previous literature, this study shows that digital resources become digitally transformed into performance-enhancing deliverables through resilience mechanisms (Al-maaitah et al., 2026). In addition, the research also generalizes the findings on interpretations of contingency by empirically confirming the presence of environmental uncertainty as a contingency that defines the relationship between the digital and the performance, especially in an emerging economy setting.

Concerning practicality, the findings can provide useful information to managers and policymakers. The concept of digital supply-chain maturity needs to be seen not only as a technological improvement by manufacturing companies but as an addition to strategic capabilities that strengthens flexibility and competitiveness. The resilience-building efforts should be matched by investments in digital infrastructure (i. e. flexible sourcing strategies, real-time monitoring systems, adaptive planning mechanisms, etc.). Moreover, with high environmental uncertainty, companies are expected to achieve more performance benefits in the form of high-quality digital integration.

The study has a number of weaknesses in spite of its contributions. To begin with, cross-sectional design does not allow causal inferences on the relationships observed. Second, the information was gathered on one country and one industry sector which might limit generalization to the other situations. Third, the subjective managerial ratings were employed to measure performance of firms, which along with its popularity in the literature of emerging-market research is subject to perceptual bias.

The longitudinal research designs may be used in future studies to examine how digital maturity and resilience change over time. Relative analyses of various industries or nations can also help to shed more light on situational differences in digital transformation results. Further research can also be conducted on the moderated mediation models or application of other strategic capabilities including the supply-chain agility or innovation capability to further develop the theoretical construct (Nour et al., 2020). Besides the limitations discussed above, this study is prone to common method bias particularly, because of the application of a single survey instrument and responses by a single informant. Despite all the statistical and procedural solutions, it is never too late to exclude bias. Moreover, there are no control variables, which could result in omitted-variable bias. Reverse causality might also happen, as companies with greater performance might be more inclined to invest in digital capabilities. In future studies, the issues should be met via longitudinal data, multi-source designs and objective performance measures.

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