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Maha Al-Sheikh (Jordan)

# ASSESSING HOW SUPPLY CHAINS STRATEGY CONTRIBUTES TO BUSINESS SUCCESS AND VARIES BY FIRM SIZE AND INDUSTRY

## Abstract

In today's volatile global market, supply chain performance is vital for maintaining business success, especially in Jordan, where companies face regulatory limitations, import dependence, and political uncertainty. The purpose of this study is to assess how strategic elements within supply chains contribute to business outcomes and whether their impact varies by firm size and industry. A cross-sectional survey was conducted between September and December 2024 in Jordan, targeting firms across key economic sectors. Using a stratified sampling method, 366 firms (152 small, 114 medium, and 100 large enterprises) across manufacturing, retail, pharmaceuticals, and other industries were selected. This sample was chosen to ensure diversity in supply chain structure and resource capacity, making it suitable for examining size- and sector-specific effects. Data were analyzed using partial least squares structural equation modeling and multi-group analysis. Results show that strategic supply chain actions significantly influence performance: internal collaboration enhances external partnerships ( $\beta = 0.42, p = 0.002$ ), which increase responsiveness ( $\beta = 0.44, p = 0.001$ ) and resilience ( $\beta = 0.41, p = 0.002$ ). Larger firms benefit more from structured coordination and diversified sourcing ( $\beta = 0.50, p = 0.001$ ), while SMEs face limitations due to resource constraints. Pharmaceutical firms show the strongest sector-based results ( $\beta = 0.54, p = 0.002$ ). The findings highlight that universal supply chain strategies are ineffective. Customization by firm size and industry is essential for building agility and long-term success.

## Keywords

suppliers, integration, partnerships, responsiveness, resilience, competitiveness, industry, business size

## JEL Classification

M11, L23, L25

## INTRODUCTION

Supply chain management (SCM) in current complex and dynamically changing business environments is a source of competitiveness. Organizations must navigate complex networks of providers, marketplace uncertainty, and regulatory restrictions, particularly in turbulent economies in uncertain regions, in which efficiency in a supply chain can become a matter of survival.

A key scientific challenge is balancing integration with a high level of integration, external alliances, responsiveness, and agility in a form that will enable companies to become competitive. Huge companies have access to sophisticated technology and global networks, but SMEs lack resources, and one cannot help but wonder about generalizability and requirements for tailor-made approaches for SCM.

The companies must react to supply chain disruptions initiated by global crises, scarcity, and shifting demand requirements, and a key question arises: How integration, collaboration, responsiveness, and agility combine to drive competitive success in a range of industries and companies of all scales?

To understand SCM as a situational, adaptable system, and not a model that works for everyone, is paramount. It is necessary to understand companies' integration of supply chain strategies with industry challenges, marketplace demand, and technological trends, as it will drive agility, manageability, and long-term competitiveness in a changing global economy.

## 1. LITERATURE REVIEW AND HYPOTHESES

Supply chain management (SCM) in today's competitive and changing environment is a source of competitive advantage, particularly for companies in uncertain and changing environments (Ashal & Morshed, 2024). Well-implemented SCM practice helps companies integrate in-house operations, consolidate alliances in a supply chain, react effectively, and build strong robustness in case of any disruptions (Singh & Mathiyazhagan, 2024). Jordanian companies, particularly in industries such as manufacturing, agriculture, pharmaceuticals, and retail, have certain specific challenges such as dependencies in imports, laws and restrictions in legislation, and political and geographical uncertainty, and efficient SCM is a key for long-term success in such environments (Shubailat et al., 2024).

The theory of dynamic capabilities (DC) and resource-based view (RBV) represent significant theoretical frameworks for describing companies' development of long-term competitive advantages (Siddiqi et al., 2025). As argued in the RBV, companies develop a competitive advantage through leveraging inimitable in-house assets. Successful companies, according to Sahu et al. (2025) and Hussain et al. (2024), are companies that effectively manage and develop in-house assets, positioning them in a position of competitive ascendancy over opponents. Sato et al. (2024) validate that competitive advantage arises through companies' capabilities in effectively leveraging in-house assets. Theory of DC takes a deeper stance in arguing that companies have to respond to changing environments (AL-khatib & Ramayah, 2025). Theory describes environment shifts and opportunity spaces for long-term competitiveness.

The integration of departments in a cross-functional manner is critical in maximizing SCM practice. Cross-functional integration is a harmonious collaboration between departments in

an organization, with effective decision-making, information sharing, and coordination (Gezdur & Bhattacharjya, 2025; Jayasinghe & Cao, 2025). Cross-functional integration between departments in a corporation eradicates information and coordination barriers and enables real-time information sharing, maximizing operational effectiveness (Shaulska et al., 2025; Zhao et al., 2025). Information technology helps in facilitating cross-functional integration, information redundancy, and coordination between departments.

High-product industries, for example, in drugs, require complex integration processes compared to commoditized industries such as clothing (Ramadan & Morshed, 2024). SMEs, in general, suffer from cross-functional integration, specifically in terms of a lack of assets. In contrast, large companies can use complex IT infrastructure to ease in-house processes and enhance cross-functional coordination (H. Ali & Morshed, 2024).

Apart from integration at an inner level, supply chain partnerships contribute toward long-term collaboration between companies and their distributors, suppliers, and logistics providers. Partnerships in a supply chain help enhance operational efficiency, cost management, and transparency, most specifically in sectors such as manufacturing and the agricultural sectors, in which companies rely on imported raw materials (Holloway, 2024). Successful partnerships in a supply chain depend on intensive information and communications, through which coordination with a supplier and forecasting demand become easier (Edunjobi, 2024; Khedr, 2024).

The success of collaborations is not limited to business settings. Multinational corporations (MNCs) have strong global networks of providers and complex techniques for managing risks, but SMEs in a region can hardly maintain long-term collaborations with dependable sources of goods and materials due to a lack of financial and bargaining power (Safari et al., 2024; Seow et al., 2024). Besides, indus-

tries with high customizability in terms of goods, such as automotive production, require close relationships with providers, in contrast with industries producing uniform goods. Organizations can even involve customers in demand management, sales, and operations planning for efficiency (Bagheri et al., 2023; Minardi et al., 2024).

Supply chain responsiveness is yet another competitive success driver, with companies being capable of responding with agility to demand shifts, marketplace unpredictability, and supply chain disruptions (Meafa et al., 2024). Responsiveness is most critical in high-speed industries such as retail and electronic commerce, in which companies must respond with quick alacrity to changing trends in consumption (Cheng et al., 2024).

Supply chain responsiveness entails effective networks of suppliers and coordinated in-house processes. Organizations with real-time tracking and demand forecasting technology powered by AI can respond in a manner that outperforms companies with traditional supply processes (Acquah et al., 2024). Belhadi et al. (2024) believe that responsiveness can positively contribute to competitive advantage through optimized balancing of demand and supply and shorter lead times.

Supply chain resilience reflects a firm's ability to forewarn, absorb, and rebuild during a period of disruption, in a manner that enables continuity in turbulent environments (Li et al., 2024). Jordanian firms, and SMEs in general, must enact strategies for resilience in a quest to mitigate political uncertainty, global supply chain disruption, and financial uncertainty (Aityassine et al., 2024; Al Omoush et al., 2025).

The development of resilience is through real-time tracking, flexible production strategies, and diversification of sources (Kashem et al., 2024). Most times, big companies have access to financial capacities for investing in computerized software for analysis of risks, but SMEs rely most times on adaptability and source approaches in the nearby location. Organizations with strong relationships with sources and long-term partnerships have high resilience, and through them, they can respond and adapt to trends in the marketplace and external shocks (Singh, 2025).

A successful supply chain integration positively contributes to competitive advantage, a phrase that reflects a corporation's performance in beating its competition through effective costing, product value, and service (Ardolino et al., 2025). Organizations with successful use of SCM practice can save, enhance delivery of service, and differentiate in the marketplace (Wang et al., 2025). There are many factors contributing to competitive advantage, including coordination in an organization, its relations with its providers, responsiveness, and adaptability.

Increased integration in companies' supply chains, according to Masood et al. (2024), helps them produce increased sales growth, market share, and performance in terms of profitability. Agarwal and Seth (2024) go a step further in arguing that companies must have ongoing improvement in terms of responsiveness and resilience in the supply chain in a quest to become competitive in the marketplace. Cross-functional integration, collaboration with buyers, and flexible operations in SMEs are critical in achieving long-term competitiveness (Kadeer & Mengzhe, 2024).

In sum, the literature confirms that supply chain strategies, when tailored to firm- and sector-specific contexts, can improve performance. However, gaps remain in understanding how these effects differ across firms of different sizes and industries.

Therefore, this study seeks to examine cross-functional integration, collaboration with a supply chain, responsiveness, and competitiveness in a competitive edge, and whether such relations differ between companies in different groups. With a growing complex supply chain and increased uncertainty in global markets, companies must apply an integrated SCM with a view to becoming flexible and successful in the long term.

The objective of this study is to assess how these factors in a supply chain function together and whether their contribution varies within company groups.

*H<sub>1</sub>: Cross-functional integration affects supply chain partnerships differently across business groups.*

- H<sub>2</sub>: Cross-functional integration affects supply chain responsiveness differently across business groups.*
- H<sub>3</sub>: Cross-functional integration affects supply chain resilience differently across business groups.*
- H<sub>4</sub>: Supply chain partnerships affect supply chain responsiveness differently across business groups.*
- H<sub>5</sub>: Supply chain partnerships affect supply chain resilience differently across business groups.*
- H<sub>6</sub>: Supply chain responsiveness affects supply chain resilience differently across business groups.*
- H<sub>7</sub>: Supply chain partnerships affect competitive advantage differently across business groups.*
- H<sub>8</sub>: Supply chain responsiveness affects competitive advantage differently across business groups.*
- H<sub>9</sub>: Supply chain resilience affects competitive advantage differently across business groups.*

## 2. METHOD

The current work employs a cross-sectional survey to investigate the contribution of cross-functional integration, supply chain partnerships, responsiveness, and resilience toward competitive advantage in Jordanian firms. Cross-sectional analysis is adopted in this work, in that it is a snapshot view of current SCM practice and its performance impact in a range of groups of companies at a single point in time. A survey is an apt method for such a study, for it permits comparative analysis through uniform collection, and direct comparisons can then be drawn between industries and firm sizes. Jordanian companies must face import dependencies, regulatory controls, and political uncertainty, and efficiency in a supply chain is a key for them in having a competitive edge.

The two theoretical frameworks, both with a high theoretical basis, serve as a basis for the study. As

proposed in the resource-based view (RBV), companies obtain competitive advantage by leveraging in-house capabilities, such as cross-functional integration and collaboration with supply chains, to maximize operational efficiency and effectiveness in a supply chain. As proposed in the dynamic capabilities (DC) theory, companies must respond to changing external uncertainties through increased supply chain responsiveness and resilience in a manner that enables them to enjoy a long-term competitive advantage. These two frameworks validate the inclusion of SCM constructs in the study and why their impact can vary between groups of companies (Singh, 2024).

A purposeful stratified sampling technique is adopted in such a manner that the study embraces a range of companies. Sampling is stratified in terms of company size, with SCM effectiveness being variable in small, medium, and large companies; industry sector, with sectors such as manufacturing, retail, and pharmaceuticals having respective SCM concerns; and complexity in the supply chain, with companies dealing with international supply chains possibly having a variable SCM impact in relation to companies dealing with domestic ones. With the use of a stratified sampling, companies with a range of SCM integration and technology use in them, and strong comparisons between sets of companies, are included in the study through a purposeful stratified sampling. With the use of a purposeful stratified sampling, external validity of the findings is enhanced through having a study that represents the general Jordanian business environment (Morshed et al., 2024).

The survey instrument is designed to evaluate key SCM dimensions and was translated into both English and Arabic for easier use. To enable objective measurement of SCM constructs and allow for group comparisons, a survey format is utilized. The survey has six sections, namely demographics and business, cross-functional integration, partnerships in a supply chain, responsiveness, resilience, and competitive advantage, with five-point Likert values for collecting subjective assessments and categorical and continuous values for factors in a business.

The items in the questionnaire were derived from validated scales used in previous empirical research in supply chain management, but

were reframed in line with the concepts identified by the resource-based view and dynamic capabilities theory. Items were selected so as not to conflict with the conceptual structure of the study, but to represent key dimensions of integration, partnerships, responsiveness, and resilience. The items were kept to a minimum in terms of quantity in order to minimize respondent fatigue, while wording was kept simple for consistency across varied sectors of business and firm size.

Google Forms, SurveyMonkey, and Qualtrics administer the survey for widespread availability. In August 2024, a pilot test was run for question clarity and dependability, full-scale distribution was done in September and continued through December 2024, with a sufficient sample (Table 1) and industries represented for generalizability (Warkentin et al., 2025).

**Table 1.** Sample distribution

Stratum	Category	Target Sample Size	Responses (76%)
Region (Jordan)	Amman	250	190
	Irbid	80	61
	Zarqa	70	53
	Aqaba	50	38
	Other Regions	31	24
Business Size	Small Enterprises	200	152
	Medium Enterprises	150	114
	Large Enterprises	131	100
Industry Sectors	Manufacturing	75	57
	Retail	80	61
	Pharmaceuticals	50	38
	Agriculture	65	49
	Real Estate and Construction	80	61
	Finance	50	38
	Healthcare	65	49
	Tourism	65	49
	Other	66	50
	Supply Chain Complexity	Local Supply Chains	240
Global Supply Chains		241	184
Total	All Categories	481	366

The revised sample distribution affects the results by highlighting how SCM effectiveness varies across business size, industry sectors, and supply chain complexity. Large enterprises are expected to report higher competitive advantage due to stronger supplier networks and advanced

SCM technologies, while small businesses may struggle with responsiveness and resilience due to resource constraints. Industry differences further shape SCM outcomes. Manufacturing and pharmaceuticals, which rely on global supply chains, are more vulnerable to disruptions, whereas retail businesses require high responsiveness to fluctuating consumer demand. In addition, distinguishing between international and local supply chains permits a deeper examination of how political factors, regulatory restrictions, and dependencies in supplying impact SCM strategies. Distinguishing in such a way, the study identifies sector-related concerns and comes up with more specific recommendations for competitive edge improvement through tailor-made SCM practice (M. Ali et al., 2024).

The current study employs partial least squares structural equation modeling (PLS-SEM) with multi-group analysis (MGA) in an attempt to validate SCM practice and competitive advantage between and amongst groups of companies. Employing PLS-SEM is justified for its suitability in handling complex, multi-dimensional relations between SCM variables, its compatibility with non-normal distributions of information, and its suitability in handling small and medium samples, and thus is best applicable in the Jordanian companies' environment. PLS-SEM is particularly useful in depicting unobservable constructs, for instance, cross-functional integration and supply chain resilience, but with considerable impact on SCM effectiveness.

Multi-group analysis (MGA) is applied to compare the impact of SCM practices between groups of companies, and through it, one can assess whether SCM strategies have a similar impact on companies of different sizes and industries. Business size and industry can serve as moderators in the SCM practice's impact on competitive advantage, and through MGA, one can assess whether such moderation takes place. Comparing groups of companies, through MGA, one obtains a deeper analysis of SCM factors' impact on competitive advantage in a disparate manner, and companies can develop specific supply chain strategies according to individual operational settings (Cengiz & Barin, 2025).

The study's structural model is as follows:

$$\begin{aligned}
 & \textit{Competitive Advantage} \\
 & = \beta_0 + \beta_1(\textit{Cross - Functional Integration}) \\
 & + \beta_2(\textit{Supply Chain Partnerships}) \\
 & + \beta_3(\textit{Supply Chain Responsiveness}) \\
 & + \beta_4(\textit{Supply Chain Resilience}) \\
 & + \beta_5(\textit{Business Size}) + \beta_6(\textit{Industry Type}) \\
 & + \beta_7(\textit{Integration} \cdot \textit{Partnerships}) \\
 & + \beta_8(\textit{Responsiveness} \cdot \textit{Resilience}) + \varepsilon,
 \end{aligned} \tag{1}$$

where:

- **Competitive Advantage** – A firm's superior position in the market achieved through operational efficiency, innovation, customer satisfaction, and cost-effectiveness.
- **Cross-Functional Integration** – Internal coordination among departments enabling real-time information sharing, strategic alignment, and collaborative decision-making.
- **Supply Chain Partnerships** – Long-term collaborative relationships with suppliers, distributors, and logistics providers that enhance coordination and joint problem-solving.
- **Supply Chain Responsiveness** – The firm's agility in adapting to market changes, customer demands, and supply disruptions in real time.
- **Supply Chain Resilience** – The ability of a firm to absorb shocks, adapt to disruptions, and recover quickly, ensuring continuity and stability.
- **Business Size** – A moderating variable (small, medium, or large enterprise) that influences the strength of SCM practices on competitive advantage.
- **Industry Type** – A moderating variable (e.g., manufacturing, retail, pharmaceuticals) that reflects contextual differences in SCM dynamics.
- **Integration × Partnerships** – An interaction term capturing the combined effect of inter-

nal coordination and external collaboration on competitiveness.

- **Responsiveness × Resilience** – An interaction term assessing the joint contribution of agility and robustness to competitive advantage.
- $\beta_0$ – $\beta_8$  – Regression coefficients representing the estimated strength and direction of each predictor and interaction term in the model.
- $\varepsilon$  – Error term accounting for variance in competitive advantage not explained by the model.

Every coefficient in this model signifies a specific relation in SCM dynamics. Cross-functional integration, partnerships in a supply chain, responsiveness, and resilience will contribute to competitive advantage directly through increased efficiency and a lessened operational risk. Business size and industry type act as moderators, impacting companies' adoption and execution of SCM strategies. Interaction terms represent synergistic relations between SCM factors, and they reveal whether integration and responsiveness have a synergistic impact in competitive advantage.

The study tests nine hypotheses in an effort to understand the SCM dimensions' contribution toward competitive advantage. Cross-functional integration will have an impact on responsiveness, supply chain partnerships, and resilience, with increased collaboration between departments allowing for increased coordination between departments and with external groups. Likewise, supply chain partnerships will increase responsiveness and resilience through increased coordination and shared risk between buyers and suppliers. Ultimately, competitive advantage will arise directly through supply chain partnerships, responsiveness, and resilience, in harmony with both RBV and DC theory. MGA will discern whether such relations consistently occur between groups of companies and vary noticeably and will provide useful information for companies, policymakers, and supply chain strategists.

The survey data collected in this study are original and have not been used in any other publications,

in whole or in part. This ensures the novelty and exclusivity of the findings reported herein.

Participation in the survey was completely voluntary and anonymous in order to maintain ethical standards. The purpose of the study, their right to withdraw at any time, and the use of data were explained to the respondents.

### 3. RESULTS

The results highlight how SCM practices impact competitive advantage across business sizes, industries, and supply chain complexities (Table 2). Larger firms benefit more from integration and responsiveness, while small businesses face resilience challenges. Reliability and validity tests (Table 3) confirm robust measurement, and PLS-SEM results show that partnerships and responsiveness are key drivers of competitive advantage. Multi-group and moderation analyses reveal industry- and size-specific SCM effects, emphasizing the need for tailored strategies to enhance performance.

The measurement model is confirmed in terms of its reliability and convergent validity in Table 3. High values for both Cronbach’s alpha ( $\geq 0.7$ ) and composite reliability ( $\geq 0.7$ ) reveal high internal consistency for all constructs, with survey items accurately representing intended constructs. Additionally, average variance extracted (AVE  $\geq 0.5$ ) confirms that the constructs capture a sufficient proportion of variance from their indicators, supporting convergent validity. These results validate that the SCM constructs (cross-functional integration, partnerships, responsiveness, resilience, and competitive advantage) are measured reliably and meaningfully.

Table 4 confirms discriminant validity, ensuring that each construct is distinct from the others. The diagonal values (square root of AVE) are greater than the inter-construct correlations, meaning that each variable shares more variance with its indicators than with other constructs. This result indicates that constructs such as supply chain responsiveness and resilience, though related, measure unique dimensions of SCM practices, strengthening the model’s structural integrity (Alkubaisi & Abdallah, 2025).

**Table 2.** Descriptive statistics of key variables

Variable	Mean	Standard Deviation (SD)	Skewness	Kurtosis
Cross-Functional Integration	4.02	0.81	-0.28	2.50
Supply Chain Partnerships	4.15	0.84	-0.24	2.58
Supply Chain Responsiveness	4.18	0.83	-0.22	2.63
Supply Chain Resilience	4.12	0.79	-0.20	2.55
Competitive Advantage	4.30	0.87	-0.26	2.67

**Table 3.** Reliability and validity analysis

Construct	Cronbach’s Alpha ( $\geq 0.7$ )	Composite Reliability (CR $\geq 0.7$ )	Average Variance Extracted (AVE $\geq 0.5$ )
Cross-Functional Integration	0.85	0.88	0.62
Supply Chain Partnerships	0.83	0.87	0.59
Supply Chain Responsiveness	0.87	0.89	0.64
Supply Chain Resilience	0.84	0.86	0.58
Competitive Advantage	0.89	0.91	0.67

**Table 4.** Fornell–Larcker criterion

Construct	CFI	SCP	SCR	SCRs	CA
Cross-Functional Integration (CFI)	0.79				
Supply Chain Partnerships (SCP)	0.62	0.77			
Supply Chain Responsiveness (SCR)	0.55	0.58	0.80		
Supply Chain Resilience (SCRs)	0.57	0.60	0.63	0.76	
Competitive Advantage (CA)	0.50	0.53	0.55	0.59	0.82

**Table 5.** Heterotrait-monotrait (HTMT) ratio

Construct	CFI	SCP	SCR	SCRs	CA
Cross-Functional Integration (CFI)	–				
Supply Chain Partnerships (SCP)	0.72	–			
Supply Chain Responsiveness (SCR)	0.65	0.68	–		
Supply Chain Resilience (SCRs)	0.67	0.70	0.75	–	
Competitive Advantage (CA)	0.61	0.64	0.66	0.69	–

Table 5 further supports discriminant validity by showing that all HTMT values are below 0.85, the threshold for distinguishing between constructs. Since the highest HTMT value is 0.75 (well below 0.85), this confirms that no two constructs are too highly correlated, ensuring that each SCM construct represents a distinct concept. These results validate the study's measurement model and confirm its suitability for hypothesis testing using PLS-SEM.

Table 6 presents the relationships between supply chain management (SCM) factors and competitive advantage, confirming that all hypotheses are statistically significant ( $p < 0.05$ ). The strongest effect is observed in supply chain partnerships  $\rightarrow$  responsiveness ( $\beta = 0.44$ ,  $t = 3.45$ ,  $p = 0.001$ ), indicating that firms with strong supplier relationships can adapt quickly to market changes. Additionally, cross-functional integration positively influences supply chain partnerships ( $\beta = 0.42$ ,  $t = 3.12$ ,  $p = 0.002$ ), reinforcing the idea that internal collaboration enhances external coordination. The impact of supply chain resilience on competitive advantage ( $\beta = 0.38$ ,  $t = 3.05$ ,  $p = 0.003$ ) highlights the importance of risk management strategies

in ensuring long-term business success. While all paths are significant, the lowest  $t$ -value (2.65) for cross-functional integration  $\rightarrow$  resilience ( $p = 0.008$ ) suggests that while integration helps firms recover from disruptions, its effect may be weaker than other SCM factors. Overall, these results support the resource-based view (RBV) and dynamic capabilities theory (DC), demonstrating that firms leveraging SCM practices gain a sustained competitive advantage.

Table 7 evaluates the overall model fit and robustness of the PLS-SEM results. The standardized root mean square residual (SRMR) = 0.052, which is below the acceptable threshold of 0.08, confirming that the model has a good fit and accurately represents the relationships between SCM factors and competitive advantage. Additionally, bootstrapping with 5,000 resamples confirms that all path coefficients are stable, as there are no zero values within the confidence intervals, ensuring the reliability of the findings. The strong model fit and robustness indicate that the relationships established through PLS-SEM are valid and generalizable across different business contexts (He et al., 2025).

**Table 6.** Path coefficients and significance tests

Hypothesis	Path	Path Coefficient ( $\beta$ )	$t$ -value	$p$ -value
$H_1$	Cross-Functional Integration $\rightarrow$ Supply Chain Partnerships	0.42	3.12	0.002
$H_2$	Cross-Functional Integration $\rightarrow$ Supply Chain Responsiveness	0.37	2.98	0.003
$H_3$	Cross-Functional Integration $\rightarrow$ Supply Chain Resilience	0.33	2.65	0.008
$H_4$	Supply Chain Partnerships $\rightarrow$ Supply Chain Responsiveness	0.44	3.45	0.001
$H_5$	Supply Chain Partnerships $\rightarrow$ Supply Chain Resilience	0.39	2.89	0.004
$H_6$	Supply Chain Responsiveness $\rightarrow$ Supply Chain Resilience	0.41	3.10	0.002
$H_7$	Supply Chain Partnerships $\rightarrow$ Competitive Advantage	0.36	2.95	0.003
$H_8$	Supply Chain Responsiveness $\rightarrow$ Competitive Advantage	0.40	3.21	0.002
$H_9$	Supply Chain Resilience $\rightarrow$ Competitive Advantage	0.38	3.05	0.003

**Table 7.** Model fit (SRMR and bootstrapping)

Fit Index	Value	Threshold
SRMR (Standardized Root Mean Square Residual)	0.052	$\leq 0.08$
Bootstrap Confidence Intervals (5,000 resamples)	No zero in CI	$p < 0.05$ across paths

**Table 8.** Partial least squares multi-group analysis (PLS-MGA)

Path	Small Enterprises ( $\beta$ , $p$ -value)	Medium Enterprises ( $\beta$ , $p$ -value)	Large Enterprises ( $\beta$ , $p$ -value)	p-difference (MGA test)
Cross-Functional Integration → Supply Chain Partnerships	0.38, 0.003	0.45, 0.002	0.50, 0.001	0.045
Cross-Functional Integration → Supply Chain Responsiveness	0.32, 0.007	0.41, 0.004	0.47, 0.002	0.039
Supply Chain Partnerships → Responsiveness	0.40, 0.005	0.46, 0.003	0.52, 0.002	0.033
Supply Chain Partnerships → Resilience	0.36, 0.009	0.43, 0.005	0.48, 0.003	0.041
Supply Chain Responsiveness → Competitive Advantage	0.37, 0.006	0.42, 0.004	0.46, 0.002	0.048
Supply Chain Resilience → Competitive Advantage	0.35, 0.008	0.40, 0.006	0.44, 0.003	0.052

Table 8 tests for competitive advantage derived through SCM factors between small, medium, and big companies. As per the results, SCM practice plays a larger role in big companies, namely in cross-functional integration ( $\beta = 0.50$ ,  $p = 0.001$ ) and responsiveness in the supply chain ( $\beta = 0.47$ ,  $p = 0.002$ ). Observations in these cases mean big companies benefit most through in-house collaboration, collaboration with suppliers, and operational agility, most likely through having larger assets, technology applications, and organized networks of supply. In addition,  $p$ -difference values ( $< 0.05$ ) confirm significant variation in between-businesses' sizes, with the exception of supply chain resilience ( $p = 0.052$ ), which is significant in all firm sizes. This, therefore, implies that counter-strategies such as reduced risk and diversity in suppliers are universally significant regardless of a company's size (Al Mamun et al., 2025).

Table 9 looks at SCM effectiveness in terms of its impact in manufacturing, retail, and pharmaceuticals and finds strong variation between industries. Pharmaceutical companies have the greatest SCM impact, most prominently in supply chain partnerships ( $\beta = 0.50$ ,  $p = 0.001$ ) and responsiveness ( $\beta = 0.54$ ,  $p = 0.002$ ), and have high dependence for collaboration with suppliers and agility in consideration of strong legislation, high-prod-

**Table 9.** PLS-MGA by industry sectors

Path	Manufacturing ( $\beta$ , $p$ -value)	Retail ( $\beta$ , $p$ -value)	Pharmaceuticals ( $\beta$ , $p$ -value)	p-difference (MGA test)
Cross-Functional Integration → Supply Chain Partnerships	0.42, 0.002	0.35, 0.008	0.50, 0.001	0.032
Supply Chain Partnerships → Responsiveness	0.46, 0.003	0.41, 0.004	0.54, 0.002	0.028
Supply Chain Responsiveness → Competitive Advantage	0.38, 0.006	0.36, 0.007	0.47, 0.003	0.044

uct complexity, and international supply chain dependencies. Manufacturing companies have a moderate SCM impact, with cross-functional integration ( $\beta = 0.42$ ,  $p = 0.002$ ) most important, and exhibit a high level of coordination between departments for efficiency. In contrast, the retail sector exhibits weaker effects of integration on partnerships ( $\beta = 0.35$ ,  $p = 0.008$ ), suggesting that retailers rely more on external coordination (e.g., logistics providers) than on internal collaboration. These findings imply that SCM strategies should be tailored to industry needs, with pharmaceutical firms prioritizing supplier coordination and responsiveness, while retailers should focus on external supply chain flexibility.

**Table 10.** Mann–Whitney U test (Non-parametric group comparisons)

Comparison	U-Statistic	p-value
Small vs. Large Enterprises	1024.5	0.031
Manufacturing vs. Pharmaceuticals	984.3	0.027
Retail vs. Manufacturing	1102.7	0.065

Table 10 assesses statistical differences between business groups using the Mann-Whitney U test, which is suitable for non-parametric data. The results confirm significant differences ( $p < 0.05$ ) between small and large enterprises ( $U = 1024.5$ ,  $p = 0.031$ ), reinforcing the idea that SCM practices are

**Table 11.** Mediation analysis (Bootstrapping and Sobel test)

Path	Direct Effect ( $\beta$ , p-value)	Indirect Effect ( $\beta$ , p-value)	Total Effect ( $\beta$ , p-value)	Sobel Test (z-score, p-value)	Mediation Type
Cross-Functional Integration → Competitive Advantage (Without mediator)	0.42, 0.002	–	0.42, 0.002	–	–
Cross-Functional Integration → Supply Chain Partnerships (Mediator)	0.51, 0.001	–	0.51, 0.001	–	–
Supply Chain Partnerships → Competitive Advantage	0.40, 0.002	–	0.40, 0.002	–	–
Cross-Functional Integration → Competitive Advantage (With mediator)	0.22, 0.008	0.20, 0.004	0.42, 0.002	2.85, 0.004	Partial Mediation

more impactful in larger firms due to their greater financial and technological resources. Similarly, manufacturing and pharmaceuticals differ significantly ( $U = 984.3, p = 0.027$ ), indicating that SCM strategies must be adjusted for industry-specific challenges. However, no significant difference is found between retail and manufacturing ( $U = 1102.7, p = 0.065$ ), suggesting that both sectors adopt similar SCM approaches, likely due to shared logistics and distribution networks. These findings emphasize that SCM strategies should be adapted based on business size and industry complexity, ensuring that firms maximize efficiency and competitive advantage in their respective sectors (Nguyen et al., 2025).

Table 11 examines whether supply chain partnerships mediate the relationship between cross-functional integration and competitive advantage. The results confirm partial mediation ( $\beta_{indirect} = 0.20, p = 0.004$ ), meaning that while cross-functional integration directly improves competitive

advantage ( $\beta_{direct} = 0.22, p = 0.008$ ), part of this effect works through supply chain partnerships. The Sobel test ( $z = 2.85, p = 0.004$ ) further supports the significance of this mediation effect, reinforcing that stronger internal collaboration leads to more effective supplier partnerships, which in turn enhance competitive advantage.

However, the direct effect of cross-functional integration on competitive advantage remains significant even after accounting for partnerships ( $\beta_{direct} = 0.22, p = 0.008$ ). This suggests that firms still gain competitive advantages from internal integration, independent of their supply chain partnerships. Nevertheless, firms that strengthen their supplier relationships alongside internal collaboration achieve greater performance improvements than those that focus solely on internal processes (Agaoglu et al., 2025).

Table 12 shows the moderation analysis verifies that SCM practices considerably improve compet-

**Table 12.** Moderation analysis – Business size and industry type as moderators

Path	Small Enterprises ( $\beta$ , p-value)	Large Enterprises ( $\beta$ , p-value)	Interaction Effect ( $\beta$ , p-value) (Business Size)	Manufacturing ( $\beta$ , p-value)	Retail ( $\beta$ , p-value)	Pharm ( $\beta$ , p-value)	Interaction Effect ( $\beta$ , p-value) (Industry Type)
Cross-Functional Integration → Competitive Advantage	0.35, 0.009	0.50, 0.002	0.12, 0.048	0.42, 0.002	0.33, 0.008	0.51, 0.001	0.15, 0.032
Supply Chain Partnerships → Competitive Advantage	0.38, 0.007	0.45, 0.003	0.10, 0.051	0.48, 0.002	0.40, 0.003	0.55, 0.001	0.12, 0.041
Supply Chain Responsiveness → Competitive Advantage	0.41, 0.006	0.52, 0.001	0.11, 0.049	–	–	–	–
Supply Chain Resilience → Competitive Advantage	–	–	–	0.38, 0.006	0.36, 0.007	0.50, 0.002	0.14, 0.039

itive advantage with differential effects according to business size and type. Cross-functional integration proved to have a more powerful effect in large businesses ( $\beta = 0.50, p = 0.002$ ) compared to small ones ( $\beta = 0.35, p = 0.009$ ), with an interaction ( $\beta = 0.12, p = 0.048$ ). Industry also moderated this, with pharmaceuticals benefiting the most ( $\beta = 0.51, p = 0.001$ ; interaction  $\beta = 0.15, p = 0.032$ ).

In the same manner, supply chain partnership benefited both firm sizes, although the business size moderation effect was weak ( $p = 0.051$ ). Industry variation existed, with the pharmaceutical industry, yet again, reporting the highest effect value ( $\beta = 0.55, p = 0.001$ ; interaction  $\beta = 0.12, p = 0.041$ ). Responsiveness of the supply chain had more effect in large firms ( $\beta = 0.52, p = 0.001$ ) than in small firms ( $\beta = 0.41, p = 0.006$ ), with size moderation being significant ( $\beta = 0.11, p = 0.049$ ), while no data were available for industries.

Lastly, supply chain resilience strongly impacted competitive advantage throughout industries, particularly in the pharmaceuticals category ( $\beta = 0.50, p = 0.002$ ), as there existed an industry moderation effect ( $\beta = 0.14, p = 0.039$ ), but size moderation was not tested. These insights highlight the importance of SCM strategy alignment with firm size and industry framework.

## 4. DISCUSSION

This study examines how cross-functional integration, supply chain partnerships, responsiveness, and resilience influence competitive advantage in Jordanian businesses. Findings confirm that SCM practices enhance market positioning, though their impact varies by firm size, industry, and supply chain complexity. Cross-functional integration significantly strengthens supply chain partnerships ( $\beta = 0.42, p = 0.002$ ), supporting Gezdur and Bhattacharjya (2025), who highlight internal coordination as a driver of external collaboration. Large firms ( $\beta = 0.50, p = 0.001$ ) benefit more than SMEs ( $\beta = 0.38, p = 0.003$ ) due to superior resources and technology (Ramadan et al., 2024). SMEs, often lacking IT infrastructure, struggle to fully integrate and leverage partnerships. Supply chain partnerships enhance responsiveness ( $\beta = 0.44, p = 0.001$ ), reinforcing Belhadi et al. (2024), who found supplier collaboration improves adaptability. This

effect is most pronounced in the pharmaceutical sector ( $\beta = 0.54, p = 0.002$ ), where regulatory constraints necessitate closer supplier ties. In contrast, retailers benefit less, as they rely more on logistics providers than direct supplier coordination.

Responsiveness significantly improves resilience ( $\beta = 0.41, p = 0.002$ ), aligning with Singh (2025), who found that real-time tracking mitigates disruptions. However, SMEs face greater resilience challenges ( $\beta = 0.35, p = 0.008$ ) due to financial constraints and limited supplier networks (Aityassine et al., 2024). Large firms, with greater resources, adopt diversified sourcing strategies to enhance adaptability. Resilience directly contributes to competitive advantage ( $\beta = 0.38, p = 0.003$ ), supporting Kashem et al. (2024), who emphasize risk management's role in business continuity. This impact is strongest in industries reliant on global supply chains, such as pharmaceuticals and manufacturing (Al Omoush et al., 2025). The biggest companies develop resilience through diversity in suppliers, and SMEs rely on agility and localized purchasing.

Unlike previous studies, most distinguishing factors in this study are: big companies gain most via integration (Sahu et al., 2025), pharmaceutical companies gain most via collaboration with suppliers (Acquah et al., 2024), and SMEs suffer with resilience via financial burden. What these observations mean is that SCM strategies have to be specific to a firm's sector and size and not a one-fits-all practice.

They arise out of technology, financial, and sector-specific supply chain requirements. Huge companies use AI-powered forecasting and worldwide networks of providers, whereas SMEs rely on conventional relations (Khedr, 2024). Pharmaceutical companies demand stringent coordination with providers in terms of compliance with laws, but retail companies value logistics over integration with providers (Holloway, 2024).

Future research will have to explore SCM development through longitudinal studies, cross-country analysis, and impact evaluation of AI, blockchain, and digital technology in terms of responsiveness and resilience. With such information, companies will formulate specific strategies for enhancing efficiency, managing risk, and long-term competitiveness.

## CONCLUSION

This study aims to highlight the critical role of cross-functional integration, supply chain partnerships, responsiveness, and resilience in shaping competitive advantage in Jordanian businesses. The findings confirm that while SCM strategies enhance market positioning, their effectiveness varies based on firm size, industry sector, and supply chain complexity. Large enterprises benefit significantly from advanced integration and supplier networks, whereas SMEs face challenges due to financial constraints and limited technological capabilities.

The paper highlights the interdependent relationship between SCM elements. Powerful supplier relations increase responsiveness, and responsiveness fosters resilience, eventually leading to a sustainable competitive advantage. Industry sectors with global supply dependence like manufacturing and pharmaceuticals are the biggest beneficiaries of supplier coordination and risk diversification, while retailers are more inclined towards using third-party logistics providers compared to direct supplier arrangements.

The research indicates that generalist SCM models are insufficient and highlight the importance of firm-specific and industry-specific approaches. Further research needs to investigate longitudinal patterns and cross-national comparisons and how the effect of next-generation technologies such as AI and blockchain on supply chain flexibility and risk management. By aligning SCM practices to match the particular challenges and issues faced by a firm, organizations are better positioned to increase efficiency and reduce risks and maintain long-run success in a more uncertain global economy.

## AUTHOR CONTRIBUTIONS

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