Lean Supply Chain Management Practices and Performance: Empirical Evidence from Manufacturing Companies

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***Abstract*— The current study aims to investigate the effects of lean supply chain management (LSCM) practices on supply chain performance and market performance of manufacturing companies in Jordan. Five LSCM practices were identified based on an extensive literature review, namely, just-in-time system, flow of information, supplier relationship, customer relationship, and waste reduction. To achieve the study goals, a survey questionnaire was prepared and distributed to managers of 400 manufacturing companies from different industries and sizes. The final number of usable questionnaires was 308, representing a response rate of 77%.**

The results revealed positive and significant effects of three LSCM practices on market performance, namely, just-in-time system, flow of information, and customer relationship. In addition, all LSCM practices showed positive and significant effects on supply chain performance. Furthermore, supply chain performance demonstrated a positive and significant effect on market performance.

This study is motivated by the fact that the effect of LSCM on performance is an under-investigated area in the literature. It contributes to the existing knowledge by identifying the most widely used LSCM practices and exploring their effects on supply chain performance and market performance of manufacturing companies in a developing country.

***Keywords*—** *Lean supply chain management, Supply chain performance, Market performance, Manufacturing companies, Jordan.*

1. Introduction

Markets are currently witnessing many changes, such as intense competition, rapid innovations, advances in manufacturing and information technologies, and discerning customers. The uncertainty related to have turbulent market conditions and customer demand has increased the necessity for adopting new competitive strategies that increase the ability of manufacturing companies to respond in an efficient and effective manner to have a dynamic and interactive environment. These realities have encouraged manufacturers to look for advanced modes of supply chains (SCs) that enable the transfer of high-quality products in a short timeframe and increase their competitiveness. Improving the efficiency and effectiveness of SCs represents the main challenge for manufacturing companies aiming at sustaining and improving their competitiveness. Lean management can be incorporated into supply chain management (SCM) to reduce the cost, delivery time, and improve the effectiveness of SCs [1], [2]. Lean is increasingly being used as a way to manage the SC and can become a long-term philosophy for guiding companies in the direction of high-class overall performance [3], [4]. Currently, the implementation of the lean SC approach has become a trend in the global market and is one of the major strategies being adopted by manufacturing companies.

Jordanian manufacturing companies are facing considerable challenges in reacting to regional and international competitors in terms of quality, delivery, flexibility, and cost. These challenges have become a reality due to free trade agreements signed by the Jordanian government, which ended the era of protection of local companies. In addition, Jordan's membership in the World Trade Organization made the situation more difficult for Jordanian manufacturers. It is worth noting that the manufacturing inputs in Jordan are among the most expensive regionally. Lean supply chain management (LSCM) represents an optimal strategy for Jordanian manufacturers to improve the

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efficiency and flexibility of their operations and SCs in an attempt to improve their market performance.

Although the existing literature emphasizes the essential role of LSCM in enhancing the performance of manufacturing companies, there is a lack of consensus on what practices constitute LSCM. Furthermore, it is still unclear which LSCM practices are expected to enhance SC performance and market performance. Moreover, the effect of LSCM and SC performance on market performance have rarely been investigated in the Middle East in general and Jordan in particular.

Therefore, the current study attempts to address the gaps in the existing literature by investigating the impact of LSCM practices on SC performance and market performance, which will be investigated in manufacturing companies in Jordan.

2. Literature Review

2.1 Lean Supply Chain Management

LSCM refers to the implementation of lean principles across the entire SC [5]. Ref. [6] defined LSCM as "a set of organizations directly linked by upstream and downstream flows of products, services, information and funds that collaboratively work to reduce cost and waste by efficiently pulling what is needed to meet the needs of individual customers." Researchers are increasingly paying attention to the concept of LSCM as an effective way to improve operations and eliminate waste along the SC [7]. Early lean studies of [8] and [9] indicated that lean management principles can be applied across the SC. Lean SC means also applying steps to eliminate all types of waste across the SC, guided to minimize the production lead time and SC-related costs [10]. Ref. [11] argued that lean paradigms are deployed for the intention of SC improvement and company performance. Adopting LSCM yields several benefits including greater manufacturing efficiency, reduced costs, improved flexibility, and enhanced competitiveness and success [12]. In addition, a lean supply chain allows a smooth flow of products, information, and technologies among supply chain partners without waste [5]. Furthermore, [13] argued that LSCM is integrated into upstream and downstream activities that may reduce demand variation by simplifying, optimizing, streamlining, and creating capabilities. Moreover, manufacturing companies realized that combining SCM with lean management could yield superior performance outcomes [5].

Different practices have been used in the literature to measure LSCM. [14] measured LSCM in terms of setup time reduction, continuous improvement, pull production, shorter lead time, and small lot size. [15] measured LSCM in terms of customer and supplier management, SC features, communication and speed, and information sharing. [16] considered four constructs to measure LSCM practices, customer relationships, supplier relationships, e-commerce, and enterprise software. [17] used the following measures of LSCM, JIT capabilities, participating in sourcing decisions, geographical proximity of suppliers, information sharing, improved integration, communicating future strategic needs, and reduced response time. [18] empirically validated four bundles of LSCM practices, namely, elimination of waste and continuous improvement, logistics management, top management commitment, and customer-supplier relationship management. Ref. [19] determined the following LSCM practices, waste reduction, process focus, continuous improvement, customer focus, systems perspective, and cooperative relationships. Ref. [11] determined the following LSCM practices, supplier partnership, JIT, pull flow, quality management, and customer relationships. Ref. [20] used the following practices for LSCM, customer relationship, supplier development and partnership, JIT production, set-up time reduction, concurrent engineering, and design for manufacturing. Ref. [21] measured LSCM in terms of supplier selection, pull production, information technology, process focus, and employee empowerment. Ref. [7] measured LSCM in terms of JIT, total quality management, human resource management, total productive maintenance, manufacturing strategy, supplier relationship management, and customer relationship management.

Based on the reviewed studies, five LSCM practices were defined as the most widely and commonly used in the literature: JIT system, flow of information, supplier relationship, customer relationship, and waste reduction. These five LSCM practices are discussed in the subsections below.

2.1.1 Just-In-Time System

JIT system is defined as an integrated SC strategy incorporating defined elements of JIT-production, JIT-purchasing, JIT-selling, with the addition of an important new element, JIT-information [22]. Some of the JIT lean principles are inventory, production, human resource, quality, and supplier relation principles [23].

JIT system has been a key element in the development of lean production in many companies [24], [25]. In addition, lean production processes require small-size deliveries from approved suppliers, which helps to minimize inventory levels and the associated inventory holding costs [26].

The benefits of implementing JIT system include improved quality, increased responsiveness, reduced cost, minimized inventory levels, improved productivity, decreased lead time, and reduced downtime [2], [27], [28]. Researchers pointed to some barriers to JIT implementation including absence of top management support, lack of supplier training, lack of employee participation, and local culture barriers [29], [7].

2.1.2 Flow of Information

Flow of information aims at acquiring and diffusing information among SC partners in order to improve decisions, operations, responsiveness, and service levels [30]. Several researchers pointed to information sharing as one of the main pillars in SC and lean management [31], [32], [33]. [32] further argued that sharing information with SC partners can be a source of competitive advantage. However, the impact of shared information depends on how and when information to be shared and with whom [33], [34]. In this vein, the benefits of information sharing depends on the quality of shared information [30], [35]. Quality of shared information refers to accuracy, sufficiency, timeliness, and truthfulness of exchanged information which leads to enhanced SC performance [36]. On the contrary, transfer of distorted information will misguide SC members in their decisions, resulting in wastes, thereby affecting the coordination between the different stages of a SC [37].

Shared information may include production information, inventory levels, delivery and shipment information, capacities, order quantities, prices, point-of-sale, and competition information [38].

2.1.3 Supplier Relationship

Supplier relationship refers to the ability of a firm to establish, manage, and maintain long-term reliable partnership with its suppliers [32]. It was also defined as "the organizational practice of a buying firm and its suppliers sharing and applying operational, financial, and strategic knowledge in order to generate mutual benefits" [39]. Supplier relationship is expected to reduce costs and increase trust levels [40], enhance responsibility and improve technological and design capabilities of SC partners [32], align capabilities and build learning routines [41], and minimize or eliminate wasted activities and time [42]. It also may include integrated processes, long-term contracts, mutual quality improvements programs, and risk and reward sharing [43], [41].

2.1.4 Customer Relationship

Customer relationship is defined as a set of activities related to building long-term relationships with customers, managing customer complaints, and enhancing customer satisfaction [32]. [44] argued that customer relationship is a way of obtaining information about products, market needs, inventory, and operational processes from the organizations' clients. It was also defined as "demand management practices through long-term customer relationship, satisfaction improvement, and complaint management" [45]. Customer relationship involves different forms and activities including integrated problem-solving initiatives, establishing long-term relations with customers, enhancing customer contacts, effective response to customer complaints, and increasing customer satisfaction [46], [47].

Different benefits of customer relationship have been reported in the literature including increased customer loyalty, improved problem-solving process, enhanced knowledge and expertise sharing, improved understanding of customer needs, enhanced responsiveness to customers, enhanced capacity to differentiate products, and increased market share [37], [48].

2.1.5 Waste Reduction

[49] defined waste as "any human activity which absorbs resources but creates no value." Waste was also defied as "anything other than the absolute minimum resources of material, machines, and

manpower required to add value to the product" [50]. This includes any tasks performed by organizations that consume resources without adding value to the customer's final product [51]. Waste reduction leads to optimized and simplified processes along the entire SC [27].

The widely known types of waste are overproduction, waiting, transport, unnecessary motion, over-processing, defects, excessive inventory, and unused employee creativity [52]. [53] pointed to four groups of office waste: people waste, process waste, information waste, and asset waste.

2.2 Supply Chain Performance

Researchers have investigated SCP from different perspectives. [54] investigated SCP in relation to product development strategy focusing on efficiency. [55] measured SC performance in terms of cost, flexibility, responsiveness, and relationship. [56] used the measures of flexibility and efficiency to measure SCP. [57] pointed to efficiency and effectiveness as appropriate measures of SCP. Similarly, [37] used efficiency and effectiveness to measure SCP. In this study, the widely used indicators of efficiency and flexibility have been adopted to measure SCP.

Efficiency refers to the usage of minimum resources and often is measured in terms of cost and inventory turnover [37], [58]. Flexibility is a key measure of SCP and is often regarded as a reaction to environmental uncertainty [59]. It refers to the ability of making available the products or services to meet the particular customer demands [60].

2.3 Market Performance

MP is a core construct of interest for researchers concerned with any area of management. It is often characterized in terms of the market share (e.g., market share growth) and sales indicators (e.g., sales volume, sales growth) of a company's products and services [61], [62]. [63] pointed to comparative sales growth, market growth, and the profitability as appropriate measures of MP. [64] measured market performance in terms of customer satisfaction, delivery reliability, and responsiveness to customer needs. [65] used the measures of customer satisfaction, profitability, and market share and growth to reflect MP. In this study, the indicators of market share, overall competitive position, sales, customer satisfaction, and profitability have been used to measure MP.

3. Theoretical Framework and Hypotheses Development

3.1 Research Framework

This research is based on the framework proposed in Figure 1. The framework depicts the effects of LSCM practices on SC performance and MP. The effect of SCP on MP is also proposed.

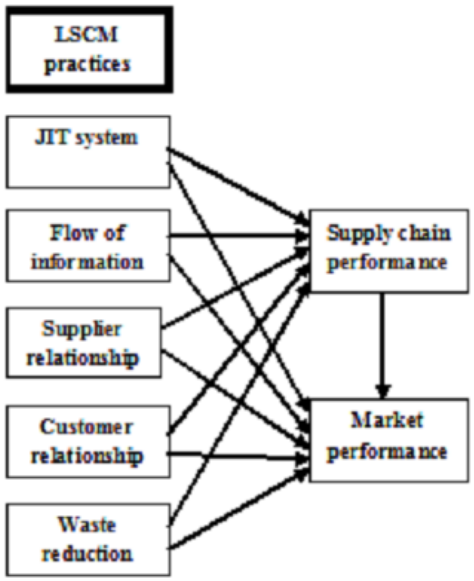

Figure 1. Research model

3.2 JIT System and Performance

JIT improves performance through reducing inventory levels and operational costs, and maximizing customer responsiveness [66]. In addition, JIT techniques lead to reduced set-up time and improved quality levels [67]. The improvements in material flow accompanied with reduced costs and improved quality will result in improved SCP and MP [68]. Moreover, JIT enhances the competitiveness of a firm and increases customer satisfaction through meeting their different requirements effectively and efficiently [69]. The decreased inventories, minimized defects and failures in the operational processes, and enhanced ability to identify and eliminate bottlenecks are expected to considerably improve SCP [70]. [71] found that JIT system is positively related to inventory turnover, cycle time,

and competitive performance. [72] found positive effects of JIT on some measures of operational and business performances.

H1. JIT is positively related to SCP.

H2. JIT is positively related to MP.

3.3 Flow of Information and Performance

Flow of information within internal organizational units as well as with suppliers and customers represents a source of competitive advantage [58]. Real-time information exchange with suppliers in the upstream and with customers in the downstream will create an opportunity for optimizing operations and improving MP [73].

Ref. [32] asserted that sharing of the available data with other SC partners can speed up the information flow in the SC, enhance flexibility and efficiency of the SC, and increase responsiveness to changing customer needs. Ref. [74] indicated that more information sharing leads to greater visibility across the SC, and thus contributes to lower inventory levels. Ref. [75] concluded that information sharing within a SC could lower SC costs considerably and reduce lead time through reductions in inventories and shortages. In addition, the rapid data and information transfer between an organization and its partners results in increased cooperation and efficiency [31]. Collaborative planning activities and information sharing have been found to have a positive effect on SCP, but the quality of information shared and the level of trust between the firms must be considered as well [76]. Ref. [37] found that information sharing positively related to SC efficiency and effectiveness. Ref. [56] showed that information sharing is positively related to SCP and MP. On the other hand, [77] found no relationship between SC information sharing and various measures of MP.

H3. Flow of information is positively related to SCP.

H4. Flow of information is positively related to MP.

3.4 Supplier Relationship and Performance

Within lean initiatives, close coordination with suppliers enables the manufacturer to decrease inventories, reduce business risks, enhance product quality, and provide stable supply prices [21]. In addition, supplier relationship leads to reduced costs, improved quality, enhanced product design with greater flexibility, increased information sharing, and improved delivery performance [17]. Strategic supplier relationship enables organizations to foster close working relationships with key suppliers, promotes open communication among SC partners, and leads to a long-term strategic relationship orientation to achieve mutual gains, which support customer responsiveness and affect buying organizations' MP and SCP [78].

Ref. [58] studied the relationship between SC linkages and SCP and found that supplier integration is highly related to reliable SCP. Other empirical studies demonstrated that supplier integration is positively related to different performance measures [79], [80], [32], [81]. However, [82] found only weak relationships between supplier collaboration and performance improvement.

H5. Supplier relationship is positively related to SCP.

H6. Supplier relationship is positively related to MP.

3.5 Customer Relationship and Performance

Customer relationship leads to long-term partnership between an organization and its customers founded on mutual trust and the ability to meet customers' needs, promote cooperation, openness of communication, and a problem-sharing attitude, leading thus to improved overall performance [83]. A close and efficient customer relationship allows an organization to sustain customer loyalty, differentiate its products from competitors, and extend the value it provides to customers [84]. Furthermore, customer-focused practices such as determining and communicating a customer's future needs, obtaining the customer's feedback, educating customers, providing after sales services, and participating in the customer's marketing efforts are expected to improve MP and SCP [85].

[86] found a direct positive effect of customer relationship orientation on MP. [37] found a positive effect of customer integration on SCP. Other researchers found a positive effect of

customer relationship on different performance measures [87], [88], [33], [89].

H7. Customer relationship is positively related to SCP.

H8. Customer relationship is positively related to MP.

3.6 Waste Reduction and Performance

Achieving perfection through waste reduction is a key aspect of a lean system through the elimination of non-value-adding activities and other forms of waste [52], [3]. Waste reduction can be achieved through the implementation of lean principles, which includes assessing the current situation and designing a production system based on lean system concepts and techniques [9]. Organizations that apply waste reduction strategy can lower operational and SC related costs including waste management costs, hazardous material management costs, time and costs for reporting, as well as savings from conserving energy, water, fuel, and other resources, which positively will affect SCP and MP [90]. Waste reduction decreases the requirements for resources while maintaining increasing output levels. Waste reduction contributes to improving SC performance by streamlining processes and increasing process consistency [91]. [92] found a positive relationship between waste elimination and the maximization of productivity of manufacturing organizations.

H9. Waste reduction is positively related to SCP.

H10. Waste reduction is positively related to MP.

3.7 SCP and Market Performance

The purpose of SC improvements is to improve MP dimensions including profitability, market share, and customer responsiveness [93]. MP will be improved as a result of using optimum capabilities of SC partners [45], eliminating the inefficiency along the SC [93], enhancing flexibility to responding to unexpected customer needs and requirements [94], and increasing the relationship effectiveness [32]. In addition, SCP positively affects MP through the enhanced coordination of critical activities across the SC [95]. Improved SC flexibility enables switching production among SC partners, increasing thus, the ability to cope with variability in customer demand and leading to enhanced MP [96]. Ref. [97] argued that the benefits of applying SCM will be reflected in the short term in the form of improved SCP. They further indicated that the improved SCP will lead to increased MP in the long run.

Ref. [97] using a sample of 211 companies in the USA found that collaborative advantage (SCP) is positively and significantly related to business performance. Ref. [95] using a sample of 474 manufacturing managers in the USA found that SCP positively affects MP. Ref. [32] using a sample of 196 companies in the USA found that SC-related competitive advantage positively and directly related to organizational performance. Ref. [93] using a sample 231 responses from the Australian food and hardware retailing firms found that SCP positively affects customer responsiveness and financial performance.

H11. SCP is positively related to MP.

4. Methodology

4.1 Sample

The research population consisted of all manufacturing companies operating in the capital city of Amman, Jordan. The total number of manufacturing companies in Amman is 1200 [98]. The appropriate sample size for this population is 292 [99]. The unit of analysis is a manufacturing plant. Convenience sampling was used to select the targeted manufacturing companies. One respondent representing each company's management was targeted. To achieve the targeted sample size, 400 questionnaires were distributed by the researchers to the companies. The targeted respondents were managers whose responsibilities are related to SCM. These included general managers, deputy general managers, operations managers, SC managers, plant managers, and others. The surveyed companies were selected from different industries to ensure the diversity of the sample. The surveyed companies included electrical, chemical, food, electronics, pharmaceuticals, plastic and rubber, and others. Three hundred forty-one questionnaires were completed by the respondents, and 33 questionnaires were excluded because of missing data. Thus, the final number of usable questionnaires is 308, representing a response rate of 77%. This rate is considered acceptable compared with other empirical studies in Jordan that used personal visits approach to collect the

data. For instance, [100] received a response rate of 69%, [101] received a response rate of 80.6%, and [102] got a response rate of 64.3%.

4.2 Questionnaire and Measures

A survey questionnaire was prepared to collect the data. The items included in the survey were adapted from the existing literature. The survey was first prepared in English language and then translated into Arabic. Both versions were reviewed by five professors in Operations and Supply Chain Management. Based on the received feedback, revisions were made as needed. Additionally, the survey was pre-tested by five managers from different companies to check the understandability of the question items and the needed revisions were made.

JIT construct included six items and was adapted from [68] and [22]. Flow of information construct included eight items and was adapted from [32] and [103]. Supplier relationship construct included seven items adapted from [58], [56], and [104]. Customer relationship included seven items adapted from [103] and [104]. Waste reduction construct included seven items adapted from [27] and [22]. SCP construct included 16 items adapted from [105], [84], and [56]. Finally, MP construct included five items adapted from [32] and [84].

Respondents were asked to indicate their agreement or disagreement with the statements provided using 5-point Likert scale where 1 indicated strongly disagree and 5 indicated strongly agree. Items related to MP require respondents to evaluate their performance as compared to their competitors in the same industry during the last three years.

4.3 Measurement Validity and Reliability

Exploratory factor analysis (EFA) was applied to evaluate the validity of the research constructs. Principal component analysis and the promax rotation method were selected to run the analysis. All the items were entered simultaneously, and as was initially expected, seven distinct factors resulted. Items that loaded onto one factor with item loadings greater than 0.40 were retained [106]. Twenty three items did not meet this criteria and were deleted. The large number of deleted questions could be attributed to adapting the items for most constructs from different sources. In addition, SC question items tend to be highly correlated, and this may resulted in cross-loadings of many items. Eigenvalues for the seven constructs were greater than one.

To test the reliability of the constructs, Cronbach's α-coefficient was applied. Alpha values ranged between 0.796 and 0.935 indicating reasonable internal consistency [106].

Based on EFA results, confirmatory factor analysis (CFA) was run using Amos 20. The objectives of running CFA were to ensure that all the item loadings were greater than 0.50 and were greater than twice their standard errors so that to provide support for convergent validity, to ensure that the average variance extracted (AVE) value for each construct was above 0.50 to further support convergent validity, to verify that the composite reliability value for each construct was above 0.70 to provide a satisfactory evidence of reliability, and to confirm that the model fit indices were within the recommended values [107], [108], [109]. Ten additional items were deleted to meet these values.

The final model fit indices fitted the data reasonably well (X^2 = 589.219; d.f. = 209; X^2/d.f. = 2.819; CFI = 0.922; GFI = 0.891; NNFI = 0.917; and RMSEA = 0.069). The normed chi-square of 2.819 is less than the maximum value of 3.0 [110]. The comparative fit index (CFI) and non-normed fit index (NNFI) are greater than the recommended minimum values of 0.90 [107]. The goodness-of-fit index (GFI) is slightly below the recommended minimum value of 0.90 [107]. The root mean square error of approximation (RMSEA) is 0.069 indicating acceptable model fit [107], [111]. Table 1 shows means and standard deviations of study constructs, the standardized factor loadings of CFA, Cronbach's alpha values, and composite reliability for the final constructs.

Discriminant validity was evaluated by ensuring that the square root of each AVE value of each construct is higher than the absolute correlation values between that construct and other constructs. All the constructs met this criterion, providing reasonable support for discriminant validity [108]. Moreover, the AVE value for each construct was greater than the maximum shared squared variance (MSV) and average shared squared variance (ASV) values for that construct as shown in Table 2, providing additional support for discriminant validity [106].

Table 1. Reliability and validity of the constructs

Construct	Item number	Mean	Standard deviation	Loadings CFA	Cronbach's alpha	Composite reliability
JIT		4.25	0.681		0.796	0.789
	JIT5			0.789		
	JIT6			0.840		
FI		3.94	0.661		0.811	0.811
	FI1			0.738		
	FI2			0.765		
	FI3			0.799		
SR		3.84	0.795		0.847	0.858
	SR5			0.795		
	SR6			0.902		
	SR7			0.751		
CR		4.04	0.760		0.843	0.845
	CR1			0.694		
	CR2			0.872		
	CR4			0.837		
WR		4.28	0.659		0.913	0.912
	WR1			0.826		
	WR2			0.861		
	WR3			0.950		
SCP		3.95	0.682		0.869	0.882
	SCP3			0.739		
	SCP4			0.769		
	SCP5			0.759		
	SCP10			0.837		
	SCP14			0.765		
MP		3.99	0.961		0.935	0.938
	MP1			0.917		
	MP2			0.937		
	MP3			0.907		
	MP5			0.791		

Table 2. Discriminat validity

Construct	AVE	MSV	ASV	1	2	3	4	5	6	7
1. JIT	0.664	0.227	0.153	0.815						
2. FI	0.589	0.477	0.310	0.408	0.768					
3. SR	0.670	0.651	0.325	0.254	0.691	0.818				
4. CR	0.648	0.631	0.374	0.448	0.675	0.795	0.805			
5. WR	0.775	0.294	0.135	0.276	0.238	0.542	0.448	0.881		
6. SCP	0.600	0.484	0.321	0.429	0.631	0.596	0.696	0.426	0.775	
7. MP	0.792	0.323	0.203	0.476	0.553	0.332	0.499	0.063	0.568	0.890

5. Results

Study hypotheses were tested using structural equation modeling with Amos 20. The results show that the effects of all LSCM practices on SCP are positive and significant, therefore hypotheses H1, H3, H5, H7, and H9 are supported. As for the effects of LSCM practices on MP, three practices, JIT, flow of information, and customer relationship show positive and significant effects, therefore hypotheses H2, H4, and H8 are supported. The effects of supplier relationship and waste reduction on MP are negative and significant, therefore hypotheses H6 and H10 are not supported. Finally, the effect of SCP on MP is positive and significant, therefore hypothesis H11 is supported. Table 3 provides summary of the tested hypotheses.

Table 3. Summary of results

Hypothesis	Path	Standardized regression Weights	*p*-value	Result
H1	JIT → SCP	0.122	0.017	Supported
H2	JIT → MP	0.264	0.000	Supported
H3	FI → SCP	0.397	0.000	Supported
H4	FI → MP	0.276	0.000	Supported
H5	SR → SCP	0.134	0.015	Supported
H6	SR → MP	- 0.104	0.030	Not supported
H7	CR → SCP	0.349	0.000	Supported
H8	CR → MP	0.224	0.000	Supported
H9	WR → SCP	0.207	0.000	Supported
H10	WR → MP	- 0.246	0.000	Not supported
H11	SCP→ MP	0.312	0.000	Supported

6. Discussion and Conclusion

6.1 Discussion

The findings of the study showed significant and positive effects of three LSCM practices, namely flow of information, JIT, and customer relationship on MP. This confirmed earlier findings on the presence of positive effects of these practices on MP [32], [66], [86], [89].

The exchange of high-quality information between partners improves the coordination and responsiveness of the partnership and ultimately MP, such as sales growth, market development, and product development [73], [112]. Furthermore, the sharing of information across the SC will lead to closer integration, which improves productivity, customer service, and MP. This implies that timely and accurate information can be a source of competitive advantage. JIT proved to be one main driver of MP in manufacturing companies. JIT is a major component of LSCM, and a comprehensive implementation of this strategy is expected to contribute to organizational performance and may provide manufacturing companies with a competitive advantage [66]. Customer relationship is also essential LSCM practice that can considerably improve MP. Such relationship is expected to improve quality, flexibility, and delivery performance. It also enhances the company's responsiveness to its customers increasing, thus, their satisfaction. Manufacturing companies should focus on building long-term relationships with key customers in order to avoid any future problems and timely respond to their complaints and requirements. On the one hand, the findings of this study showed negative significant effects of supplier relationship and waste reduction on MP. These results are inconsistent with some previous studies [92], [81], [80], [32], [90]. The result regarding supplier partnership could be attributed to the fact that most Jordanian manufacturers rely on international suppliers, and cultural differences seem to inhibit the exploitation of expected market benefits of the relationship. The negative effect of waste reduction on MP could be attributed to the fact that waste reduction efforts

reflect operational and SC improvements that are expected to improve SCP, but it seems that these improvements are not perceived by customers. Moreover, waste reduction efforts require resources, training, and time to succeed, and this may negatively affect profitability and MP in the short-term.

The results revealed a significant positive effects of all LSCM practices on SCP. This is in line with previous literature [37], [68], [58], [80], [70], [88], [32]. LSCM represents an ideal strategy for manufacturing companies to improve their SCP. The expected benefits may include reduced costs, improved quality, faster delivery, and enhanced flexibility. In addition, LSCM practices can provide solutions to reduce lead times and improve responsiveness to demand variability.

Finally, the results showed that SCP is positively related to MP. This is consistent with previous literature examining this relationship [97], [95], [32], [93]. This indicates that SCP is an essential indicator of MP for manufacturing companies in today's dynamic and competitive environment. Companies seeking improvements in their MP should not focus solely on internal improvements, but rather should pay considerable attention on improving their SCP through adopting LSCM practices.

6.2 Conclusion

This study developed a theoretical framework to investigate the effects of LSCM practices on SCP and MP performance in Jordanian manufacturing companies. Additionally, the effect of SCP on MP was investigated.

The results revealed that three LSCM practices, namely, JIT system, flow of information, and customer relationship positively affected MP. Jordanian manufacturing companies should increase their implementation levels of these practices in order to enhance their MP. Supplier relationship and waste reduction did not show positive effects on MP.

The findings demonstrated that all LSCM practices positively affected SCP. Managers in manufacturing companies should pay considerable attention to LSCM as a winning strategy to improve SCP. In addition, SCP proved to positively affect MP.

All in all, the overall conclusion is that LSCM practices are critical to improve SCP and MP. In today's competitive and dynamic environment, manufacturing companies, especially in the developing countries, have to increase their competitiveness through the adoption of LSCM.

6.3 Limitations and Future Research

Although this study reached some important findings, it has some limitations that can be addressed in future research. First, this study used only five practices of LSCM. Future studies could employ other practices to explore their effects on SCP and MP. Second, data were collected from manufacturing companies representing mainly the buying firms. Data from suppliers and key customers could have provided better understanding of LSCM practices and their effects on SCP and MP. Future studies should tackle the opinion of SC partners to provide deeper insights on LSCM. Third, the study included only manufacturing companies, so the results cannot be generalized to other sectors. Future studies should investigate the proposed effects in service organizations such as hospitals.

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