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The Role of SCM practices in Competitive Advantage and Firm Performance: A Mediating Role of Supply Chain Innovation and TQM

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Abstract: The present study aimed to propose a theoretical framework that elucidates the impact of supply chain management (SCM) practices on the competitive advantage and performance of firms while considering the mediating effects of supply chain innovation and total quality management (TQM). This research article employed a descriptive correlational methodology based on a questionnaire, complemented by structural equation modelling. The study involved the participation of 279 individuals, including managers, assistants, and supply chain experts from small and medium-sized enterprises. The study findings suggest that SCM practices significantly influence TQM, supply chain innovation, competitive advantage, and firm performance. Additionally, TQM has a significant effect on supply chain innovation, competitive advantage, and firm performance. Similarly, supply chain innovation has a positive and significant impact on competitive advantage and firm performance. Furthermore, the positive and significant mediating role of supply chain innovation and TQM in the effect of SCM practices on competitive advantage and firm performance was observed. Therefore, it can be concluded that SCM practices enhance firm performance and competitive advantage through the improvement of supply chain innovation and TQM.

Keywords: competitive advantage; firm performance; SCM; supply chain innovation; TQM

1 INTRODUCTION

Firm performance is a broad concept that includes what the firm produces as well as the areas it interacts with. In other words, firm performance refers to the way of performing organizational missions and activities and their outcomes [1]. In most firms, managers and leaders are always looking to promote and improve their performance, because firms need to continuously improve their performance to maintain their survival and progress in a current competitive world. After all, improving performance is the key to success in competition. Therefore, the survival and success of companies in a current competitive environment, which is characterized by change and transformation, complexity, and uncertainty require the adoption and implementation of effective strategies and continuous performance improvement [2]. Performance management has become more important due to factors like rapid change, budget deficits, downsizing, and restructuring, as well as societal pressures to make organizations responsible for their performance. As a result of this, Organizations are constantly seeking methods to enhance their overall performance and this is one of the underlying themes of organizational analysis. Therefore, this research article investigates the mediating influence of supply chain innovation and total quality management (TQM) on the link between practices of supply chain management (SCM) and the performance of a firm as well as a competitive advantage.

A supply chain is a structured combination of all business processes whose purpose is to satisfy the customer with the required goods and services. The supply chain process commences with the procurement of raw materials based on the specific requirements of the customer and culminates with the transportation and delivery of the finished product to the customer [3]. In a well-managed supply chain, all members of the developed organization work together to bring to market a common product or service that the customers are willing to pay for. Supply chain management is the joint effort of companies to improve strategic positions and improve group performance. This integrated value-creating process must be managed from procurement of materials to delivery of goods/services to the final customer [4]. High quality and low cost for the final consumer, one of the key points in SCM is that the supply chain should be considered as a coherent whole. Therefore, when managers tend to make an individual decision in a component of the supply chain, i.e. supply, production, or distribution, this should be made clear to them the chosen solution optimizes the entire supply chain [5]. Practices in SCM consist of a series of tasks that an organization undertakes to enhance the efficiency of its supply chain. A team of researchers examined four supply chain management practices in this article: customer relationship management, supplier relationship management, information sharing between companies in the supply chain, and quality of information that gets passed between companies in the supply chain.

Firms and their suppliers establish strategic collaborative relationships called supplier relationships that use their capabilities and competencies to obtain mutually beneficial rewards [6]. Relations with customers are defined as the process of handling complaints from customers and developing long-term relationships with them. Good customer relationships enable the firm to fulfill its customers' needs [7]. In order to drive business growth, the importance of information is widely acknowledged. Several studies have examined the quality and quantity of information shared as a key practice of SCM. A firm's information-sharing policy refers to how much information it shares with its business partners. A successful supply chain relies on the flow of information throughout the organization. As a result of accurate, timely, adequate, and reliable information being exchanged throughout a supply chain, it is of high quality. Providing information without errors or delays is of great importance for the effectiveness of the supply chain [7].

Today, competition between companies has become a topic of discussion among managers, politicians, academics, and researchers. As a result of its competitive advantage, a company is positioned better than its competitors in a given industry [8]. When a company consistently earns more profit than other companies that compete in the same industry, it is known as an organization that has a competitive advantage over its competitors in this market. The competitive advantage of a company depends on its ability to design, produce and deliver valuable products and services based on the needs of the customer. Without achieving a competitive advantage, the firm will have little economic justification for its continued survival and will decline financially. Under these circumstances, only companies can survive and improve their position by focusing on quality, price, speed, responsiveness, and all other aspects of competition to customers, and innovation, to achieve sustainable competitive advantage and outperform their competitors. Studies have also shown that competitive advantage leads to improved firm performance [9].

Today's business environment is extremely competitive and everything changes, but the phenomenon of change remains constant. There is increasing importance of innovation in organizations due to rapid technological changes in multiple industries and the consequent shortening of product life cycles and intensified competition [10]. Innovation will enable more organizations to respond to changing environments more effectively by creating and developing new capabilities. This is why nowadays innovation is noted as the most important factor of sustainable competition in the organization. An organization's innovation capability refers to its willingness to support experimentation, new ideas, and creative processes when developing new products/services or technological developments [6, 11]. An organization's ability to innovate enables it to exceed customers' expectations. As a result, innovation not only allows companies to increase their performance, but also to create mechanisms that are rare, valuable, diverse, distinctive, and difficult to duplicate. The goal of supply chain innovation is to provide new, effective, and innovative solutions for end users by dealing with uncertainties and disruptions in an internal and external environment. Innovative supply chains are essential in competing in the industry and are increasingly recognized by organizations, and their business strategies are accordingly adjusted [12]. Additionally, research has demonstrated that innovation can have a beneficial and noteworthy effect on both competitive advantage and performance [13].

TQM means directing and controlling activities based on the leadership of top management and extending them to all employees and units. These control and management measures focus on quality assurance achieved through the quality created in services provided to customers [14].

There is a management philosophy known as quality management that recognizes the needs and common goals of a company as inseparable. This philosophy is utilized in business, industry, and services to ensure maximum efficiency and effectiveness. Its application results in business leadership through the governance of processes and systems. Additionally, it promotes stability, increases efficiency, and helps prevent errors in the decision-making process of managers. Furthermore, this philosophy ensures that organizations meet the needs of their customers by aligning all their goals in that direction [1, 6]. If a quality management system is provided according to the conditions and requirements of the company, it can be effective in improving management and increasing effectiveness and modifying the decision-making processes and performance of the organization. Findings of the conducted studies have also shown that the effectiveness of TQM is positively correlated with innovation and firm performance [15].

As noted, the role of SCM practices, supply chain innovation, and TQM has been emphasized in competitive advantage and firm performance throughout the academic literature. However, empirical research shows that few studies have developed a model for SCM practices on firm performance and competitive advantage with the mediating role of supply chain innovation and TQM in small and medium-sized enterprises (SMEs). Therefore, the purpose of the present research is to formulate a model for SCM practices concerning firm performance and competitive advantage, taking into account the mediating roles of supply chain innovation and TQM.

2 CONCEPTUAL MODEL

A conceptual model is illustrated in Fig. 1 as a result of the literature and theoretical framework outlined in the background. In this model, SCM practices are considered independent variables; supply chain innovation, TQM, and competitive advantage as mediating variables, and firm performance is the dependent variable.

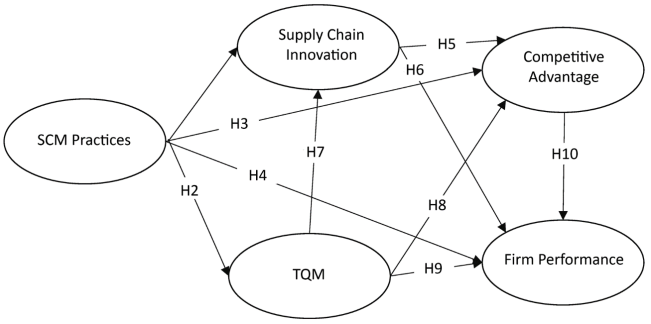

Figure 1 Conceptual model

Therefore, the following are the hypotheses:

H1: SCM practices influence supply chain innovation.
H2: SCM practices influence TQM.
H3: SCM practices influence competitive advantage.
H4: SCM practices influence firm performance.
H5: Supply chain innovation influences competitive advantage.
H6: Supply chain innovation influences firm performance.
H7: TQM influences supply chain innovation.
H8: TQM influences competitive advantage.
H9: TQM influences firm performance.
H10: Competitive advantage influences firm performance.
H11: Supply chain innovation plays a mediating role in the effect of SCM practices on competitive advantage.

H12: Supply chain innovation plays a mediating role in the effect of SCM practices on firm performance.
H13: TQM plays a mediating role in the effect of SCM practices on competitive advantage.
H14: TQM plays a mediating role in the effect of SCM practices on firm performance.
H15: Competitive advantage plays a mediating role in the effect of supply chain innovation on firm performance.
H16: Competitive advantage plays a mediating role in the effect of TQM on firm performance.

3 RESEARCH METHODOLOGY

In the present study, a descriptive correlation with SEM was used because structural equations were used to examine the relationships between variables.

3.1 Population and Sampling

The population was managers, assistants, and supply chain experts of SMEs in Iran, among whom 340 questionnaires were distributed. Once incomplete questionnaires were removed, 279 questionnaires were analyzed.

3.2 Data Collection Instruments

SCM practices: In this study, the SCM practices were evaluated using a questionnaire developed by Amedofu et al. [15]. The questionnaire included 21 items that assessed various features of SCM practices, including the relationship of customer (5 items), the relationship of supplier (5 items), information sharing of supply chain (6 items), and supply chain information quality (5 items). Likert scales were used to measure the responses, ranging from strongly disagree (1) to strongly agree (5).

TQM: The TQM practices were evaluated using the questionnaire developed by Modgil and Sharma [16]. The questionnaire comprises 16 items, which are categorized into four dimensions. These dimensions include quality information and reporting, product innovation, research and development management, and management of technology. Each dimension consists of four items.

Supply chain innovation: The measurement was conducted using the questionnaire created by Afraz et al. [12], which comprises five items.

Competitive advantage: The measurement of competitive advantage was conducted using a questionnaire developed by Chang [17], which comprises six items.

Firm performance: The measurement of firm performance was conducted using a questionnaire developed by Wijethilake et al. [18], which comprises of five items.

4 RESULTS

4.1 Reliability and Validity

As part of the testing of measurement models, the reliability of constructs and instruments (internal consistency) and the validity of the instruments (discriminant validity) are evaluated. The reliability of a construct can be determined by three criteria, which are as follows: 1) the reliability, 2) the composite reliability, and 3) the average variance extracted. According to confirmatory factor analysis, loading ≥ 0.6 for each item indicates that the item is reliable within that construct. Additionally, item factor loads should be significant at least at the 0.01 level [11].

Table 1 Factor loadings, CR, and AVE

Variable	Item	Factor	Alpha	CR	AVE
Supplier relationship	1	0.786	0.68	0.91	0.88
	2	0.816			
	3	0.861			
	4	0.893			
		0.769			
Customer relationship	1	0.772	0.54	0.86	0.79
	2	0.737			
	3	0.704			
	4	0.735			
	5	0.744			
Supply chain information sharing	1	0.713	0.57	0.89	0.85
	2	0.708			
	3	0.808			
	4	0.803			
	5	0.770			
	6	0.724			
Supply chain information quality	1	0.755	0.56	0.86	0.81
	2	0.749			
	3	0.690			
	4	0.807			
	5	0.748			
Supply chain innovation	1	0.820	0.71	0.92	0.90
	2	0.837			
	3	0.912			
	4	0.863			
	5	0.788			
Quality information and reporting	1	0.713	0.62	0.87	0.80
	2	0.786			
	3	0.832			
	4	0.823			
Product innovation	1	0.753	0.74	0.92	0.88
	2	0.905			
	3	0.856			
	4	0.912			
R&D management	1	0.919	0.74	0.92	0.88
	2	0.881			
	3	0.749			
	4	0.885			
Technology management	1	0.868	0.81	0.90	0.86
	2	0.846			
	3	0.892			
	4	0.751			
Competitive advantage	1	0.827	0.60	0.90	0.87
	2	0.746			
	3	0.838			
	4	0.714			
	5	0.739			
	6	0.770			
Firm performance	1	0.814	0.60	0.88	0.83
	2	0.824			
	3	0.776			
	4	0.710			
	5	0.737			

In order to assess the importance of factor loadings, a bootstrap test was conducted using 500 subsamples. The reliability of each construct was measured using the Dillon-

Goldstein coefficient (ρc). A value of ρc greater than 0.7 is considered ideal for reliability. Lastly, the average variance is a criterion of reliability [11]. It is suggested that constructs should have an AVE value of at least 0.50, indicating that the construct explains at least 50% of the variance in its markers [11]. In Tab. 1, factor loadings, composite reliability, and AVEs are reported. It can be seen from the values displayed in these tables that the constructs are adequate and appropriate in terms of their reliability.

In order to determine the validity of a construct or its discriminant validity, two criteria are applied. Items of a construct must have the greatest factor load on their respective constructs and a low cross-sectional load on other constructs. Considering Gefen and Straub's [19] suggestion that factor loads should be at least 0.1 higher for each item on its related construct. Tab. 2 shows that cross-sectional loads are reported for the items on the constructs.

Table 2 Cross-sectional factor loads for checking the validity of questionnaires

Variable Item	Supply chain management	Supply chain innovation	Competitive advantage	Firm performance	TQM
AS1	0.582	0.548	0.506	**0.814**	0.381
AS2	0.511	0.518	0.454	**0.824**	0.431
AS3	0.564	0.471	0.438	**0.776**	0.366
AS4	0.486	0.502	0.484	**0.71**	0.38
AS5	0.529	0.506	0.395	**0.737**	0.39
CA1	0.574	0.57	**0.827**	0.522	0.405
CA2	0.547	0.58	**0.746**	0.585	0.396
CA3	0.513	0.494	**0.838**	0.545	0.35
CA4	0.443	0.379	**0.714**	0.409	0.328
CA5	0.416	0.425	**0.739**	0.457	0.38
CA6	0.494	0.535	**0.77**	0.515	0.367
SCI1	0.516	**0.82**	0.42	0.499	0.403
SCI2	0.512	**0.837**	0.406	0.541	0.392
SCI3	0.585	**0.912**	0.506	0.5	0.434
SCI4	0.587	**0.863**	0.558	0.587	0.393
SCI5	0.5	**0.788**	0.479	0.504	0.346
SCM1	**0.786**	0.483	0.555	0.545	0.287
SCM2	**0.816**	0.509	0.574	0.533	0.361
SCM3	**0.861**	0.426	0.425	0.465	0.26
SCM4	**0.893**	0.481	0.471	0.504	0.228
SCM5	**0.769**	0.415	0.433	0.448	0.239
SCM6	**0.737**	0.374	0.435	0.451	0.285
SCM7	**0.704**	0.332	0.388	0.44	0.204
SCM8	**0.735**	0.263	0.38	0.357	0.228
SCM9	**0.744**	0.618	0.611	0.581	0.417
SCM10	**0.772**	0.484	0.461	0.537	0.328
SCM11	**0.713**	0.438	0.455	0.496	0.322
SCM12	**0.708**	0.362	0.474	0.501	0.279
SCM13	**0.808**	0.464	0.468	0.52	0.333
SCM14	**0.803**	0.369	0.377	0.453	0.252
SCM15	**0.77**	0.474	0.391	0.532	0.347
SCM16	**0.724**	0.485	0.393	0.532	0.358
SCM17	**0.755**	0.369	0.34	0.445	0.265
SCM18	**0.749**	0.371	0.429	0.389	0.131
SCM19	**0.69**	0.326	0.316	0.33	0.087
SCM20	**0.807**	0.47	0.314	0.477	0.246
SCM21	**0.748**	0.487	0.313	0.474	0.224
TQM1	0.353	0.295	0.332	0.386	**0.713**
TQM2	0.413	0.379	0.424	0.423	**0.786**
TQM3	0.255	0.389	0.352	0.368	**0.832**
TQM4	0.328	0.403	0.407	0.411	**0.823**
TQM5	0.359	0.323	0.325	0.419	**0.753**
TQM6	0.44	0.539	0.469	0.532	**0.905**
TQM7	0.375	0.561	0.497	0.505	**0.856**
TQM8	0.432	0.543	0.553	0.57	**0.912**
TQM9	0.403	0.527	0.564	0.526	**0.885**
TQM10	0.374	0.481	0.46	0.563	**0.919**
TQM11	0.416	0.506	0.444	0.547	**0.881**
TQM12	0.544	0.438	0.448	0.547	**0.749**
TQM13	0.555	0.417	0.487	0.591	**0.868**
TQM14	0.462	0.538	0.545	0.546	**0.846**
TQM15	0.593	0.435	0.568	0.581	**0.892**
TQM16	0.564	0.498	0.539	0.426	**0.751**

A minimum distance between factor loadings associated with the dimensions and their constructs is more than 0.1, suggesting good validity for the constructs based on Tab. 2. Based on correlation analysis and the square root of AVE, Tab. 3 shows the results related to validity. We have been able to meet the second criterion for the discriminant validity of variables in our study. Furthermore, the correlation matrix's values below the diagonal have been reported to confirm that the variables are interrelated. All variables show a positive and significant correlation.

Table 3 Correlation matrix

Variable	SCM	TQM	Supply chain innovation	Competitive advantage	Firm performance
SCM practices	**0.85**				
TQM	0.61**	**0.86**			
Supply chain innovation	0.63**	0.66**	**0.84**		
Competitive advantage	0.59**	0.61**	0.58**	**0.77**	
Firm performance	0.57**	0.53**	0.64**	0.61**	**0.77**
Note: The square root of AVE is represented by the values on the diagonal of the correlation matrix.					

4.2 Tests of a Structural Model

To anticipate the performance of a firm, the conceptual model was assessed through SEM; in accordance with the hypotheses, a PLS analysis was used to estimate the model. Furthermore, *t*-values were calculated using the bootstrap method. Fig. 2 illustrates the proposed model for examining the relationship between variables.

As shown in Tab. 4, the estimated path coefficients are reported, as well as an explanation of the variance of the variables. A significant and positive mediating effect of TQM can be seen in Tab. 4 with regard to the effect of SCM practices on supply chain innovation, competitive advantage, and firm performance. There is a significant and positive mediating role played by supply chain innovation in relation to competitive advantage, firm performance, TQM, competitive advantage, and firm performance. The mediating effect of competitive advantage on firm performance is positive and significant in the context of SCM practices, TQM practices, and supply chain innovation. The model variables can explain 78% of the variance in firm performance, 61% of the variance in competitive advantage, 58% of the variance in supply chain innovation, and 38% of the variance in TQM.

PLS uses the GOF index to measure the fit of the overall model. GOF was measured at 0.65 for the tested model in the current study, which indicates that the model is well-fitted. It is considered that the quality of the model is good and acceptable when the value is greater than 0.36.

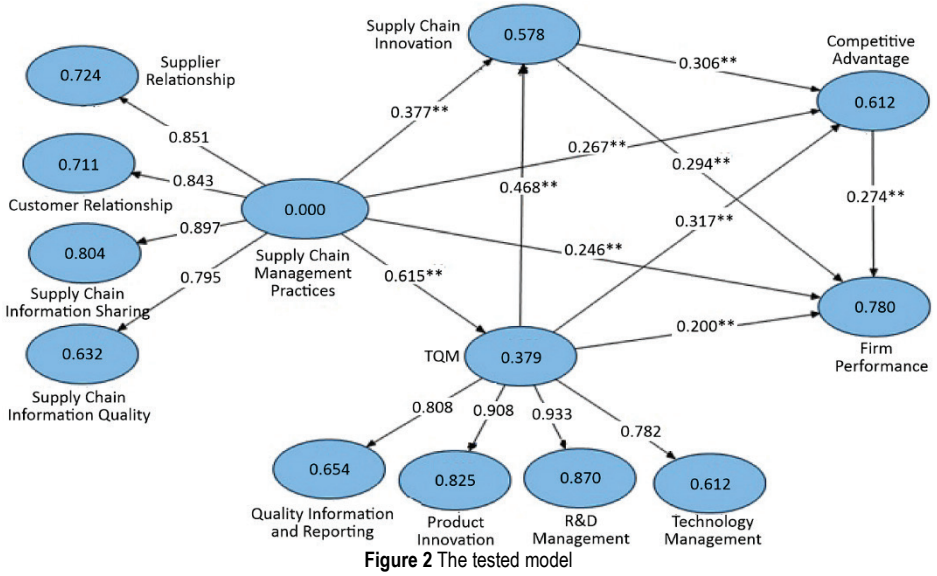

Figure 2 The tested model

5 DISCUSSION

Upon analysis, it was discovered that SCM practices had a positive and significant correlation with TQM, supply chain innovation, competitive advantage, and overall firm performance. According to Nazari-Shirkouhi et al. [7], Agyabeng-Mensah et al. [20], and Cousins et al. [21], Tavana et al. [27], the results are consistent with this finding. The present study suggests that firms can improve their TQM, supply chain innovation, and competitive advantage by considering quality in supplier selection. Additionally, regular joint problem-solving with suppliers, enhancing the quality of products/services, and having ongoing development/growth plans with suppliers can lead to improved firm performance. Involving key suppliers in the process of planning and setting goals, frequently measuring and evaluating customer satisfaction, setting future customer expectations through frequent interaction, informing

business partners of changes in needs that affect their business, sharing proprietary information with business partners, and exchanging information that might impact the partnership are also important factors for improving firm performance. These findings highlight the importance of a collaborative approach to supplier management and suggest that firms should take into account quality and engage in ongoing communication with their business partners to achieve better outcomes. It is essential that this exchange of information be timely, accurate, complete, sufficient, and reliable to ensure that informed decisions are made by all parties.

Table 4 Path coefficients and explained variance

Variable	β	t-value	Variance explained
On firm performance vie:			
Competitive advantage	0.27**	5.853	0.78
Supply chain innovation	0.29**	5.592	
TQM	0.20**	3.825	
SCM practices	0.25**	5.618	
On competitive advantage vie:			
Supply chain innovation	0.30**	5.315	0.61
TQM	0.32**	5.208	
SCM practices	0.27**	4.960	
On supply chain innovation vie:			
TQM	0.47**	8.825	0.58
SCM practices	0.38**	7.192	
On TQM vie:			
SCM practices	0.61**	12.688	0.38
The mediating role of TQM in the effect of:			
SCM practices on supply chain innovation	0.29**	7.245	-
SCM practices on competitive advantage	0.19**	4.818	
SCM practices on firm performance	0.12**	3.662	
The mediating role of supply chain innovation in the effect of:			
SCM practices on competitive advantage	0.11**	4.274	-
SCM practices on firm performance	0.11*	4.414	
TQM on competitive advantage	0.14**	4.553	
TQM on firm performance	0.14**	4.723	
The mediating role of competitive advantage in the effect of:			
SCM practices on firm performance	0.07**	3.784	-
TQM on firm performance	0.09**	3.891	
Supply chain innovation on firm performance	0.08**	3.935	

*$p < 0.05$; **$p < 0.01$

According to the model, TQM influences supply chain innovation, competitive advantage, and firm performance. The results of this study are in agreement with the findings reported in previous research studies including Masoudi [22], Ezenyilimba et al. [15], and Ali et al. [23]. For clarity, the current research aims to demonstrate how supply chain innovation, competitive advantages, and firm performance can be achieved through the availability of quality information. Such quality information should be timely, accurate, and reliable as well as used to improve management practices. To achieve these goals, firms should make use of the latest technological innovations in the development of new products which should be done significantly fast. Additionally, having products that have been introduced to the market for the first time is a crucial aspect of this process. Crucially, the research and development (R&D) department must have satisfactory communication processes with other departments in the firm and should follow innovative and progressive research. High-risk projects with opportunities for high returns should be the main characteristics of a sound R&D strategy. Moreover, R&D department should always be an integral part of the business strategy, emphasizing the importance of staying ahead in new technologies related to the industry, anticipating the full potential of new practices and technologies, pursuing long-term plans to achieve technological capabilities and constantly considering the next generation of technology.

The study reveals that supply chain innovation influences significantly both competitive advantage and firm performance. The present study's findings are consistent with previous research conducted by Banmairuroy et al. [24], Afraz et al. [12], and Fatoki [25]. The study aims to explain this finding by highlighting the importance of a supplier-buyer relationship that is strengthened through various factors. These factors include delivering products/services to customers using the latest technologies, ensuring that all supply chain partners provide the highest quality to customers, developing new products before competitors, actively adapting to customer needs, relying on suppliers as a source of innovation in products/services, and allocating more funds to the R&D department. By focusing on these factors, firms can improve their supplier-buyer relationships and ultimately enhance their overall performance in the market. Currently, innovation is considered one of the most valuable and stable sources of creating a comparative advantage for different companies, and it is considered one of the main necessary tools for developing new organizational practices for business management. Therefore, considering the dynamic and complex conditions that organizations face in a highly competitive environment, the continuous need to develop organizational innovation has

become more tangible for various organizations and companies. It seems that this phenomenon is likely to play a pivotal role in developing and strengthening consulting services and increasing income and stabilizing their activities.

The effect of competitive advantage influences firm performance. Therefore, competitive advantage leads to improvement in firm performance. The discovery is in agreement with the studies conducted by Wijayanto et al. [26]. To provide a better understanding of this phenomenon, it is important to note that a firm's performance can be significantly enhanced if it possesses superior product or service quality compared to its competitors. Additionally, a company's proficiency in R&D, management capabilities, financial profitability, corporate image, and difficult-to-replicate competitive advantages all contribute to better performance. Therefore, it is crucial for firms to focus on these factors to gain a competitive edge over their competitors. Note that the success of a company is based on a sustainable competitive advantage and maintaining it. In fact, understanding which resources or behaviors lead to competitive advantage is the main issue in marketing strategy.

According to the findings, TQM significantly contributes to the innovation of supply chain, competitive advantage, and firm performance when it comes to SCM practices. SCM practices and TQM both influence competitive advantage and firm performance positively and significantly through supply chain innovation. Firm performance is positively affected by SCM practices, TQM, and supply chain innovation through competitive advantage. In conclusion, through supply chain innovation and TQM, SCM practices can boost performance and competitive advantage.

6 CONCLUSION

This research article investigated the influence of SCM practices on firm performance and competitive advantage, with a focus on the mediating role of supply chain innovation and TQM. The results elucidated that the data fit the proposed model, explaining 78% of the variance in firm performance, 61% of the variance in competitive advantage, 58% of the variance in supply chain innovation, and 38% of the variance in TQM. However, it should be noted that these findings are limited to a sample of managers, assistants, and supply chain specialists in SMEs in Iran. Additionally, self-report data were used for analysis. Therefore, mixing qualitative and quantitative methods is recommended to further investigate the implications of SCM practices and TQM.

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