

Effects of Supply Chain Management on Competitiveness and Performance: Empirical Evidence in Mexico

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Abstract

Globalization has influenced modern business environments and supply chain management has become a critical issue for organizations because supply chains have become more complex to manage. As a result, delivery reliability is becoming a key factor in competing in the industry. In recent decades, scholars' interest has focused in selecting the most appropriate supply chain management strategy has increased because it has been recognized by many organizations as an effective strategy to achieve business objectives and consequently improve firm performance and achieve competitive advantage. Therefore, many SMEs are interested on adopting supply chain management practices to be able to ensure better quality products and diminish operational costs with the end goal of improving their business efficiency and add value to consumers. Considering this context, the objective of this study is to analyze the effects of supply chain management on competitiveness and performance of manufacturing companies, using for it a sample of 217 firms of the State on Aguascalientes in Mexico. The relationships between the variables were analyzed through structural equation modeling and the empirical results conclude that supply chain management has a positive influence on competitiveness and performance of the manufacturing companies.

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1. Introduction

Globalization has shaped modern business environments, companies all over the world have testified unprecedented technological development speed and changed pace of change in business conditions. This scenario had brought completely new challenges and new definitions of performance in each of the individual components of modern business processes. Considering this context, over the last fifty years supply chain management has faced significant changes (Sosko et al., 2019).

Consequently, as the global market is evolving and competition increases all around the world with technological advances, supply chain managers are concerned with new challenges, such as supply chain management (Talib, Rahman and Qureshi, 2010). In general, supply chains have become more complex to manage in recent years, especially considering the huge uncertainty and unpredictability that characterizes business environments and the behavior of the stakeholders in the supply chain (Ates, and Memis, 2021; Serdarasan, 2013). Within this framework, Seth, Goya, and Kiran (2015) consider that supply chain management has become a very important and critical issue for organizations due to globalization and increasing competition. As a result, it has been recognized by many organizations as a strategy to achieve business objectives.

Considering the above mentioned, supply chain management nowadays plays a critical role in the success and business competitiveness of organizations particularly in ensuring that the customer requirements are satisfied (Christopher 2011:4). Other authors, as Garcia-Buendia et al. (2023), reflect that in recent decades, scholars', and managers' interest has focused specially in selecting the most appropriate supply chain management (SCM) strategy has increased as a proven strategy to improve firm performance and cultivate the achievement of competitive advantage (Zimmermann et al., 2020).

In fact, Garcia-Buendia et al. (2023), conclude that in an increasingly competitive environment it is crucial to have a well-suited supply chain strategy because this can provide the right ingredients for success. Most compelling evidence confirm that a suitable supply chain strategy that pursues efficient and flexible processes helps companies to attain higher delivery reliability, improved quality, and lower costs from a supply chain perspective (Ding et al., 2023).

It is no surprise that SMEs continue to lag in adopting the changing market approaches leading to increased competitive advantage. In specific, innovation through SCM involves proposing new ways to drive business, such as better-quality products and cost reduction. In fact, many SMEs are interested on adopting SCM to be able to ensure better quality products and diminish operational costs with the end goal of improving their business efficiency and add value to consumers in the short and long term (Muangmee et al., 2022).

It is convenient to highlight that industry in general, and the manufacturing industry in particular, are influenced by permanent technological transformation and challenges that preoccupy every corporation and that have powerful effects along the entire supply chain (Garcia-Buendia et al., 2023; Ghobakhloo, 2020).

The main purpose of this research paper is to study the effects of supply chain management on competitiveness and performance in the context of Mexico using empirical evidence of SMEs manufacturing companies located in the State of Aguascalientes.

2. Preliminary Notes

In recent years, the industry has been subjected to increasing global competition and the challenge that are facing companies all over the world in the process of adapting to constant changes in the environment. As a result, delivery reliability is becoming a critical factor in competing in the industry. In addition to this factor, there are other competitive priorities related to improving production quality, reducing operating costs, increasing productivity, improving delivery times, and reducing inventories (Martínez and Moyano, 2011).

In this context, Connelly, Ketchen and Hult (2013) point out that supply chain management (SCM) in recent years deserves greater attention because the globalization has significant effects on the supply chains. Specifically, SCM is the orchestration of units inside and outside a company whose activities collectively transform raw materials into finished products and distribute them to customers (Hult, Ketchen and Arrfelt, 2007). Certainly, the effects of globalization have influenced the full range of administrative activities and processes associated with the flow of goods and services to end users (Hult, 2004; Mudambi and Venzin, 2010).

According to Muangmee et al. (2022), the concept of SCM involves the effective management of the supply chain activities, including product development, sourcing, production, and operations, and managing the supply in organizations (Zimon et al., 2020). Equally important, SCM aims at the movement of goods and services from one end of the supply chain to the other, through different stages to improve efficiency, productivity, and the profitability of the entire process (Seth et al., 2015). Therefore, improving supply chain performance is a fundamental approach for achieving competitive advantages of companies (Cai, Liu, Liu, & Xiao, 2009). Considering this, it is important to realize that SMEs play a key role in the development of emerging economies across the globe (Dankiewicz et al., 2020; Kozubikova et al., 2015).

In addition, the SCM practice involves the activities and actions employed by SMEs towards promoting their business supply chains. Certainly, something that add significant value to the customers is precisely the SCM practices to provide products, services, and information (Muangmee et al., 2022). In fact, Monnagaaratwe & Motatsa (2021) consider that the adoption of SCM initiatives by corporations has been one of the key business strategies, which has resulted in companies to follow customer-centric approach in their operation to satisfy customer requirements.

Another key point is that during the last decade companies started to interact with their suppliers and customers electronically through the selective use of electronic communication technologies for the effective integration of the supply chain specially in the process of exchange of information and the coordination of flows (Ghobakhloo et al., 2014). Within this framework, Martínez and Moyano (2011) point out that the inability to respond to unforeseen changes in demand and the large delays in delivery times in the industry require greater flexibility and adaptation to customer needs, ensuring maximizing workforce training and improving SCM (James-Moore and Gibbons, 1997; Crute et al. 2003).

In this order of ideas, it is important to note that SCM has an important role in strengthening the competitiveness of organizations and its goal is to achieve customer satisfaction (Talib et al., 2010). Thus, it is pertinent to point out that for various countries and regions today competitiveness is a common concern specially when trying to accelerate their development to reach international markets (Casadesus and Ricart, 2011). Must be remembered that this is due to today's rapidly changing global economy, which is increasingly characterized by the need for industries to compete and maintain a competitive advantage (Jackson, 2014).

Obviously, competitiveness must be a constant concern for companies operating in a market economy. For this reason, is important that companies hire highly qualified human resources capital, because companies that are correctly managed generally remain competitive for a long period of time, regardless of conditions of rapid technological, social, and economic change, which make it very challenging to maintain competitiveness (Charles and Lehner, 1998).

Monnagaaratwe & Motatsa (2021) trust that business exceptionally competitive environment forces organizations to adopt SCM methods to supply their customers with quality products, instant deliveries and at the right cost. For instance, this provides businesses with an added competitive advantage over their competitors. Lambert (2014:2) indicated that nowadays individual businesses do not compete as autonomous businesses but rather as supply chains because of a modern paradigm shift in business management. In detail, SCM is generally seen as a core strategy to improve the competitive performance of the company, by combining the internal functions of a company and its link with the external operations of suppliers, customers, and other members of the chain (Tutuncu and Kucukusta, 2008). Therefore, this can lead to changing the traditional structure of the organization (Talib, 2010).

Most compelling evidence confirms that in the actual business context, it has become increasingly meaningful to build long-term collaboration and cooperation with chain partners to secure the resources and/or capabilities needed to overcome or mitigate its impact (Garcia-Buendia et al., 2023). In addition, SCM plays an important role in strengthening the competitiveness of organizations and its goal is to achieve customer satisfaction (Talib, 2010).

It is important to point out that the current research paper is based on the Resource-Based Theory (RBT). According to Garcia-Buendia et al. (2023) RBT states that an effectively leveraged combination of unique, uncommon, valuable, and inimitable

resources enables organizations to achieve sustainable competitive advantage (Barney, 1991; Grant, 1991). At the same time, the relational view of RBT focuses not on individual firms, but on the whole network as the unit of analysis (Dyer and Singh, 1998), and, because of this reason, obtaining and maintaining a competitive advantage in an organization depends on both, the supply chain members, and the focal firm's resources (Garcia-Buendia et al., 2023).

In detail, Garcia-Buendia et al. (2023) states that this RBT emphasizes the relevance of supply chain collaboration, cooperation, and teamwork as intangible resources to achieve competitive advantage (Prajogo et al., 2016; Srinivasan et al., 2020), which leads to improved integration with suppliers (Iyer et al., 2019; Xiao et al., 2019), better buyer and supplier firm performance (Alshahrani et al., 2018; Rezaei et al., 2018) and enhanced responsiveness to customers (Gligor et al., 2016; Srinivasan et al., 2020).

Considering the above mentioned, it is pertinent to remember that, although it is important to develop viable SCM strategies and plans, their execution depends on having the right human resources capital, which includes the employees who are involved in all the supply chain processes. Indeed, people are strategically important to the success of a company. Therefore, the successful implementation of SCM requires effective management of related human resources and superior employee performance (Swart et al., 2012).

Finally, must be remembered that employees are a key factor for the execution of supply chain initiatives and the efficient management of human resources, emphasizing that the personnel commitment can be decisive in improving the performance of the company. To sum up, it is essential to recognize that SCM is not just about strategy development, process design or hardware upgrades, but also involves effective human performance management (Swart et al., 2012).

2.1 Supply Chain Management and Competitiveness

Considering the historical context, in the 1980s, intense global competition forced companies to offer high-quality products at a low cost, while simultaneously making efforts to increase design flexibility. Certainly, it was at this time that SMEs manufacturing companies, in their quest to improve their competitiveness, adopted some SCM practices, such as just-in-time principles and total quality management (Tan, Kannan, Handfield, & Ghosh, 1999).

Later, in the 1990s, competition intensified and with it, the challenges associated with making it possible for a product or service to reach the right place, at the right time, at the lowest possible price. In fact, at that time, SMEs manufacturing companies began to recognize the potential benefits and relevance of having strategic and cooperative relationships among buyers and suppliers. For this reason, strategic suppliers began to be involved with resource management decisions (Morgan and Monczka, 1996).

Today, the globalization has forced organizations continue to operate in an uncertain and competitive business environment. As in the past, one way to address these challenges in companies is by implementing SCM practices. Considering this scenario, many organizations have chosen to work closely with their suppliers, customers, and competitors in a collaborative supply chain environment (Chong, Chan, Ooi, & Sim, 2011).

Within this framework, it is important to highlight that since the 1980s, SCM has become one of the most important business practices for manufacturing companies to obtain a competitive advantage in the present-day global environment (Lambert and Cooper, 2000). In particular, the core objective of SCM is to achieve continuous improvement in manufacturing quality and efficiency through supply chain integration (Chin, Yeung, and Pun, 2006).

For this reason, one of the most important approaches of SCM is for manufacturing companies to integrate the production capacity and technological competence of their suppliers to increase their own competitive advantage and performance (Huang, Stewart, and Chen, 2010).

For instance, it happens, then, that when faced with highly competitive and globally expanding markets, manufacturing companies are continuously looking for ways to improve their competitiveness. Most compelling evidence confirms that to achieve this, they have focused on producing superior quality products, reliability, flexibility, and performance, while reducing costs and bringing products to market faster. Therefore, a portion of the company's resources has been allocated to:

- Improve the management of their suppliers, since manufacturing companies consider their suppliers as an extension of their business operation (Tan, Kannan, Handfield and Ghosh, 1999);
- Propose design practices and techniques to improve time to market, reduce product development time, as well as reduce product quality deficiency (Liu, Chen, and Tsai, 2005); and
- Share technical and management knowledge in a novel and innovative way, to boost the employee's capacity and performance at work, which will eventually contribute to optimal business performance (Lubit, 2001).

In other words, today competition increasingly occurs between supply chains rather than individual companies. Therefore, it is important to realize that SCM is expected to be a key factor in maintaining the competitiveness of companies (Hassini, 2008). Below, Table 1 summarizes some findings in the literature that explain that there is a relationship between SCM and competitiveness.

Table 1: Results of theoretical research on the SCM-competitiveness relationship

Author	Findings
Fine (1998)	The SCM has acquired strategic relevance as a source of competitive advantage. In other words, SCM has become a critical factor for company survival and growth.
Tan, Kannan, Handfield & Ghosh (1999)	In the 1990s, some SCM practices, such as total quality management, supply base management, and customer-focused corporate policies, were frequently cited in the literature as strategic options for achieving competitive success for companies.
Folinas, Manthou, Sigala, & Vlachopoulou (2004)	These authors conclude that effective SCM can create short-term economic benefits as well as long-term competitive advantage.
Sahay, Gupta, & Mohan (2006)	The SCM is perceived as an effective means to achieve successful international competitiveness. Globally, interest in SCM has increased since the 1980s, when organizations began to see the benefits of collaborative relationships.
Shankar (2001); McGinnis, Kohn & Spillan (2010)	The SCM plays an important role in the ability of companies to remain competitive in the market.
Moeller (2010)	Supplier selection is one of the key decisions in SCM, because supplier performance has a great impact on the productivity, quality, and competitiveness of the purchasing company.
Pandiyan, Sundram, Chandran & Bhatti (2016)	The study of SCM has emerged as a prominent field in providing organizations with strategies to build long-term competitiveness. The literature highlights that SCM practices have become an essential requirement to remain competitive in the global landscape with profitable growth.
Muangmee et al. (2022)	SMEs across the globe apply SCM strategies due to the demonstrated improvement in business competitiveness and performance.
Garcia-Buendia et al. (2023)	Technological change and the emergence and fast development of Industry 4.0 have changed the traditional idea of competition and further emphasized the SCM strategy's role in achieving a better competitive position.

Source: Own elaboration

According to what was stated above, firstly, Fine (1998) and Tan et al. (1999) recognized that SCM is a critical factor for the growth of a company and is essential as a strategy and source of competitive advantage. Subsequently, Folinas et al. (2004) pointed out that SCM, although it can generate some benefits in the short

term, without a doubt, can lead the company to acquire a competitive advantage in the long-term.

Next, Sahay et al. (2006), Shankar (2001) and McGinnis et al. (2010) agreed that the SCM plays a fundamental role in providing the necessary conditions for the company to have the necessary capacity to achieve international competitiveness. It is important to highlight that, despite having passed a few years in the theory presented by Folinas et al. (2004) and Pandiyan et al. (2016), both authors agree that SCM practices are an effective means to build a company's long-term competitiveness. Similarly, to remain competitive while achieving sustainable growth in profitability, SCM seeks close integration of internal functions within the company and external linkages with suppliers, customers, and other channel members (Pandiyan et al., 2016).

After performing an analysis of the theoretical framework regarding the relationship of SCM and competitiveness, it is pertinent to make an historical analysis of the empirical research findings that provide linkage between these two variables. For this purpose, Table 2 shown below, summarizes the findings of the empirical research results between 2008 and 2021 that have confirmed the relationship between SCM and competitiveness.

Table 2: Empirical research results of the SCM-competitiveness relationship

Author	Findings
Hassini (2008)	Through conceptual models and empirical studies, it has been proved how the design and operation of efficient supply chains, through SCM and the effective use of information technologies, can provide companies with a competitive advantage.
Huang, Stewart & Chen (2010)	Empirical research results revealed that some business activities with respect to SCM, such as the evaluation and selection of suppliers, have a strong influence on business results, in terms of competitiveness and performance.
Mellat-Parast & Spillan (2014)	Empirical evidence demonstrates that SCM has positive and significant effects on the competitiveness of companies. In other words, the findings confirm the vital role of SCM as a key factor to improve the competitiveness of firms.
Mafini & Loury-Okoumba (2018)	The authors link the increasing interest in SCM by SMEs to their inherent innovation and competitive advantage.
Monnagaaratwe & Motatsa (2021)	SCM enhances the business competitiveness. The results revealed that the competitiveness of the retailers is enhanced through good and improved supplier/customer relationships by sustained continuous flow of goods and services.

Source: Own elaboration

In summary, Hassini (2008) verifies through conceptual models and empirical studies that SCM is a source of competitive advantage for companies. Correspondingly, Huang et al. (2010) reveal that SCM practices have influence on the competitiveness and performance of companies. Finally, Mellat-Parast and Spillan (2014) demonstrate with empirical evidence that SCM has positive and significant effects on the competitiveness of companies.

Finally, it is important to highlight that today real competition between companies is focused on their supply chains rather than individual corporations. Therefore, it is important to realize that SCM could be expected to be a key element in maintaining the competitiveness of companies (Hassini, 2008).

For instance, from the analysis carried out in both theoretical and empirical research, the importance of carrying out studies that explore the SCM-competitiveness relationship is assumed, to be able to corroborate or reject the findings presented by researchers over time. Therefore, the following hypothesis is established:

H1: There is a positive and significant relationship between supply chain management and competitiveness.

2.2 Supply Chain Management and Business Performance

Today, as previously in the business history, any company strives to improve its revenue, control its costs, and increase the utilization of its assets to increase customer satisfaction. In fact, SCM emphasis is placed on how well a supply chain or group of companies performs in those terms, to create value for the end customer (Brewer and Speh, 2001).

For instance, there are several ways to describe performance in a supply chain. Accordingly, one way to structure performance in the supply chain was proposed by Krajewski, Ritzman, and Malhotra (2007), who noted a distinction between inventory, processes, and financial measures. First, inventory measures can be inventory value, weeks of supply, and inventory turnover. Second, process measures are primarily related to customer relationships, order fulfillment, and supplier relationship processes and could include several process measures, such as customer satisfaction, on-time delivery or waiting times. Third, financial measures can be return on assets or cost of goods sold (Krajewski et al., 2007).

Faced with this scenario, SCM is the proactive management of supply chain activities and processes to maximize customer value and achieve a competitive advantage through the joint effort of the various parties involved (Ellinger and Ellinger, 2014).

According to Chong, Chan, Ooi, and Sim (2011), SCM practices are represented from different perspectives with the common goal of improving organizational performance. In this sense, it is pertinent to mention that according to the literature, there are five dimensions of SCM in which the existing relationship between SCM and business performance is clearly identified. These dimensions are listed below in Table 3.

Table 3: The dimensions of SCM and business performance

The dimensions of SCM and business performance	
Strategic partnership with suppliers	The strategic partnership with suppliers is defined as a long-term relationship between an organization and its supplier. In specific, the strategic partnership could include joint product development and sharing product demand forecasts.
Relationship with customers	The relationship with customers involves building and maintaining positive long-term relationships with customers that will benefit the business. This will allow organizations to be more receptive and open to customer needs, thus creating great customer loyalty, which will result in the customer repeating the purchase and being willing to pay higher prices for higher quality products.
Information exchange	Most compelling evidence confirm that success of a company's SCM practices depends on the accuracy of the information and the speed with which it obtains that information from its business partners. This, in turn, can result in reduced inventory and manufacturing cost, better understanding of customer needs, and faster response to market changes.
Information technology	Ultimately, information technology can improve SCM performance. This can be very useful for members of the supply chain to share information in real time.
Internal operation	One of the main challenges for successful supply chain integration is ensuring reliable internal operational capability. In specific, internal operation is defined as those activities that are related to production systems and internal logistics flows. The internal functioning of an operation is the cornerstone in creating better SCM performance, before initiating external coordination. In other words, the quality and reliability of internal operations in manufacturing companies will result in better performance in the operation.

Source: Own elaboration with data from Chong et al. (2011)

In addition to the above mentioned, another way of structuring supply chain performance can be found in the Supply Chain Operations Reference (SCOR) model. For instance, this model identifies five performance attributes of the SCM, which are: reliability, responsiveness, flexibility, costs, and efficiency in the use of assets. The explanation of these attributes is detailed below in the Table 4.

Table 4: SCM performance attributes according to SCOR

SCOR performance attributes	
Reliability	Reliability refers to the ability to perform tasks as expected. In particular, it focuses on the predictability of the results of a process. Typical metrics for the reliability attribute include: time, adequate quantity, and adequate quality.
Speed	This attribute describes the speed at which tasks are performed.
Flexibility	Flexibility describes the ability to respond to external influences and the ability to change. Must be remembered that external influences include unforeseen increases or decreases in demand, when suppliers or partners go out of business, natural disasters, acts of terrorism, or availability of financial tools.
Costs	Costs attribute describes the cost of operating the process. Includes diverse costs, such as materials, fixed and variable costs, labor, and transportation.
Efficiency in asset utilization	This attribute describes the ability to efficiently use assets. In specific, asset management strategies in a supply chain include inventory reduction and insourcing versus outsourcing.

Source: Supply Chain Operations Reference (SCOR) (2010)

The attributes established above are transformed into defined performance metrics, such as delivery performance and order lead times, which allow performance to be measured across the entire supply chain. For instance, taken together, it can be inferred that measuring supply chain performance is a complex issue that companies face, containing an infinite number of possible metrics that in many cases are also interrelated (Basu, 2001).

In fact, to improve company performance through SCM, organizations must plan the integration of multifunctional activities within the company and link them externally with the processes of their business partners, suppliers, and customers in the supply chain. This is very important, because the supply chain integration strategy creates value for a company's customers and attracts suppliers and customers into the value creation process (Beheshti, Oghazi, Mostaghel and Hultman, 2014).

Within this framework, there is theoretical research in the literature that demonstrates a relationship between SCM and business performance. Below, in Table 5, some of the researchers who have studied this relationship are listed.

Table 5: Results of theoretical research of the SCM-business performance relationship

Author	Findings
DeWitt, Giunipero & Melton (2006)	SCM theory suggests that the performance of companies and the entire supply chain improves when the processes that occur between the companies involved and their relationships with the supply chain are managed effectively.
Koh, Demirbag, Bayraktar, Tatoglu & Zaim (2007)	Although organizational performance is measured with financial and market criteria, the short-term objectives of the SCM are to improve productivity and reduce inventory and waiting time. On the other hand, the long-term objectives of the SCM are to increase market share and supply chain integration.
Trienekens, van Uffelen, Debaire & Omta (2008)	Supply chain performance can be measured. Supply chain performance is defined as the degree to which a supply chain satisfies end-user and stakeholder requirements.
Huang, Stewart & Chen (2010)	In general, SCM seeks to improve manufacturing performance by eliminating waste, improving internal teamwork, as well as leveraging suppliers' capabilities and technologies.
Forslund (2010)	Performance Management (PM) is an approach to measuring and improving performance in the supply chain and can be viewed as a process. The PM process between customer and supplier consists of the activities of performance variable selection, metrics definition, goal setting, measurement, and analysis. Supply chain PM refers to the PM processes that occur between supply chain actors.
Feng et al. (2018)	The management of a firm's supply chain directly affects its financial performance. In addition, influence can also be indirect through operational excellence, leading to customer satisfaction, long-term loyalty, and financial gains.
Duong & Ha (2021)	Managers can predict and recognize SCM risks quickly and effectively. The collaborative practices within their organizations and their strategic SCM partners are highly recommended to implement to control risks and increase the firms' performance.
Jermisittiparsert et al., (2019); Liu & Lee (2018); Zhou et al. (2014)	Today SMEs are improving their operational performance through more efficient management of the supply chain. In fact, these firms are innovating internal processes to ensure continuous competitiveness and sustainability in an international environment.
Lee (2021)	The aim of SCM is to improve business performance and competitiveness through these strategic linkages. For this reason, reinforcing the strategies formed in the supply chain is key to supply chain and business overall success.

Source: Own elaboration

Based on what was described, according to DeWitt et al. (2006), an adequate SCM results in better business performance. On the other hand, Trienekens et al. (2008) point out that supply chain performance can be measured based on the degree to which it satisfies the requirements of the end user and interested parties.

Huang et al. (2010) point out that SCM aims to improve manufacturing performance. For its part, Forslund (2010) considers that the term Performance Management (PM) is an approach to measuring the performance of the supply chain and covers the process between the customer and the supplier. In contrast, Table 6 lists the empirical research results of the SCM-business performance relationship, from 1999 to 2023. It is important to emphasize that, according to Tan et al. (1999) and Chong et al. (2011), empirical results demonstrate that there is a positive and significant relationship between SCM practices and business performance.

Table 6: Empirical research results of the SCM-business performance relationship

Author	Findings
Tan, Kannan, Handfield & Ghosh (1999)	The empirical results confirm that suppliers, producers, and customers must be efficiently integrated to achieve financial and growth objectives. Furthermore, the results demonstrate that there is a positive relationship between SCM practices and business performance. In fact, successful supply chain management is a key factor in the long-term success of any organization. In other words, success cannot occur if organizations implement business practices arbitrarily and without coordination. Likewise, if they direct limited financial resources to SCM initiatives, positive results are unlikely to occur.
Sezen (2005)	Empirical studies show that the overall performance of a company when there is effective coordination between functions can be far above the performance achieved when tasks are performed individually. In detail, coordination between operations and logistics functions is essential to achieve good performance. Must be remembered that the SCM plays an elemental role in linking the two most important functions of a company: operations and marketing.
Huang, Stewart & Chen (2010)	In their study, these authors found that the evaluation and selection of suppliers (as part of the SCM) plays a key role in improving competitiveness and manufacturing performance in companies. Given these points, the importance of applying the criteria appropriately to make the correct decision is highlighted. It happens, then, that the company and its suppliers must work together. Consequently, this will result in optimal business performance in the long term.

Chong, Chan, Ooi & Sim (2011)	The empirical results demonstrate that SCM practices have a direct and significant impact on the organizational and innovative performance of companies. In the long run, the improved innovation caused by SCM also results in better organizational performance. Overall, the results reveal that manufacturing and service companies do not have a significant difference in their SCM practices.
Ellinger & Ellinger (2014)	SCM decisions significantly influence financial performance because companies spend up to 75% of their revenue on supply chain activities.
Lee (2021)	The empirical study entitled " <i>The Effect of Supply Chain Management Strategy on Operational and Financial Performance</i> " confirms that introducing combination of SCM strategies and organizational competencies can generate sustainable overall business performance among SMEs.
Bach et al. (2023)	The obtained research results confirm a positive relationship between SCM maturity and business performance from the balanced scorecard perspective.
Garcia-Buendia et al. (2023)	The empirical study entitled " <i>The lean supply chain management response to technology uncertainty: consequences for operational performance and competitiveness</i> " analyzed the supply chain management strategy's role as a mechanism to address technology uncertainty. In their study these authors confirmed that considering the business scenario permeated by technological uncertainty, the effective implementation of lean throughout the supply chain is a mechanism that brings stability to the focal company, improves its performance, and provide organizations with competitive advantage.

Source: Own elaboration

Based on the above, Sezen (2005) confirms, taking as reference the findings of empirical studies, that effective SCM practices result in better business performance. On the other hand, Huang et al. (2010) point out that SCM plays a fundamental role in improving company performance, especially in terms of supplier selection and evaluation.

Furthermore, the empirical results of the research by Chong et al. (2011) demonstrate that SCM practices have a direct and significant impact on business performance. On the other hand, research by Ellinger and Ellinger (2014) concludes that the decisions made in the SCM significantly influence the financial performance of companies.

Finally, Bach et al. (2023); Garcia-Buendia et al. (2023); and Lee (2021) empirical studies confirm that in a business environment scenario characterized by technological uncertainty, introducing a combination of SCM strategies can

generate sustainable overall business performance among SMEs and provide organizations with competitive advantage.

Based on the above mentioned and considering the findings of theoretical and empirical research on the SCM-business performance relationship, the relevance of studying said relationship is validated, through the following hypothesis:

H2: There is a positive and significant relationship between supply chain management and business performance.

3. Main Results

In the first place, as part of the research methodology used in this paper, to test the model of the impact of supply chain management on the competitiveness and performance of the manufacturing companies located in the State of Aguascalientes in Mexico, the questionnaire method design was chosen. Specifically, this questionnaire was applied to company managers and the responses were subsequently recorded in IBM SPSS Statistics to analyze them. Accordingly, it's important to point out that the questionnaire facilitated the development of latent variables for the use of factor analysis.

In particular, the type of research conducted was explanatory because it focuses on explaining the relationship between two or more variables (supply chain management, competitiveness, and business performance); causal, because empirical evidence was obtained of the relationship between supply chain management and competitiveness and business performance; and transversal, since the study was carried out in a single moment through the application of a survey.

In this study, the method used to obtain data is a very traditional quantitative method known as the survey or questionnaire method, with the aim to determine insights about a group of company managers of manufacturing companies. Within this framework, Arribas (2004) states that the questionnaire is an instrument used to collect information, designed to quantify, and universalize information and standardize the interview procedure. In fact, its purpose is to achieve the comparability of information. In other words, a questionnaire is a research instrument that presents a series of queries for the purpose of gathering information from respondents. According to Lema (2017), the questionnaire is one of the most used data collections techniques because it helps to study specific situations and even make future predictions based on the reaction of a specific population segment. In addition, the subjects of this study are the manufacturing companies of the State of Aguascalientes in Mexico. The National Statistical Directory of Economic Units (DENUE) provided by the National Institute of Statistics and Geography (INEGI) of Mexico was used to obtain the directory of companies in the manufacturing segment, a database from which 217 manufacturing companies were selected to begin the application of the questionnaires. As well, the sampling method that was used was non-probabilistic, which is characterized by being based on the experience of the researcher. According to Alaminos and Castejón (2006), it is a sampling

characterized by the intentionality of the investigator, who tries to locate cases that can provide a maximum of information. Additionally, within the non-probabilistic sample, the convenience procedure was used, which is also called accidental or fortuitous.

Specifically, in this method the investigator simply selects the cases that are most available. In convenience sampling, the researcher makes the decision on who to interview (Alaminos and Castejón, 2006). Correspondingly, regarding the determination of the sample, it is essential to note that the sample size was determined considering that the information will be analyzed later using the Structural Equation Models technique, hereinafter SEM by its acronym in English: *Structural Equation Modeling*.

It is convenient to highlight that Ruiz, Pardo, and San Martín (2010) state that in SEM techniques it is advisable to have large samples, which means to specifically have a sample size greater than 100 or 200 cases. In this case, it is usual to demand sample sizes greater than 100 subjects and, specifically, sizes greater than 200 subjects are a better guarantee. First thing to remember when using this technique and methodology is that: “*the larger the number of variables, the larger the sample size should also be (a rate higher than 10 subjects per observed variable is recommended)*” (Ruiz, Pardo, and San Martín, 2010: 44). For instance, for the purposes of the current study and since the information would be analyzed later using the Structural Equation Models technique, it was determined to establish a sample size of at least 200 cases of companies belonging to the State of Aguascalientes in Mexico.

Regarding the measurement of the variables used in this study, the measurements of various constructs are established: SCM, competitiveness, and business performance. Furthermore, the approach was made using previously developed scales implementing adaptations of them. Considering this context, it is important to note that to verify the validity of the instrument, pilot tests were carried out.

For the evaluation of the reliability and validity of the three measurement scales, a Confirmatory Factor Analysis (CFA) was applied, using the maximum likelihood estimation (MLE) with the support of the EQS 6.2 software (Bentler, 2005; Brown, 2006; Byrne, 2006). Correspondingly, for the measurement of reliability, Cronbach's Alpha, and Composite Reliability Index (CRI) were used (Bagozzi & Yi, 1988), and according to the results obtained in the CFA all the values of the three scales they are higher than 0.7 for both indices, which provides evidence of the reliability of the scales and justifies their internal reliability (Nunnally & Bernstein, 1994; Hair et al., 1995). In addition, as evidence of convergent validity, the CFA results indicate that all items of related factors are significant ($p < 0.01$) and the size of all standardized factor loads is greater than 0.60 (Bagozzi & Yi, 1988).

The results of the application of the CFA are presented in Table 7 and suggest that the measurement model provides a good fit of the statistical data ($S-B \chi^2 = 1,814.248$; $df = 1,193$; $p = 0.000$; $NFI = 0.780$; $NNFI = 0.849$; $CFI = 0.859$; $RMSEA = 0.070$). Furthermore, Table 7 shows a high internal consistency of the constructs, in each case Cronbach's Alpha exceeds the value of 0.70 recommended by Nunnally

and Bernstein (1994). In this context, must be remembered that Fornell & Larcker (1981) consider that the composite reliability represents the variance extracted between the group of observed variables and the fundamental construct, so that a CRI greater than 0.60 is considered desirable (Bagozzi & Yi, 1988), and in this study this value it is widely exceeded. The index of the Extracted Variance Index (EVI) was calculated for each of the constructs, resulting in an EVI greater than 0.50 (Fornell & Larcker, 1981), and in this research 0.50 is exceeded in all factors.

Table 7: Internal consistency and convergent validity of the theoretical model

Variable	Indicator	Factorial Loading	Cronbach's Alpha	CRI	EVI
Competitiveness	FP1	.875***	.909	.921	.662
	FP2	.894***			
	FP3	.928***			
	FP4	.862***			
	FP5	.698***			
	FP6	.569***			
Supply Chain Management	CS2	.604***	.875	.885	.558
	CS6	.676***			
	CS8	.589***			
	CS10	.717***			
	CS11	.647***			
	CS13	.686***			
	CS15	.757***			
	CS17	.748***			
	CS18	.649***			
Business Performance	PE1	.844***	.886	.889	.620
	PE2	.915***			
	PE3	.766***			
	PE4	.602***			
	PE6	.776***			
$S-BX^2$ (df = 1,193) = 1,814.248; $p < 0.000$; NFI = 0.780; NNFI = 0.849; CFI = 0.859; RMSEA = 0.070					
^a = Constrained parameters to such value in the identification process *** = $p < 0.01$					

Source: Own elaboration

In particular, the discriminant validity of the theoretical model of supply chain management, competitiveness and business performance were measured by means of two tests, which are presented in Table 8. First, the confidence interval test is presented (Anderson & Gerbing, 1988), which establishes that with a 95% confidence interval, none of the individual elements of the latent factors of the correlation matrix has the value of 1. Second, the extracted variance test is presented

(Fornell & Larcker, 1981), which states that the variance extracted from each pair of constructs is lower than its corresponding EVI. Therefore, according to the results obtained from the application of both tests, it is possible to conclude that both tests demonstrate sufficient evidence of the existence of discriminant validity.

Table 8: Discriminant validity of the theoretical model

Variables	Competitiveness	SCM	Performance
Competitiveness	0.662		
SCM	0.139	0.458	
Performance	0.494	0.233	0.620

The diagonal represents the Extracted Variance Index (EVI), whereas above the diagonal the variance is presented (squared correlation). Below diagonal, the estimated correlation of factors is presented with 95% confidence interval.

Table 9: Correlations

Variables	r	r²
Competitiveness-SCM	0.373	0.139
Competitiveness-Performance	0.703	0.494
SCM-Performance	0.483	0.233

Source: Own elaboration

3.1 Results of the SEM

To respond to the two hypotheses raised in this empirical study, a structural equation modeling (SEM) was applied with the support of the EQS 6.2 software (Bentler, 2005; Byrne, 2006; Brown, 2006), analyzing the nomological validity of the theoretical model of supply chain management, competitiveness and business performance through the Chi-square test, through which the results obtained between the theoretical model and the measurement model were compared, obtaining non-significant results which allows an explanation of the relationships observed between latent constructs (Anderson & Gerbing, 1988; Hatcher, 1994). Table 10 shows in greater detail the results obtained from the application of the SEM.

Table 10: Results of the SEM

Hypothesis	Structural Relationship	Standardized Coefficient	r ²
H₁ : The higher level of supply chain management, higher level of competitiveness.	SCM → Competitiveness	0.45***	0.20
H₂ : The higher level of supply chain management, higher level of performance.	SCM → Performance	0.57***	0.32
X ² (187) = 407.404 p=.000 RMSEA=.078 GFI=.851 NFI=.844 CFI=.908			
*** = p < 0.01			

Correspondingly, Table 3 shows the results obtained from the application of the SEM and, with respect to the **H₁** hypothesis, the results obtained, $\beta = 0.45$ $p < 0.001$, indicate that supply chain management has significant positive effects on the competitiveness of the manufacturing companies of Aguascalientes in Mexico.

On the other hand, regarding the **H₂** hypothesis, the results obtained, $\beta = 0.57$ $p < 0.001$, indicate that supply chain management has significant positive effects on the business performance of manufacturing companies in Aguascalientes in Mexico. For instance, the existence of a significant positive relationship between supply chain management, competitiveness and business performance can be corroborated.

4. Conclusion

The results obtained in this research paper generate diverse conclusions, among the most important are the following. First, by verifying that supply chain management does have significant positive effects on competitiveness and performance, it can be concluded that implementing supply chain strategies is crucial for the organizations in the modern business context characterized by globalization and constant uncertainty. Statistically, the value of β indicates the importance of supply chain management (independent variable) in competitiveness (dependent variable) and performance (dependent variable). It should be noted that the value of t confirms that the independent variable (supply chain management) is significantly related to the dependent variables (competitiveness and performance).

Regarding theoretical evidence previously reviewed in this research paper, it is important to realize that over the last fifty years supply chain management has faced significant changes (Sosko et al., 2019) as supply chains have become more complex to manage in recent years, especially considering the constant uncertainty of the business environments (Ates, and Memis, 2021; Serdarasan, 2013). Considering this context, supply chain management has become a key strategy for organizations to face the increasing competition (Seth et al., 2015).

Most compelling evidence confirms that supply chain management is a variable directly linked to competitiveness and performance. The literature review in the theoretical framework of this study confirms that there is a strong relationship between supply chain management and competitiveness. In fact, this is confirmed by authors like Fine (1998); Tan et al. (1999); Folinas et al. (2004); Sahay et al. (2006); Shankar (2001); McGinnis et al. (2010); Moeller (2010); Pandiyan et al. (2016); Muangmee et al. (2022) and Garcia-Buendia et al. (2023).

Furthermore, there is also empirical research results that corroborate the supply chain management and competitiveness relationship. Some of authors that have performed these studies over the history are Hassini (2008); Huang et al. (2010); Mellat-Parast et al. (2014); Mafini & Loury-Okoumba (2018) and Monnagaaratwe & Motatsa (2021). These scientists have confirmed through conceptual models and empirical studies how the effective operation of supply chains thought effective supply chain strategies including actions such as the evaluation and selection of suppliers have a strong influence on business results, in terms of competitiveness and performance. In other words, the findings confirm the vital role of supply chain management as a key factor to improve the competitiveness of firms.

On the other hand, the role of supply chain management on business performance has also been a focus of study. Chong et al. (2011) proposed several dimensions of SCM and business performance such as strategic partnership with suppliers, relationship with customers, information exchange, information technology and internal operation. Additionally, the Supply Chain Operations Reference (SCOR, 2010) identified five performance attributes of the supply chain management which are: reliability, responsiveness, flexibility, costs, and efficiency in the use of assets. In addition to the above mentioned, the literature review confirms that there is theoretical evidence that supports the relationship of supply chain management and business performance. In detail, authors like DeWitt et al. (2006); Koh et al. (2007); Trienekens et al. (2008); Huang et al. (2010); Forslund (2010); Feng et al. (2018); Duong & Ha (2021); Jermsittiparsert et al. (2019); Liu & Lee (2018); Zhou et al. (2014) and Lee (2021) identified that the aim of the supply chain management is to improve overall business performance by reinforcing the strategies formed in the supply chain, such as Performance Mangement (PM), eliminating waste, control risks, improving internal teamwork, as well as leveraging suppliers' capabilities and technologies. In the long term, the continuous innovation of internal processes will ensure continuous competitiveness and enhance companies' performance.

Within this framework, there is also empirical research results that corroborate the supply chain management and business performance relationship linkage. Empirical studies of authors such as Tan et al. (1999); Sezen (2005); Huang et al. (2010); Chong et al. (2011); Ellinger & Ellinger (2014); Lee (2021); Bach et al. (2023) and Garcia-Buendia et al. (2023) have demonstrated thought several analyses that there is a relationship between supply chain management practices and business performance. In fact, successful supply chain management is a key factor in the long-term success of any organization. In this context, supplier evaluation and selection play a key role in improving competitiveness and performance in

manufacturing companies particularly considering the business scenario permeated by technological uncertainty.

From the previous evidence, it can be concluded in general terms that the result of the analysis of hypothesis one agrees with both theoretical and empirical conclusions about the supply chain management-competitiveness relationship. Similarly, they confirm the existence of positive and significant influence of supply chain management on competitiveness. In the case of the present research, the values obtained demonstrate that the supply chain management has positive and significant effects on the competitiveness of the companies of the manufacturing industry located in Aguascalientes in Mexico. For instance, the first study hypothesis is accepted.

Second, by establishing the positive and significant relationship that exists between supply chain management and business performance of the manufacturing industry of Aguascalientes in Mexico, it is possible to conclude that supply chain management efficient and effective strategic practices implemented in a company will have positive and significant effects in the overall company performance.

Additionally, this research paper also has a series of implications for both the managers and the companies themselves. Some practical implications for managers include constantly develop long-term relationships based on trust with their supply chain partners because this is crucial to enhance organization's capabilities and effectively and flexibly respond to technological changes (Garcia-Buendia et al., 2023). This, because supply chain management is an essential factor for the company to perform well and remain competitive in today's market.

Finally, considering the above mentioned, confirms the relevance of supply chain management strategy practices in the manufacturing industry of Aguascalientes in Mexico, as well as the growing search for companies to be more competitive in their environment and improve their business performance. Moreover, a final implication of these results is that it is considered pertinent that the government of the State of Aguascalientes in Mexico promotes the constant education and training of supply chain managers of manufacturing SMEs in their areas of expertise, because this action in turn will improve the supply chain efficiency. In the final analysis, must be remembered that Lee (2021) empirically confirmed that introducing combination of supply chain management strategies and organizational competencies can generate sustainable overall business performance among SMEs.

5. Limitations

In general, it was very challenging to perform the fieldwork because SMEs manufacturing companies' managers located in the State of Aguascalientes in Mexico are very busy and constantly under work stress and because of this it was difficult to get the appointments to get them answer the research questionnaire. The main limitation of the present study is that the research findings are limited to the State of Aguascalientes in Mexico, so it is convenient to replicate this study in other

states in Mexico and other regions and countries to be able to confirm if same findings are the same with other research scope.

Finally, another limitation that can be considered is that the fact of applying the questionnaire only to managers only represents the opinion of a person in the company, therefore, the information collected can be subjective. It would be appropriate for future studies to apply the survey to suppliers, producers, and customers, to obtain information from another point of view because supply chain strategies must be efficiently integrated to achieve financial and growth objectives that can significantly impact the company's overall performance and competitiveness.

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