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Improving supply chain performance through the SCOR model: A case study in the agroindustrial sector

Yáñez-Hernández, Oscar Iván
Universidad Virtual del Estado de Guanajuato, México
Departamento de ingeniería
E-mail: osyanezh@uveg.edu.mx
https://orcid.org/0000-0003-0481-9614

Abstract

This study presents the application of the SCOR (Supply Chain Operations Reference) model to the supply chain of a fertilizer company in the Mexican agroindustrial sector. The main objective is to analyze how the SCOR model contributes to improving logistical efficiency and to assess its economic, administrative, and financial impact on the company. The research begins by identifying the different levels of the company's supply chain processes, including key performance indicators (KPIs), strategic attributes, and core logistical operations such as procurement, storage, production, and distribution. The SCOR model's implementation made it possible to detect and address operational bottlenecks that were previously limiting the company's performance. A case study methodology was applied, using internal company documentation and quantitative data. Projections were made for sales, warehouse capacity, labor requirements, and production levels. These were compared against the cost of implementing the SCOR model, yielding a benefit-cost ratio of 1.26. This result indicates a positive return on investment and confirms the model's viability in similar contexts. Additionally, the study offers a detailed analysis of the company's supply chain structure and explains how the SCOR model outperforms other frameworks, such as the 4C's and 4 Gaps models, which focus more narrowly on customer service. The company's case exemplifies the challenges faced by mid-sized agroindustrial company in Mexico, particularly the reliance on imported raw materials and the need for improved integration of logistics and planning systems. The findings suggest that the SCOR model is not only an effective tool for diagnosis but also a strategic framework capable of guiding decision-making and fostering long-term competitiveness in the agroindustrial sector.

Keywords: SCOR model, supply chain, processes, planning, performance indicators.

Introduction

Globalization generates opportunities and threats; this makes it more relevant that organizations are even more competitive. In Mexico, the agroindustrial business structure is concentrated in the State of Mexico, which contributes almost 13 % of it to the food industry; Jalisco with 10 %; the Mexico City with more than 8 %, Veracruz and Guanajuato each contribute around 6 %.

More than 40 % of employment in the sector is concentrated in these 5 states (Secretaría de Economía, 2022). The value of the Mexican food market was $52,423 000 000 USD and an average annual growth of 4.7 % is expected in the period 2019-2024. Additionally, in 2021, Mexico exported close to 29 billion dollars, with a TMCA of 7 % in the period 2017-2021 (Secretaría de Economía, 2022).

The present research aims to demonstrate how the SCOR model can be implemented in the agroindustrial input supply sector, specifically within a Mexican company dedicated to the production and distribution of granular and liquid fertilizers. This sector, which forms part of the broader agroindustrial economy, is characterized by intensive labor and often lacks formal supply chain planning. By focusing on this real-world context, the study enables a strategic analysis of key operational areas, particularly those related to supply chain management.

The agroindustrial sector has had significant growth in recent years thanks to the good commercial decisions of corporations that have allowed them to obtain large export trade agreements. However, the benefits they record do not directly relate to supply chain management, since they evidently do not have a formalized record of the entire process, much less a comprehensive visualization of what really shows your supply chain. Most of their efforts are carried out empirically (Bhagat & Dhar, 2014).

The supply chain is defined as a set of functional activities that are repeated along the product flow channel through which raw materials are converted into finished products and value is added to the customer (Ballou, 2004).

The SCOR model is a methodology developed by the Supply Chain Council (SCC, 2010) that allows analyzing and configuring the supply chain, which can be applied to any type of company, it is not restrictive and is flexible because it can be adapted to any configuration.

Although the SCOR model is widely recognized for its flexibility and broad applicability, there is limited evidence of its practical use in mid-sized agroindustrial companies within emerging economies like Mexico. Most existing literature focuses on large manufacturing or logistics firms. This study fills that gap by applying the SCOR model to a real company operating under resource constraints, empirical practices, and volatile external conditions. By doing so, it aims to validate the model's utility in contexts where formal supply chain systems are underdeveloped or fragmented.

In the last decade, the design of supply chains has gained importance in the optimal development of the companies in which it is applied, maximizing the total value generated (Chase & Jacobs, 2014).

There is countless research that has shown that the SCOR model has been effective and has directly impacted the improvements of the supply chains in which it has been implemented, and therefore is reflected in greater economic income for the organizations that implement it. adopt as a management model (Escalante & Uribe, 2019).

Logistics is described as the part of the supply chain responsible for the planning, implementation, and control of the flows of information, products, and money from the point of origin to those of consumption (Hugos, 2018).

An indicator is a proposition that identifies an empirically observable trait or characteristic, which allows the statistical measurement of a concept or a dimension thereof based on prior theoretical analysis, and integrating into a coherent system of linked propositions, whose analysis can be aimed at describing, compare, explain or predict facts (Estevez & Perez, 2007).

This research contributes to the literature by illustrating how the SCOR model can be effectively implemented in the agroindustrial sector of an emerging economy. Given the sector's reliance on intensive labor and the prevalence of informally structured supply chains, this study provides practical insights into how strategic areas within such organizations particularly those related to supply chain operations can be systematically analyzed and optimized. By focusing on a real-world case, the research highlights the model's adaptability to complex and resource-constrained environments, thus addressing a gap not sufficiently explored in previous studies.

While prior research has established the effectiveness of the SCOR model in manufacturing and logistics sectors, this study expands its applicability by using it in a mid-sized agroindustrial firm. A comparative analysis with other documented implementations is presented later in the paper to further support the generalizability of the findings.

The SCOR model

Adequate management of the supply chain can help the companies that comprise it to improve its competitiveness, in terms of greater efficiency in the use of resources that facilitate the achievement of service objectives for the end customer, greater precision in the planning and control of material and information flows from the supplier to the end user, improvement in relationships between members of the chain, reduction of inventory levels and delivery time, etc. (Arana *et al.*, 2011).

A growing number of investigations have addressed this phenomenon, studying the positive effect that adequate supply chain management has on business performance (as points out Arana *et al.* (2011); previous consultation Power *et al.* (2001); Rosenzweig *et al.* (2003); Bagchi *et al.* (2005); Yang *et al.* 2009; Flynn *et al.* (2010).

In this sense, the SCOR model provides a unique framework that unites business processes, management indicators, best practices, and technologies in a unified structure to support communication between supply chain partners and improve supply chain effectiveness and improvement activities (Diaz & Marrero, 2014).

The SCOR model has been able to provide a basis for supply chain improvement in global projects, as well as in specific local projects. It should be noted that this model allows describing the business activities necessary to satisfy a customer's demand, is organized around the five main management processes: Planning, Procurement, Manufacturing, Distribution and Return or Return, and also contains three levels of process details: Superior Level (Types of Processes), Configuration Level (Categories of Processes) and Level of Process Elements (Decomposition of Processes) (Calderon & Lario, 2005).

Models related to the supply chain

4C'S Model

4 C'S is a supply chain model oriented to consumption, that is, to the customer. It was born from the idea of providing better customer service and finding a way to get closer to them, letting them know that money is not the only important factor and that the experiences that the customer shares are an essential element in realizing acquisitions, from the moment you opted for the purchase until the product arrived at its destination.

It is made up of 4 concepts, being trust, commitment, communication, and collaboration. Trust is one of the most important factors that must exist throughout the supply chain to win shares over time (Sanchez & Hasbledy, 2014).

The 4C´S model has a focus aimed at the mass public and its processes are composed as follows:

Customer: Companies for the first time place the consumer at the center as a starting point for this model. This is a fundamental change, where companies give greater value to the customer than to the product.

Cost: In terms of cost, companies consider the price sensitivity of their customers. Various factors are taken when establishing them: Need, time, interest, expiration date, information.

Communication: With this type of "C" companies manage to interact more with their customers, whether offline or online. They know the opinion of their clients and they begin to consider them on a larger scale.

Convenience: When we talk about convenience, we talk about distribution. Companies seek to add significant value when facilitating the purchase of their customers, which are: faster, greater effectiveness and efficiency, less complexity, greater accessibility.

4 gaps model

The 4 gaps model in which the supply chain aims to analyze the deficiencies that exist in the quality of customer service. With this, it is possible to identify the main shortcomings of companies towards their end customers (Zeithaml *et al.*, 2002a).

This model starts from the general gap having the company, then moves to gap two, which is manifested through the company's perceptions towards the customer. Gap three designs and standardizes service to the end customer and, finally. Gap four, which is responsible for external communications to the client. This entire process of the 4 gaps is intended to satisfy customer needs through good service and communication.

Gap 1: It manifests itself due to the little knowledge we have regarding what the end customer expects. In other words, the company ignores the interests of the client.

Gap 2: Occurs when the company has not established any type of design and quality standard in the service.

Gap 3: This gap, unlike gap two, occurs when you have established your designs and standards regarding service quality, however, these are not met.

Gap 4: This occurs when the delivery of the service does not meet the promise that the company expressed through external communications (mass media, social networks).

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Method

This study employs a descriptive and applied case study methodology to examine the supply chain dynamics of a company in the Mexican agroindustrial business sector. The case study design was chosen to allow an in-depth understanding of real-life operational processes and to assess the relevance of the SCOR model within the specific context of a mid-sized fertilizer company.

The research did not involve experimental or longitudinal tracking. Instead, it was based on direct access to the company's internal records and documentary sources. The methodological strategy focused on analyzing existing processes, identifying inefficiencies, and evaluating improvement opportunities using the SCOR framework.

Primary data was obtained through the review of internal company documentation. The research team requested access to operational records, which included:

- Purchase orders and procurement logs.
- Warehouse and storage capacity reports.
- Production schedules and resource allocations.
- Internal cost structures related to labor, materials, transportation, and distribution.
- Historical sales data.

A structured documentary review guide was used to extract relevant information systematically. The data was organized by supply chain process areas (Plan, Source, Make, Delver, Return), in alignment with the SCOR model structure.

Quantitative data were analyzed to understand operational trends and identify performance gaps across the supply chain. Qualitative interpretation complemented this analysis to assess alignment between documented practices and strategic supply chain goals.

To ensure that the SCOR framework was effectively applied to the agroindustrial company, the information obtained from internal records was systematically categorized according to the five core SCOR processes: Plan, Source, Make, Deliver, and Return. Sales records and demand projections were aligned with the Plan process to assess forecasting and planning capacity. Procurement logs and purchase orders were mapped to Source, allowing the identification of supplier-related bottlenecks such as delays and quality inconsistencies. Production schedules and machine capacity data were analyzed under Make, highlighting inefficiencies in the mixing and packaging stages. Warehouse reports and outbound logistics documentation were classified in Deliver, revealing storage limitations and delivery delays. Finally, customer feedback and complaints, though less systematically recorded, were associated with Return, providing insights into product rejection and service gaps.

This operationalization not only structured the company's raw data under the SCOR taxonomy but also facilitated the detection of the four major bottlenecks (suppliers, provisioning, warehouse, and customers). Figure 1 illustrates this mapping between SCOR processes, case study information, and the main findings, highlighting how the framework guided the diagnostic process.

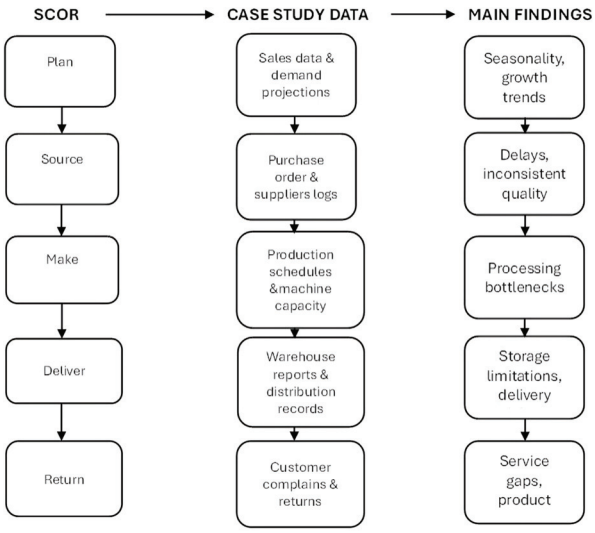

Figure 1. Operationalization of the SCOR model in the case study.

No direct intervention or experimentation was performed within the company's operations. All evaluations were based on existing records and scenario-based modeling of potential outcomes if the SCOR model were to be implemented fully.

Case study

Today, agroindustrial companies use management, administration, and decision processes to optimally manage the supply chain, but many of these companies are foreign to the idea of alternating or incorporating management models in their supply chains for the same reason, these are reflected in the high cost and time index.

The case study focuses on a medium-sized agroindustrial company located in the state of Querétaro, Mexico, which operates in the highly competitive ferti-

lizer industry. The company specializes in producing granular and liquid fertilizers, as well as custom mixtures tailored to specific crop requirements, offering a differentiated value proposition in the domestic market. It also commercializes insecticides, further diversifying its product portfolio.

Founded in the early 2000s, the company has steadily expanded its operations across several Mexican states and currently employs more than 200 workers. In response to increasing demand and operational complexity, it inaugurated a fully automated distribution center in 2019. This infrastructure investment marked a turning point in its logistical capabilities and allowed it to centralize warehousing and streamline outbound logistics.

The company was selected for this study due to its representativeness within the national agroindustrial context and its willingness to collaborate in providing internal operational data. The case is instrumental in nature: it allows an in-depth analysis of how the SCOR model can be applied to identify and address supply chain inefficiencies in a real business scenario. The findings, while specific to this organization, offer insights applicable to other companies in the sector facing similar challenges.

Figure 2 provides a visual representation of the company's current supply chain process. It begins with the reception and weighing of raw materials. These are then stored or sent directly to the mixing machinery, where the fertilizer is processed and packed into sacks. The filled sacks are weighed again, stacked onto trailers, and transported to customers. This sequential, diagram-based mapping highlights how operational inefficiencies accumulate and where strategic interventions—such as implementing SCOR–can create the most value.

The company has four bottlenecks, in this sense, a bottleneck is nothing more than an activity or a set of activities that affects or reduces the production process of a company, this generates an increase in waiting times and this reduces productivity.

The first and second bottleneck is in the suppliers and in the provisioning, being connected through the receipt of raw materials, in this process the suppliers have on certain occasions been rejected by:

1. Not delivering the product (raw materials) on time to the agroindustrial company.
2. Deliver on time, but with a smaller and/or larger quantity than agreed.
3. They do not meet product standards (fertilizer quality 80 %).

Added to this is the price that is not directly linked to production, making fertilizer prices volatile because the price is set in foreign currency (USD) and yet the company sets a price per ton for a month.

At the end of the month, prices have three outcomes: to start, they stay at the same price, they increase, or they decrease.

The third bottleneck of the company is in the warehouse, it is not supplied for tons that the purchasing area produces, in many cases it must use spaces intended for other types of raw materials or finished products, this means that the company does not deliver orders on time and with it, the final cost of the fertilizer is likely to increase.

And the last bottleneck is the customers. The external environment also plays a critical role. Fertilizer prices in Mexico are volatile due to their dependence on imported raw materials, primarily from Russia, the United States, Norway, and China. In 2018 alone, the country imported 5.06 million tons of fertilizers, representing a 12.6 % increase over the previous year. In that year, imports came from Russia (30.9 %), the United States (14.3 %), Norway (12.1 %) and China (11.1 %), mainly. In the last five years, these countries participated with 69.5 % of national fertilizer imports (Secretaría de economía, 2022).

Such market dynamics, along with the absence of standardized management practices, have compelled the company to seek structured supply chain solutions.

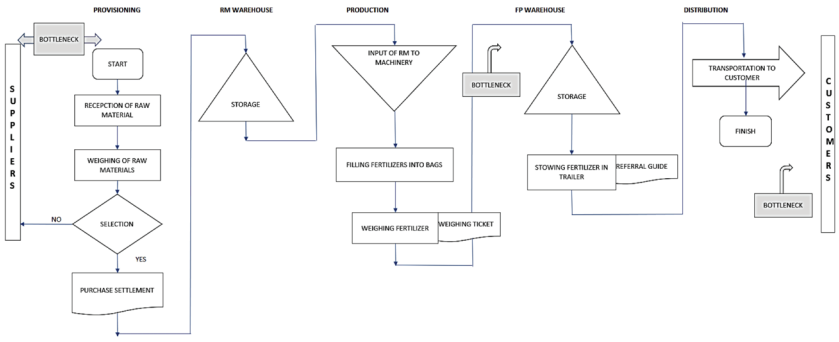

Figure 2. Flowchart of the current fertilizer supply chain.

Through this case, the research explores the implementation of the SCOR model not only as a diagnostic tool but also as a strategic framework for decision-making, efficiency gains, and competitive positioning in a sector where logistics performance is critical.

Main activities of the supply chain

The processes studied in the supply chain of the agroindustrial company were the bottlenecks, being suppliers, provisioning, warehouse, and customers.

Suppliers

Suppliers are part of a company's supply chain and are of vital importance, even more so in agroindustrial companies because they play a role in the final flow of a product or service. In this sense, the suppliers are those who provide the company with the raw materials (base fertilizers), this comes from the areas of greatest production in Mexico such as Lázaro Cárdenas, Michoacán, Cosoleacaque, Veracruz, and countries such as Russia and China; Suppliers mostly supply the company with raw materials on weekends, as per the company's requirement; but, the bottleneck is in the delivery of the fertilizer by the suppliers, in many cases, the raw material is not delivered on time, less or more quantity than agreed, fertilizers without complying with quality control, this latter is essential to be processed and transported, which is why performance is the factor that determines how high the quality standard of the mixture is; this seeks to satisfy the needs of customers.

If a part, stage, activity, or process of the fertilizer supply chain presents the so-called bottleneck, then the company would present problems in its production and commercial prestige to its clients, because this bottleneck on the part of the suppliers it has an impact on the other processes of the company's supply chain. Based on the challenges identified in the supply chain, three supply chain management models were considered: the SCOR model, the 4C's model, and the 4 Gaps model. These were selected due to their relevance in previous literature and their focus on different areas of supply chain performance. A comparative analysis was carried out to determine which model best fits the specific needs and context of the agroindustrial company under study.

Provisioning

In this process, the company purchases and receives raw materials, in which the suppliers are both national and foreign. Table 1 shows the purchases made by the agroindustrial company for the years 2018, 2019, 2020, 2021 and 2022. It is worth mentioning that purchases are made through purchase orders.

Table 2 shows the monthly purchases of raw materials. For the months of March, May and December, the purchase of raw materials by the agroindustrial company increased significantly, since these months are where the growing season is at its highest point, a totally different scenario in the months of February, September, and November, this decrease in purchases is because in these months the crops decrease or are nonexistent; purchases for those months reached 2,361,934.09 kg in September and 1,788,320.61 kg in November, compared to the previous month, which is October, a drop of -57.2 % was recorded. For the month of September, the purchase was 2,361,934.09, kg this month the purchase of raw materials also decreased by –16.08 % compared to the previous month.

Figure 3 shows the purchases of raw materials by the agroindustrial company for the years 2018, 2019, 2020, 2021 and 2022, as can be seen, the purchased quantity of kilograms of raw materials has had a significant increase, the most recent year being 2022, the one that marks the historical maximum acquired.

There is a growing trend in the behavior of purchases of raw materials to produce mixtures from 2018 to 2022. This trend in the purchase of kilograms goes from low to high. For the year 2023, considerable growth is also predicted. in the supply of raw materials.

Table 1. Annual raw material purchases by type (2018-2022).

Year	Description	Kilograms
2018	Phosphorous, nitrogenous, potassium	18,325,874.65
2019	Phosphorous, nitrogenous, potassium	21,234,467.04
2020	Phosphorous, nitrogenous, potassium	25,456,634.02
2021	Phosphorous, nitrogenous, potassium	30,235,652.01
2022	Phosphorous, nitrogenous, potassium	39,446,423.03
Total		134,699,050.80

Table 2. Monthly purchase volume of raw materials in 2022.

Month	Description	Kilograms
January	Phosphorus, nitrogenous, potassium	2,991,727.12
February	Phosphorus, nitrogenous, potassium	0.00
March	Phosphorus, nitrogenous, potassium	4,662,655.62
April	Phosphorus, nitrogenous, potassium	3,305,813.02
May	Phosphorus, nitrogenous, potassium	4,957,658.33
June	Phosphorus, nitrogenous, potassium	3,795,950.55
July	Phosphorus, nitrogenous, potassium	3,847,273.76
August	Phosphorus, nitrogenous, potassium	2,814,769.51
September	Phosphorus, nitrogenous, potassium	2,361,934.09
October	Phosphorus, nitrogenous, potassium	4,084,607.65
November	Phosphorus, nitrogenous, potassium	1,788,320.61
December	Phosphorus, nitrogenous, potassium	4,835,712.77
Total		39,446,423.03

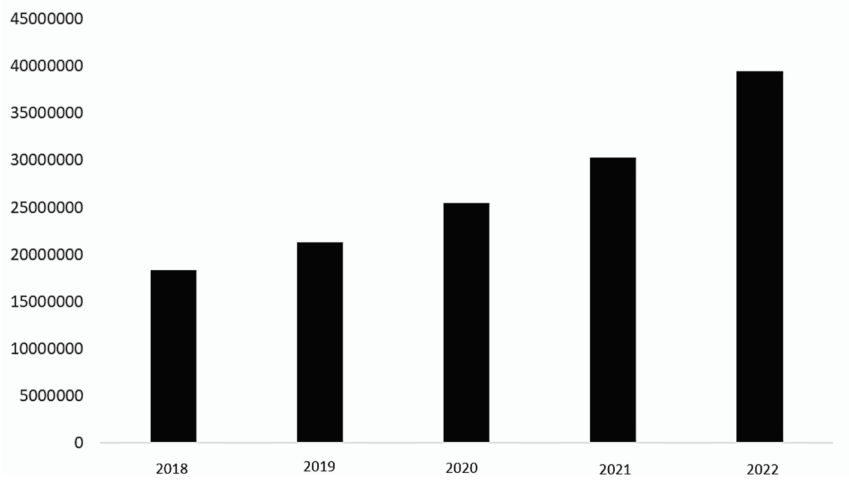

Figure 3. Annual raw material purchases (2018-2022).

Warehouse

In inventory administration or management, the company supplies a high degree of availability of fertilizers with suppliers and customers. The proportion or capacity of storage attaches a value of quality and time to the final product. Table 3 shows the information on raw materials obtained in the company, the documents that the company uses to enter the warehouse are the scale ticket and an entry referral.

Table 3 describes the general data of raw materials purchased by the agroindustrial company. The company has a secure area to store raw materials and its storage capacity amounts to 336747626.9 kg. In addition, the fertilizer is filled into plastic bags (polyethylene or polypropylene) according to customer specifications and palletized. In most cases, the warehouse is sufficient, and its occupancy will depend on the total kilograms that customers request from the company.

Table 3. Storage capacity of nitrogen-based fertilizers (in Kg).

Product	Description	Storage capacity	Unit
Fertilizer	Nitrogenous	168,373,813.00	Kg
Fertilizer	Nitrogenous	88,245,606.70	Kg
Fertilizer	Nitrogenous	80,128,207.18	Kg

The bottleneck is in the finished products warehouse (fertilizer mix), which delays the delivery of the number of kilograms that the company has scheduled for each client. It all begins at the time of entry of raw materials into the mixing machine, this does not supply the entire amount of tons that the company acquires from suppliers weekly and in many cases, it must be done with operational personnel, this means that deliver the product to customers on time and the final cost of the mixture is likely to increase. The distribution and storage of the finished product depends on the quality result, in warehouse one (1) there are those batches of fertilizer whose homogeneity ranges between 80 % and 90 %, this is the indicator in terms of uniformity for it to

be delivered to the customer; In the warehouse there are two (2) lots of fertilizer whose homogeneity is between 91 % and 100 %.

Regarding the hygroscopicity of the fertilizer, the company has as an indicator, a minimum of 95 % yield so that the product can be delivered, if the fertilizer does not reach that percentage of yield, then it is rejected by the company due to lack of it.

Clients

As the last bottleneck of the supply chain in the agroindustrial company, there are clients from different states of the republic and according to the record of the last five years, the company's specialty fertilizer sales in terms of quantity and value have has been increasing year after year.

Table 4 shows fertilizer sales nationwide from 2018 to 2022. In 2019, they increased by 12 % compared to the previous year; in 2018, it increased 4.3 % compared to the previous year, and has had increases of 20 %, 21 % and 26 % for the years 2020, 2021, 2022, respectively.

Results

Suitable model to improve the supply chain of the agroindustrial company

Table 5 provides a comparative analysis of the three most frequently referenced supply chain models, assessing their relevance across all stages of the supply chain-from suppliers to customers. These models were selected because they represent distinct approaches to supply chain management. The 4C's model focuses on customer-centered strategies, the 4 Gaps model emphasizes service quality and communication breakdowns, while the SCOR model offers a comprehensive framework that integrates internal processes, performance metrics, and best practices. Comparing these models offers a broader perspective on which is most suitable for optimizing the company's operations.

The 4C's model is applicable to supply chain management; however, it primarily focuses on the customer. Its key emphasis lies in the quality of service that companies provide to their clients, making it more relevant to marketing and customer relationship contexts. In contrast, the 4 Gaps model is designed to analyze potential deficiencies in service quality, particularly in how companies perceive and respond to customer expectations. Like the 4C's model, it is more narrowly focused on the customer-facing side of operations.

Table 4. Annual fertilizer sales volume by state and company (2018-2022).

Year	States	Companies	Net weight (kg)	Variation
2018	3	50	16,493,287.20	---
2019	5	80	18,686,331.00	12 %
2020	7	90	23,165,537.00	20 %
2021	10	120	27,212,086.80	21 %
2022	15	200	36,290,709.20	26 %

Table 5. Comparison of supply chain management models (SCOR, 4C's, 4 Gaps).

Model	Suppliers	Company	RM Warehouse	Production	FP Warehouse	Distribution	Clients
		Company					
4 C´S Model						✓	✓
4 gaps model							✓
SCOR Model	✓	✓	✓	✓	✓	✓	✓

The SCOR model, by comparison, is a comprehensive management tool that addresses inefficiencies across the entire supply chain. It enables companies to identify and eliminate bottlenecks, align cross-functional processes, and unify departments around common objectives. This holistic approach avoids the fragmentation of organizational efforts and promotes integrated performance.

To enhance organizational performance, the SCOR model proposes two key elements: performance metrics and performance attributes. The metrics provide quantitative indicators on aspects such as order fulfillment, lead times, procurement flexibility, and sourcing costs. Table 6 indicates the performance attributes-reliability, responsiveness, agility, and cost are linked to strategic objectives and help evaluate and improve the effectiveness of each process within the supply chain.

Table 7 mentions three of the main companies related to the agroindustrial company's supply chain. These companies apply various policies and strategies, in addition to having exclusive infrastructure and facilities within their organizations, this has allowed them to be among the best companies in the sector. The agroindustrial company takes the companies as a model to be in the best positions in the sector and for being one of the companies that best manages the supply chain. The SCOR model studies all the information flows of the company, achieving the alignment of areas, departments, activities, and tasks to achieve the same objective.

Table 8 shows the costs associated with each of the strategies proposed for the company based on the SCOR model.

Cost benefit of implementing the SCOR model in the supply chain of the agroindustrial company

Figure 4 shows the sales value in national currency of the agroindustrial Company from the years 2018 to 2022 ($255000000, $300000000, $375000000, $500000000, $700000000) respectively; it should be noted that during the last five years the value of sales has increased, that is, the year 2022 is the year in which the greatest sales were had, and in which the greatest growth was observed with respect to the previous year, thanks to the implementation of the SCOR models and the better management of resources that derives from this model.

Table 6. SCOR Model metrics and performance attributes.

Metrics	Performance attributes			
	Reliability	Flexibility	Agility	Costs
Compliance the orders of raw materials	•			
Cycle time compliance with the order of subjects cousins	•			
Flexibility of the chain purchases of supply		•		
Adaptability of the chain purchases of supply			•	
Management costs shopping raw materials				•

Table 7. SCOR model benchmarking of peer agroindustrial companies.

	SCOR model	Company "A"	Company "B"	Company "B"
Suppliers	Suppliers	Maintains a direct relationship with fertilizer producers even in areas with difficult access	Maintains constant technical advice on good practices in the field with producers	It has an annual plan that consists of benefits. Has a stimulus plan
Supply RM Warehouse	Company	They have a presence in the main areas of influence. It has its own delivery fleet to cover any national route	It has ERP to manage inventories. It has collection points and its own transport fleet. It has a quality department to deliver premium products	It has collection policies, with clear parameters for the quality of the fertilizer. The organization has sales strategies (alliances with national supermarkets)
Production				
FP Warehouse				
Distribution				
Clients	Clients	Participation in various fairs ensures greater presence for the brand	They attend national and international fairs to attract potential clients	Attendance at international fairs accompanied by other exporters allows you to create international business networks

Table 8. Estimated costs of SCOR model implementation strategies.

	Strategies/Activities	Detail	Goal	Cost
Suppliers Company	Development of human capital in BPM's	Manage the company's training on fertilizer performance issues, production aspects, mixing of raw materials, fertilizer logistics traceability/GAP/lean management/5s/Just in time	Know the performance of the fertilizer and the use of good practices as a technical standard for production	$120,000.00
	Organize fellowship and award events	Public recognition for quality in company supply	Build loyalty to the suppliers	$50,000.00
Company	Hiring a certified advisor	Train company personnel for a period of 6 months, in order to unify the areas of the company and focus them on self-achievement goal	Know the benefits of the SCOR model and apply them to the organization, through the training of staff	$65,000.00
Clients	Attend international fairs	Constantly attend fairs and events related to the agroindustrial sector inside and outside the country	Achieve greater participation and capture potential customers	$70,000.00
Total cost				$305,000.00

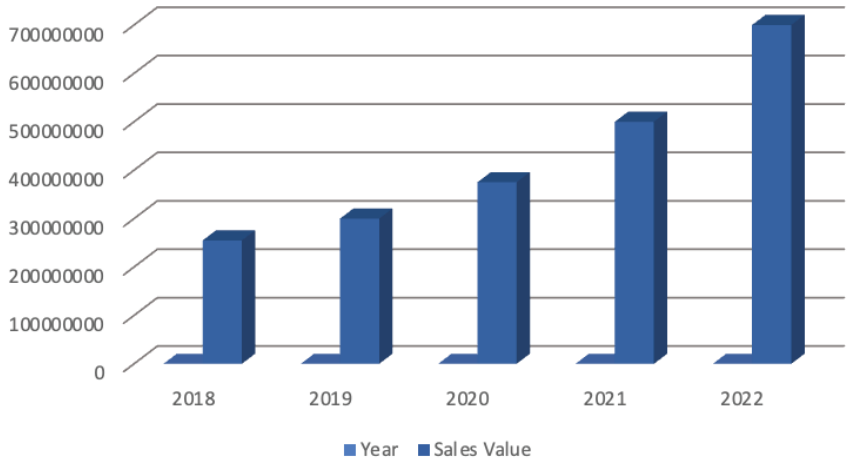

Figure 4. Annual sales revenue of the company (2018-2022).

Increases in sales value of 17 %, 25 %, 33 % and 40 % respectively have been recorded for the years 2018-2022. This scenario in the last year is due to two factors: the purchases that agroindustrial company makes, which have diversified its suppliers, and the company's greater participation in national fairs, which has meant greater dissemination and expansion of its client portfolio.

Figure 5 shows the sales from the years 2018 to 2022 respectively, these data were used to obtain the variables.

The benefit-cost (B/C) ratio of implementing the SCOR model in the company's supply chain was calculated as 1.26. This value was obtained by dividing the projected financial benefit—based on historical sales growth and future forecasts—by the total implementation cost of the proposed strategies ($305,000 MXN). A ratio above 1.0 indicates that the investment is economically viable, as the benefits exceed the costs.

Figure 6 reflects the sales projection for the years 2023 to 2027 of the agroindustrial company. The data was applied according to the variables to obtain this projection. The result is positive for the company in terms of sales.

Table 9 shows the forecasts for the next five years; each year will increase more compared to the previous year.

The benefit-cost ratio (B/C) was calculated using the sales projections for the years 2023 to 2027 (Table 9). For each year, the projected benefit from implementing the SCOR model was divided by the estimated cost of implementation ($305,000 MXN). The resulting annual B/C values ranged from 1.22 to 1.30. The final B/C ratio of 1.26 corresponds to the average of these annual values, indicating that for every peso invested, the company expects to recover the cost and generate a return

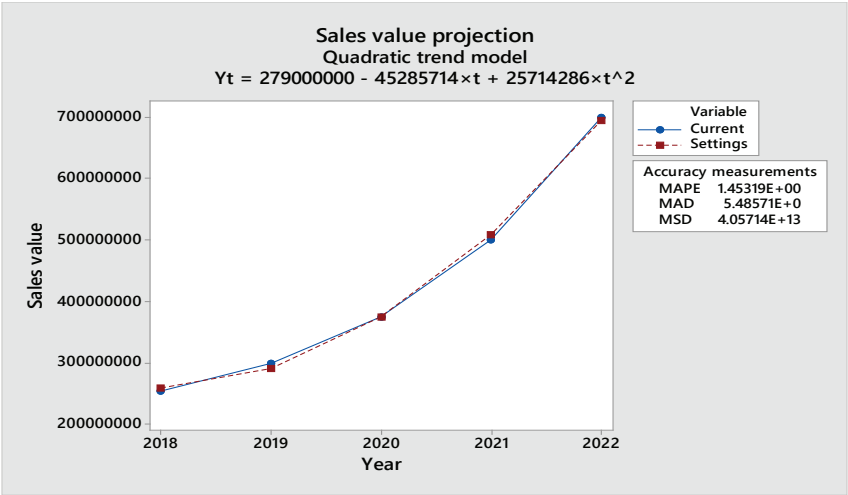

Figure 5. Variables used to calculate cost-benefit ratio of SCOR model.

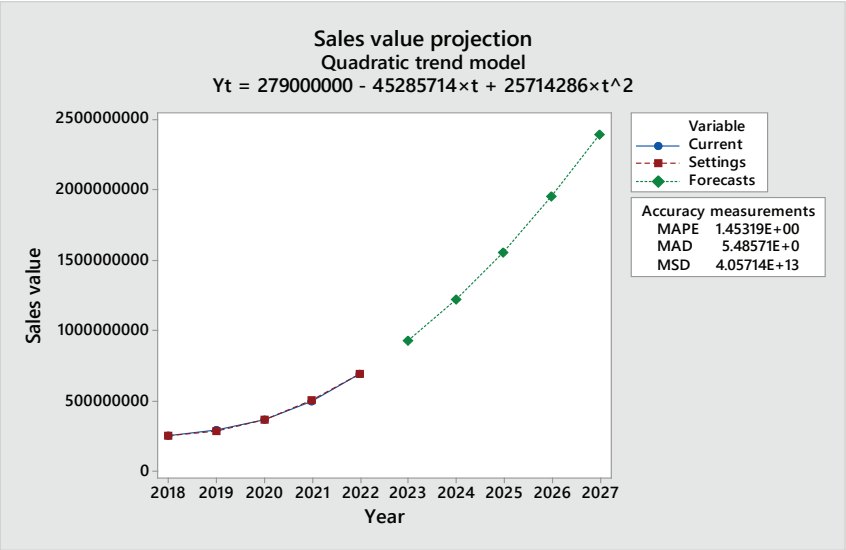

Figure 6. Projected sales revenue for 2023-2027 after SCOR model implementation.

of 26 %. A B/C ratio greater than 1.0 confirms the financial viability of the investment.

Table 9. Projected fertilizer sales revenue (2023-2027).

Period	Forecast
2023	933,000,000.00
2024	1,222,000,000.00
2025	1,562,428,571.00
2026	1,954,285,714.00
2027	2,397,571,429.00

Discussion

The main objective of the research was to implement the SCOR model in the supply chain in the agroindustrial company, but at the same time two other management models most quoted and used by companies were analyzed.

Other supply chain management approaches exist, such as the 4C's model, which has been applied in perishable product chains with an emphasis on the relationship with the final consumer (Sanchez & Hasbledy, 2014), or the 4 Gaps model, widely used in service marketing to analyze deficiencies in perceived quality (Zeithaml *et al.*, 2002b). However, both frameworks mainly focus on customer experience and external communication, and do not address the integration of internal processes or the control of operational indicators. In the agroindustrial company analyzed, the main challenges were located in supply, warehousing, and production bottlenecks, which made evident the need for a more comprehensive model such as SCOR. Therefore, the reference to the 4C's and 4 Gaps models in this study serves a comparative purpose: to highlight that, unlike customer-oriented approaches, SCOR enables a holistic intervention on structural supply chain limitations and provides strategic guidance with measurable economic impact.

The mapping exercise (Figure 1) facilitated the systematic identification of bottlenecks and demonstrated how the company's internal information could be aligned with the SCOR structure, reinforcing its role as both a diagnostic and decision-making tool.

The implementation of strategies were proposed to suppliers, companies, and clients; regarding suppliers, the strategies are: providing technical advice and training in good practices; organize fellowship and award events. For the company, the strategy is to hire a specialist in the SCOR model for 6 months; for clients, the strategy is to attend international fairs to promote and attract clients. All of this has a cost of $305,000 MX.

The cost-benefit relationship of using the SCOR model in the company's supply chain was analyzed, emphasizing the bottlenecks of the supply chain. The current processes of the supply chain were determined and analyzed to identify the real situation of the company, based on this it was proposed to identify the appropriate model to improve the supply chain, the SCOR model being the one that best fits the situation of the company. the company, with its respective metrics and attributes. The cost benefit was calculated using the company's sales history, these data were used to obtain the variables, after having applied these variables, it was determined that the cost benefit of using the SCOR model in the supply chain of the agroindustrial company is 1.26, when the benefit cost is greater than one,

the value of the benefits is greater than the costs of the project, in this sense the income is greater than the expenses so it can be stated that for each monetary unit invested, there will be a return of the capital invested and a profit of $0.26.

While the calculated benefit-cost ratio of 1.26 suggests a positive return on investment from the SCOR model implementation, this figure should be interpreted with caution. The ratio is based on projected sales increases and estimated implementation costs, not on real post-intervention performance data.

As such, the 1.26 value reflects a theoretical outcome under ideal conditions. It does not capture the full magnitude of impact, particularly in terms of intangible benefits such as improved customer satisfaction, better process visibility, or reduced risk. Moreover, it does not account for external market fluctuations, policy changes, or implementation delays that may influence actual results.

Therefore, while indicative of potential value, the benefit-cost ratio alone is insufficient to quantify the comprehensive impact of SCOR adoption. A longitudinal post-implementation study would be necessary to validate the financial, operational, and strategic outcomes in a measurable way.

Furthermore, given that this research is based on a case study, it is necessary to contrast the findings with results from other implementations of the SCOR model to provide broader validation. In this regard, the study by Díaz & Marrero (2014) applied the SCOR model to manufacturing enterprises in Cuba and reported improvements in internal coordination, identification of bottlenecks, and optimization of resource allocation-outcomes that closely mirror the results observed in the agroindustrial company analyzed in this work. Similarly, Calderón and Lario (2005) evaluated the SCOR model in a Spanish logistics company and emphasized the model's ability to integrate supply chain stages and align operational strategies with performance metrics, leading to increased responsiveness and reduced lead times.

These external cases reinforce the conclusion that the SCOR model is not only effective in diverse economic contexts but also particularly valuable in environments with complex logistical needs. The consistency in the types of improvements reported—across sectors and geographies—supports the notion that the results obtained in this study are not isolated or anecdotal but rather aligned with a broader pattern of effectiveness demonstrated in the literature. This comparative perspective strengthens the generalizability of the findings and validates the SCOR model as a robust tool for supply chain enhancement in the agroindustrial sector.

Unlike previous studies that often focus on large-scale or multinational corporations, this research provides a unique perspective by applying the SCOR model to a mid-sized agroindustrial company operating in a developing economy. This setting introduces challenges such as supplier variability, limited infrastructure, and high market volatility. By addressing these issues, the study offers a novel application of the SCOR framework and demonstrates its adaptability to different scales and contexts, which has not been sufficiently explored in the existing literature.

Conclusions

This research was carried out with the aim of improve the supply chain of an agroindustrial company through the application of the SCOR (Supply Chain Operations Reference) model. The improvement was assessed by comparing the company's initial operational state—characterized by undocumented processes, recurring bottlenecks, and lack of integration between departments—with the projected outcomes following the implementation of SCOR-based strategies.

The SCOR model allowed the company's supply chain to be formally structured for the first time, identifying key performance indicators, process levels, and strategic metrics. The comparison between the current situation and the projected SCOR-driven scenario revealed improvements in areas such as resource management, delivery times, process coordination, and warehouse efficiency.

Additionally, the study demonstrated that the SCOR model is better suited to the company's needs compared to other commonly cited models (4C's and 4 Gaps), which are more customer-service oriented and less comprehensive in addressing internal supply chain inefficiencies.

The cost-benefit analysis supported these improvements with a positive ratio of 1.26, indicating that for every monetary unit invested in SCOR implementation, the company would gain a return and an additional 26 % in profit. The benefit-cost (B/C) ratio of implementing the SCOR model in the company's supply chain was calculated as 1.26. This value was obtained by dividing the projected financial benefit—based on historical sales growth and future forecasts—by the total implementation cost of the proposed strategies ($305,000 MXN). A ratio above 1.0 indicates that the investment is economically viable, as the benefits exceed the costs. This projection, grounded in historical sales data and validated against external case studies, reinforces the model's potential for performance enhancement within the agroindustrial context of an emerging economy.

Additionally, the comparative mention of the 4C's and 4 Gaps models underscores that, while useful in contexts focused on customer service and communication, they do not provide the comprehensive coverage required to address internal inefficiencies. In contrast, the SCOR model proved to be more suitable for the agroindustrial case analyzed, as it integrates processes, performance metrics, and strategic attributes across the entire supply chain.

Therefore, this study not only documents the initial diagnosis of the company's supply chain but also provides a strategic roadmap for improvement using an internationally recognized model, offering practical and scalable insights for similar organizations in the sector.

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