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Systematic Review of the Literature on Operations Management in Servuction Systems: A Case Study of Cooperative Services

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Abstract

This literature review aims to provide an up-to-date synthesis of operations management in service systems in the cooperative services sector, both locally, regionally, nationally, and internationally. Through an exhaustive analysis in the sector, we seek to identify the main problems that hinder its development and sustainability. Where a series of challenges related to regulation, access to financing and the incorporation of innovations, the scarcity of resources, the need to train members in new practices, constant changes in regulations and various operational limitations contribute to aggravate the current situation of these organizations. Therefore, recognizing these factors is essential to propose effective strategies that strengthen their performance in the present and guarantee their future projection. To this end, the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) methodology will

be adopted, which includes the identification and evaluation of scientific articles from various databases. Studies on operational management in the cooperative services sector will be reviewed and continuous improvement methodologies such as Theory of Constraints, Lean Service and Six Sigma will be explored. Highlighting its potential to increase efficiency and improve service in cooperatives during the period 2015-2025. The purpose of this review is to provide a comprehensive view of the challenges and opportunities in operations management in the cooperative services sector, as well as to determine whether the implementation of these methodologies has contributed to mitigating existing challenges. accordingly, to establish bases for future research that optimizes these processes and the strengthening of the cooperative sector.

Keywords
Operations Management, Servuction System, Theory of Constraints, Lean Service, Six Sigma, Cooperative Services.

1. Introduction
Cooperatives, entities that operate under principles of self-management and solidarity, display a remarkable diversity in their structure and the sectors in which they operate worldwide, where cooperatives can be identified ranging from the financial sector, such as savings and credit cooperatives, to those dedicated to agricultural production, as well as those in services, housing, transportation, associated work, and consumption. (ICA. 2023). In the Colombian context, this typology extends to health, production, education, tourism, handicrafts, commerce cooperatives, and the so-called multi-active ones, reflecting their capacity to adapt to regional particularities. (Asamblea Nacional del Cooperativismo, 2023). In Cartagena, these organizations play a fundamental role in the local economy, providing a wide range of essential services for their communities. However, the provision of cooperative services faces challenges common worldwide, including the need to improve operational efficiency, the difficulty in attracting and retaining qualified talent, and limitations in infrastructure. (ILO. 2024). These issues directly impact the satisfaction of members and the ability of cooperatives to fulfill their social and economic purpose. Despite these challenges, the Colombian cooperative movement has shown significant growth, establishing itself as a relevant actor in the national economy. Globally, cooperatives generate a significant economic impact. The world's 300 largest cooperatives report revenues exceeding $2.4 trillion annually, and the cooperative sector as a whole is estimated to represent approximately 4% of global GDP. Furthermore, more than 12% of the global population is affiliated with a cooperative. (Cooperativismo. 2023) ; Consequently, this study aims to analyze the characteristics and operational strategies in the service systems of those cooperatives that have managed to thrive in an increasingly competitive and dynamic environment.

1.1. Objectives
- Analyze the Operations Management strategies implemented in the cooperative sector during the last decade (2015-2025), through a systematic review based on the PRISMA model, in order to identify patterns, trends and lessons learned that can serve as a reference for future improvements in operational efficiency.

- Develop a strategic framework that facilitates the identification of opportunities and possible interventions in the management of operations of the cooperative sector in Cartagena de Indias, Colombia, aimed at improving the effectiveness of processes, increasing member satisfaction and fostering a positive impact on the community.

2. Literature Review
2.1. Operations Management
Operations management refers to the design, operation, and improvement of the systems that create and deliver goods and services. According to (Heizer 2017), this discipline is essential for achieving efficiency and effectiveness in organizations. In the context of the cooperative sector, operations management faces unique challenges due to its democratic structure and social objectives. Research such as that of (Villalobos 2022) highlights that proper management can improve service quality and member satisfaction, both crucial elements for the success of cooperatives.

2.2. Servuction Systems
Service systems are those that combine tangible and intangible elements in the delivery of a service. (Bitner 1997) defined the concept as a system that involves both customers and employees in the process of creating the service. In the cooperative sector, where human interaction is fundamental, understanding these systems is vital to improving the

user experience (Alzate González 2021). The quality of service in this context not only depends on internal processes but also on the customer's perception of the interaction with the cooperative.

2.3. Lean Service

The methodology known as Lean Service adapts the principles and practices of Lean Manufacturing to the service sector, with the fundamental purpose of maximizing the value delivered to the customer by systematically identifying and eliminating waste. (Pons 2023). This approach focuses on process optimization, continuous improvement (Kaizen), and the creation of more efficient workflows, with the aim of producing high-quality products or services in the shortest possible time and with efficient use of resources. Through process mapping and value analysis from the customer's perspective, Lean Service seeks to eliminate activities that do not add value, known as 'muda', and promote an organizational culture oriented towards operational efficiency, customer satisfaction, and constant innovation. (Silva 2024). This methodology allows for reducing unnecessary costs, minimizing waiting and response times, standardizing procedures, and increasing competitiveness in dynamic and demanding environments like the current ones. Additionally, the implementation of Lean Service requires a strong commitment from organizational leadership, as well as the active participation of work teams, fostering interdisciplinary collaboration and empowering employees in decision-making related to the improvement of service processes. (Ortega 2024).

2.4. Cooperative services

They are services provided by organizations of a cooperative nature, whose purpose is to meet the common needs of their members through self-management, solidarity, and democratic participation. These services can cover multiple sectors such as savings and credit, health, transportation, housing, consumption, education, production, among others. Unlike traditional companies, in cooperatives the users are often also owners, which implies a focus centered on collective welfare rather than profit maximization. (Principios cooperativos 2023). Cooperative services are characterized by being offered by organizations with a distinctive structure, where the satisfaction of the shared needs of their members is the main driving force, operating under the principles of self-management, solidarity, and democratic participation. The scope of these services is notable, extending to such diverse sectors as finance (savings and credit cooperatives), health (health cooperatives), mobility (transport cooperatives), housing (housing cooperatives), consumption, education, and production (De Jesus Rahmer, Garzón Saenz y Solana Garzón 2023), among others, demonstrating their adaptability to the specific needs of each community. (Birchall 2022) . A fundamental difference with conventional companies lies in the figure of the member-user-owner, which entails prioritizing collective well-being and long-term sustainability over mere individual profit. (Zeuli 2023). This model, in addition, promotes the creation of mutual support networks and the building of social capital within the communities where they operate. (Restakis, Humanizing the Economy: Co-operatives in the Age of Capital. New Society Publishers. 2024).

3. Methods

The methodological strategy adopted in this article is the documentary review, which is carried out following the systematic review approach described in the PRISMA 2020 Statement. (M. J. Page 2021). The methodological process is organized into three main phases: identification, review, and inclusion. Each of these phases is divided into specific stages that ensure a rigorous and detailed analysis of the collected information. In total, the initial sample consisted of 900 downloaded articles, which were subjected to a process of purification and analysis in each of the described phases. (see Figure 1).

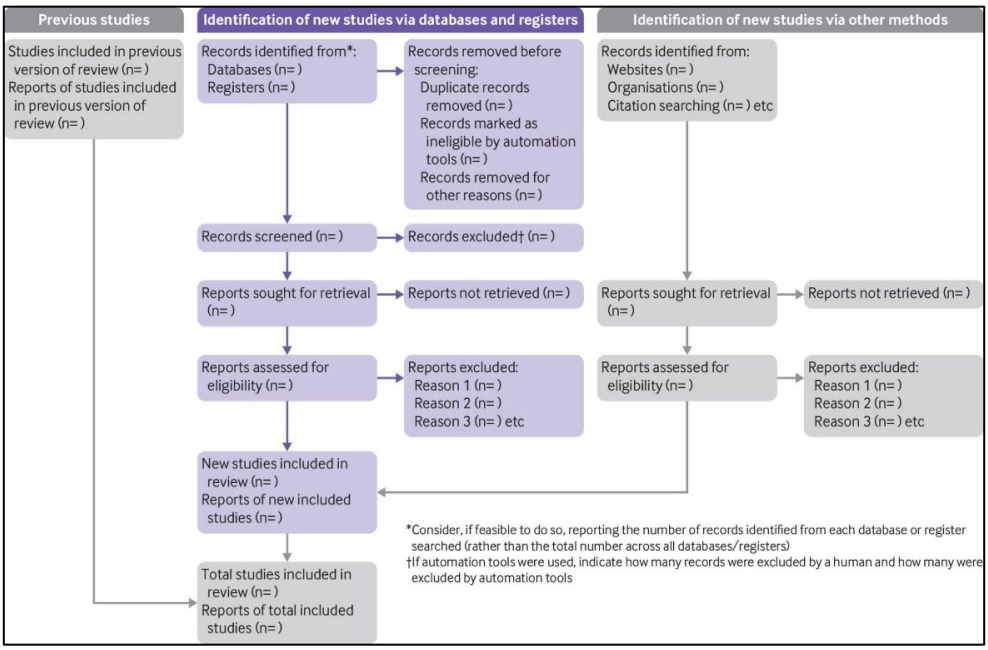

Figure 1. PRISMA 2020 Flow diagram

3.1. Identification of items

3.1.1. Eligibility criteria

In order to carry out a systematic and well-structured research, in accordance with the PRISMA 2020 statement, a main research question was formulated, accompanied by sub-questions. These were fundamental in guiding the selection of relevant information.

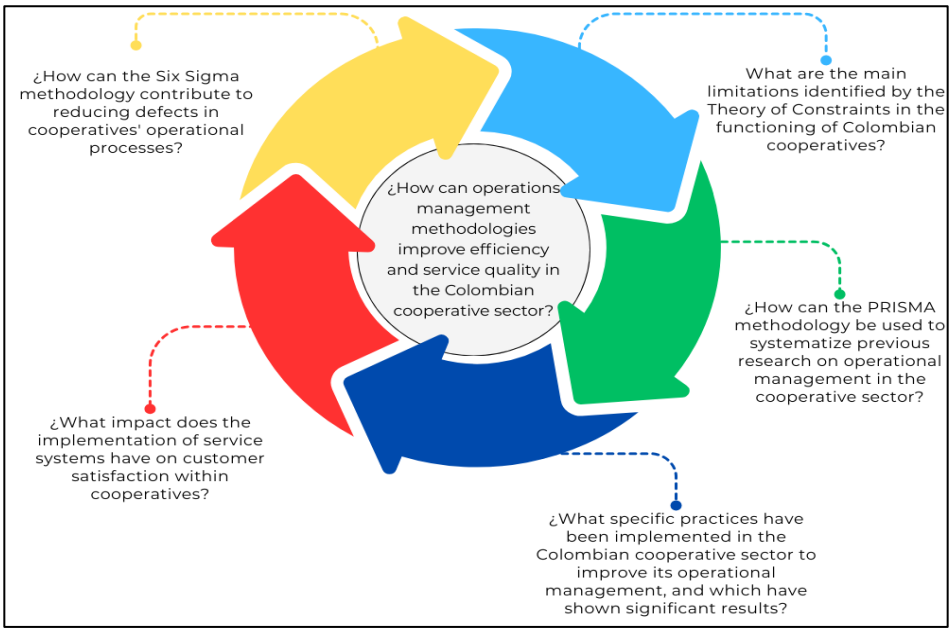

Figure 2. Questions and sub-questions of the search problem.

The questions and sub-questions proposed in Figure 2 serve a key function within a systematic review, as they allow for a breakdown and more specific approach to the different aspects of the main question. In the context of the PRISMA 2020 Declaration, these sub-questions are fundamental tools that guide and delimit the search for information, facilitating the identification of relevant studies and the organization of analysis. Thanks to them, it is possible to maintain a coherent and structured focus throughout the entire research process, ensuring that each stage addresses clearly defined objectives.

3.1.1.1. Inclusion criteria

A. **Type of study**:

- ✓ Theoretical, practical studies, and case studies (qualitative and quantitative) will be included in which the methodologies of interest are applied.
- ✓ Files in English and Spanish (publications, research articles, proceedings, theses, graduate works, conference videos, among others) that address issues related to healthcare sector attention.

B. **Publication date:** Studies published between 2015 and 2025 will be considered to ensure the relevance and timeliness of the data.
C. **Geographical context:** Studies focusing on Cartagena or that present relevant comparisons with similar contexts will be prioritized.

3.1.1.2. Exclusion criteria

A. Articles that are duplicated or repeat content without offering relevant new information or knowledge.
B. Non-peer-reviewed sources, such as blogs, expert opinions that are not academic, or articles from popular newspapers and magazines without a solid scientific basis.

3.1.2. Source of information

A. Academic databases like Science Direct.
B. Specialized journals in operations management, services, and cooperatives.
C. University theses and dissertations related to the topic.
D. Reports and technical documents prepared by organizations related to the afore mentioned methodologies.

3.1.3 Search strategies

To carry out this search, a set of keywords related to each methodology was used, which were combined using Boolean connectors (AND, OR, and NOT). A time frame was established covering the years from 2015 to 2025, which allowed for the retrieval of relevant information for the research. Additionally, two languages were selected for the search: English and Spanish, due to their wide prevalence in various academic and scientific disciplines (Table 1).

Table 1. Search Strategies.

Methodology	Database	Keywords	Files Found
Operations Management	Science Direct	By reference	400
Lean Service	Science Direct	By reference	100
TOC	Science Direct	By reference	200
Six Sigma	Science Direct	By reference	200
		Total	900

3.2. Review of information

The identified articles underwent a thorough and objective review, in which their relevance and pertinence to the study topic were evaluated. Strict selection criteria were applied to ensure that only the most relevant and highest quality articles were included in the review. Duplicates and articles that did not meet the established requirements were removed. Through a consensus process, a final selection of articles that met the necessary quality and relevance standards for the study was reached.

3.3. Included studies

Once the articles for review were selected, a set of key data was collected, such as: the sector under study, subsector, name of the database, type of document, title of the article, author and nationality, year of publication, summary, objective, and methodology implemented. This process allowed for the information to be organized systematically, facilitating its analysis and the identification of relevant patterns for the research. Finally, taking advantage of the information obtained from the documents that met the previously defined criteria, an analysis was conducted using statistical tools to describe and correlate the research approaches in the methodologies of interest.

4. Results and discussion

4.1. Selection of studies

Based on the criteria established in the identification phase, a set of studies was selected that rigorously met the previously defined inclusion criteria.

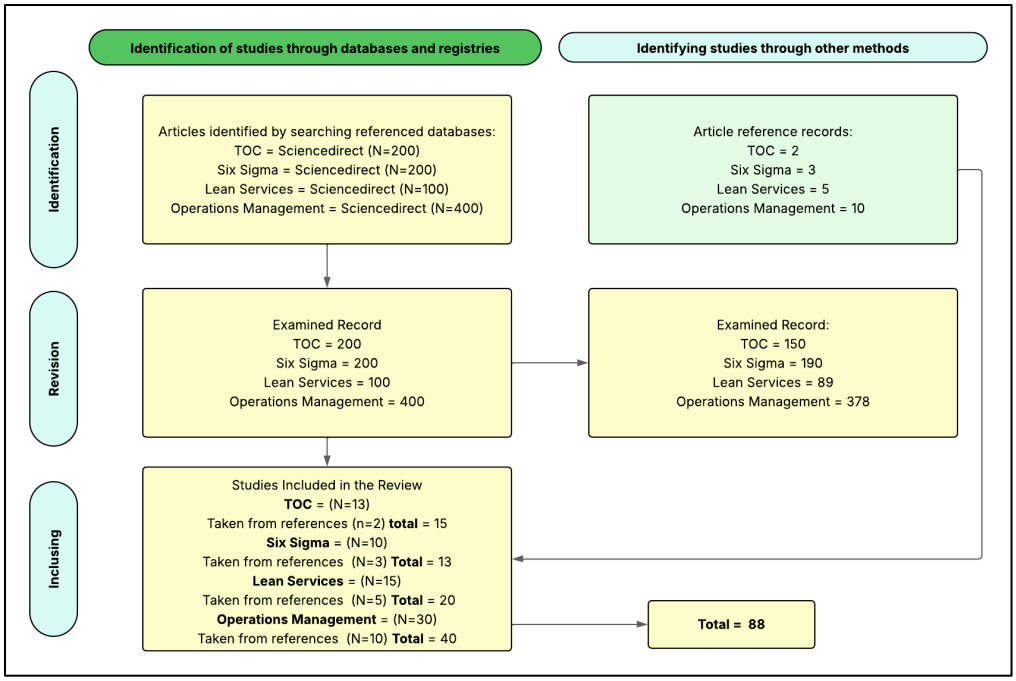

Figure 3. Flow diagram of selected studies – PRISMA 2020 model

As described in Figure 3, 900 articles were initially identified through scientific databases (Science Direct). However, during the review, numerous studies were excluded for not directly addressing the field of the tools studied or for focusing on tangential disciplines without adding value to the main object of study. In the full reading phase, stricter filters were applied:

• Duplicate articles or those with low methodological rigor were discarded. A total of 250 duplicates were removed, as some articles appeared more than once due to registration errors, different versions of the same work, or variations in metadata (title, authors, date).
• 422 studies were excluded because they were not peer-reviewed, were outdated, or presented insufficient empirical evidence.

• Many studies on approaches such as Lean Service or Six Sigma were applied to very specific industrial contexts or lacked general applicability to the case analyzed. Therefore, 140 articles were excluded.

Following the review process, only 88 studies were deemed relevant for inclusion in the final review, thus ensuring that the results are supported by relevant, recent, and academically sound evidence. Furthermore, it demonstrates that

Operations Management has a more consolidated and transversal body of theoretical and empirical research compared to more specialized methodologies such as Lean Service or Six Sigma, at least within the research framework used.

4.2. Information analysis

Continuing with the research, we conducted an exploratory analysis of the database information, revealing the following findings.

4.2.1. Bibliometric analysis of methodologies and documentary typology

Through the application of various search strategies, a total of 900 documents were found. Of these, after applying the established eligibility criteria, 88 articles were selected, distributed by methodology as follows: see Figure. (4)

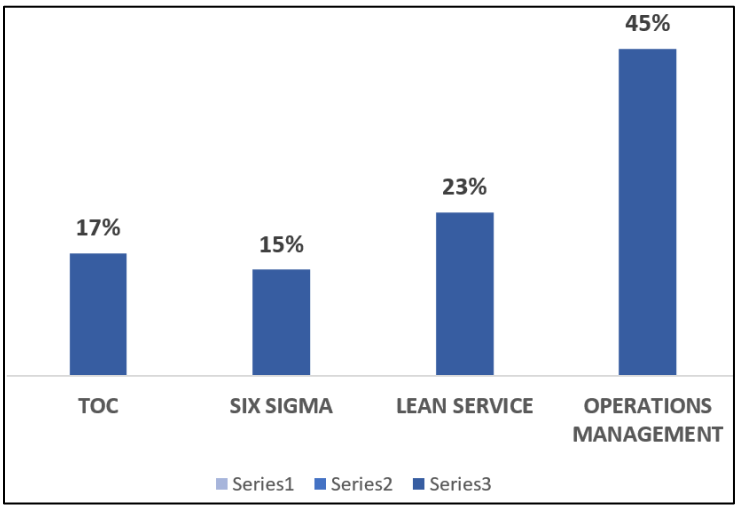

Figure 4. Illustration of biometric percentages

In Figure 4, the total percentage of documents analyzed by methodology is described; in the application of Six Sigma (15%), 13 research articles were reviewed, regarding operations management (45%), 40 research articles were analyzed; for Lean Service (23%), 20 research articles were reviewed. Finally, for TOC (17%), 15 research articles were evaluated.

4.2.2. Analysis by country or territory

By examining the geographical distribution of the analyzed documents and classifying them according to their methodology, a clearer understanding of the importance and implementation of these philosophies in each country and continent is achieved. (Restakis 2023). As shown below:

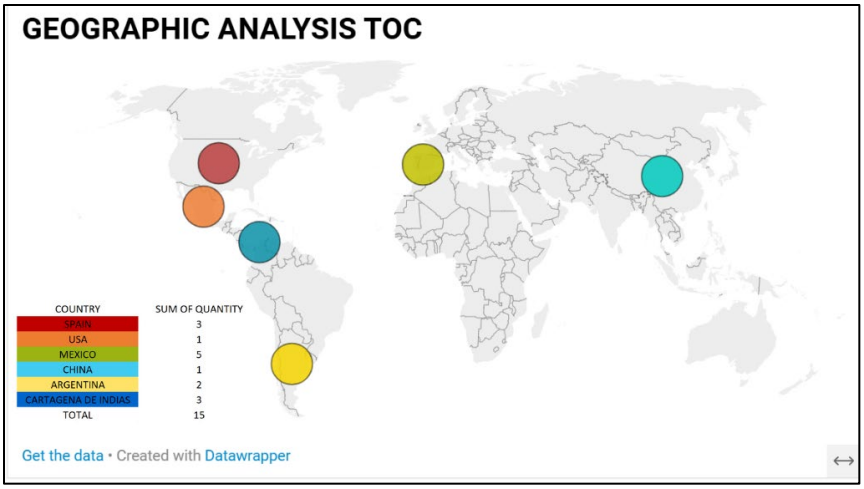

Figure 5. Geographic analysis TOC.

In Figure 5, the geographical analysis indicates that research on the applicability of the Theory of Constraints (TOC) in cooperative service systems focuses on six countries. Spain and Cartagena each have three studies, while the United States and China each have one. On the other hand, Argentina has 2 studies and Mexico stands out with 5. This distribution shows a predominance of studies on the American continent, which represents 17% of the total research reviewed.

The greater concentration of studies on the Theory of Constraints (TOC) in the Americas, especially in countries such as Mexico, Colombia, and Argentina, is due to the strong presence of the cooperative model in the region and the need to improve its operational efficiency in the face of resource limitations. In addition, the support of academic institutions and public policies aimed at strengthening the solidarity sector has promoted applied research. TOC is particularly attractive due to its capacity to optimize processes in constrained environments, making it a key tool for the development and sustainability of Latin American cooperatives.

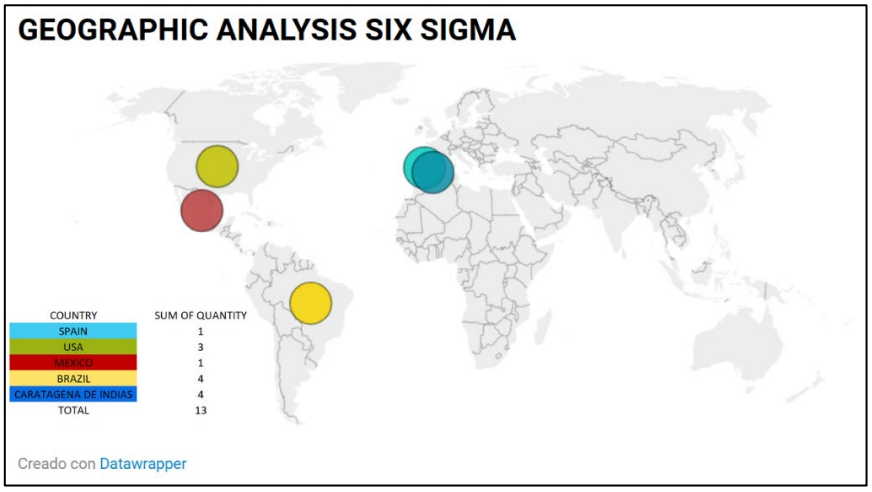

Figure 6. Geographic analysis Six Sigma.

In Figure 6, the geographical analysis indicates that research on the applicability of Six Sigma methodology in cooperative service systems focuses on five countries. Spain and Cartagena stand out with 4 studies each, while Spain and Mexico have one each. On the other hand, the United States has 3. This distribution highlights a predominance of studies in the continents of Asia and America, which represents 15% of the total researched studies.

The concentration of studies on the Six Sigma methodology in Asia and the Americas is due to the interest in improving quality and efficiency in cooperatives located in regions facing operational challenges. Colombia and Spain stand out with four studies each, followed by the United States with three, and Mexico and Brazil with one each. This distribution reflects the academic and organizational drive in these countries to reduce process variability and foster a culture of continuous improvement within the cooperative sector.

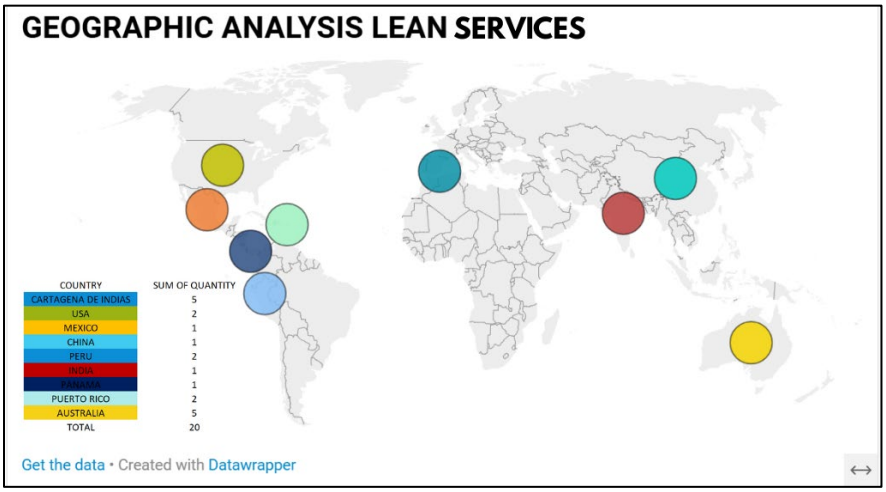

Figure 7. Geographic Analysis LS.

In Figure 7, the geographical analysis indicates that research on the applicability of Lean Service methodology in cooperative service systems is focused on nine countries. Cartagena and Australia stand out with 5 studies each, while the United States, Peru, and Puerto Rico have 2 each. On the other hand, Mexico, China, India, and Panama each have one study. This distribution shows a predominance of studies in the continents of Asia and America, which represents 23% of the total reviewed research.

The concentration of studies on Lean Service in the Americas and Asia reflects the interest in improving efficiency in cooperatives by eliminating waste and optimizing processes. Countries such as Colombia and Australia lead in research, followed by the United States, Peru, Mexico, India, among others. This trend demonstrates how Lean Service has become a key tool for strengthening the competitiveness and adaptability of the cooperative sector in contexts with high service demand and limited resources.

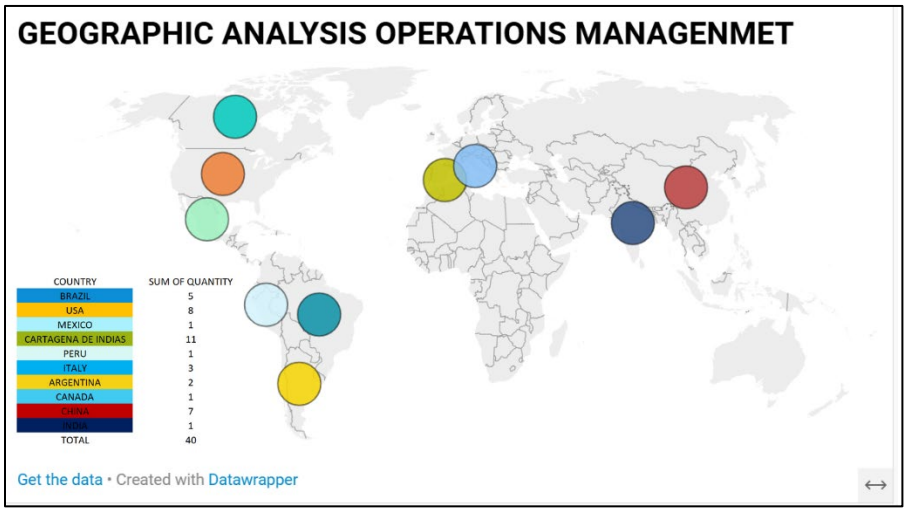

Figure 8. Geographic analysis OM.

In Figure 8, the geographical analysis indicates that research on the applicability of operations management in cooperative service systems focuses on ten countries. Cartagena, the United States, Brazil, and China have (11, 8, 5, 7), while Mexico, Peru, Canada, and India have one each. On the other hand, Italy has 3 and Argentina has 2. This distribution shows a predominance of studies in the continents of Asia and America, which represents 45% of the total research reviewed.

According to these results, the management of operations in the cooperative sector is particularly significant in the Americas, where countries like Cartagena stand out with emerging economies that are seeking to optimize the efficiency of their operations in Servuction systems.

The concentration of studies on operations management in the Americas and Asia reflects the effort to strengthen the efficiency and sustainability of cooperatives through better planning and process control. Countries such as Colombia, the United States, Brazil, and China present the highest number of studies, evidencing a growing interest in applying strategic and operational approaches that improve service quality, optimize resources, and increase the competitiveness of the cooperative sector in diverse and demanding contexts.

4.2.3. Analysis by area of application

The analysis by application area facilitates the identification of the specific fields in which each methodology is employed, as well as usage patterns and opportunities for improvement. This approach provides a comprehensive view of its impact and relevance in the various contexts of the cooperative sector, thereby allowing a better understanding of how these methodologies can be optimized to maximize their benefits.

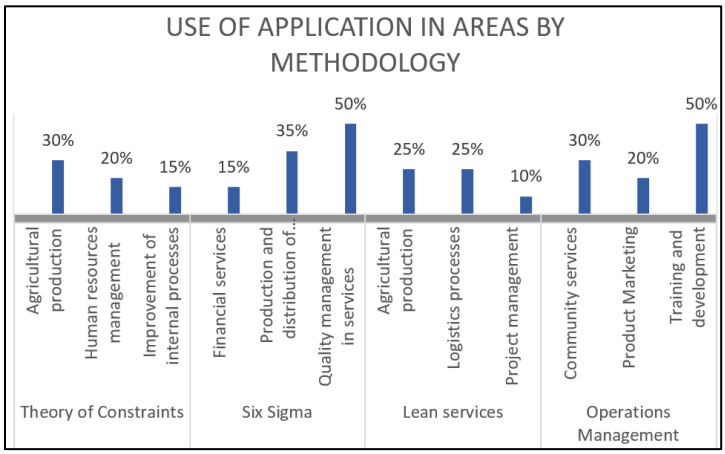

Figure 9. Use of methodologies in areas.

Figure 9, illustrates the percentage of use of the Theory of Constraints, Lean Service approach, operations management, and Six Sigma in various areas of cooperative companies. This analysis shows that each of these methodologies is capable of addressing the significant challenges faced by these departments, thereby enabling waste reduction and process optimization. By applying these strategies, cooperatives can improve their operational efficiency and better adapt to an ever-changing competitive environment. The use of these areas is considered based on the constant challenges they face and how this helps to reduce them. (See Figure 10).

4.2.4. Analysis of Tools Implemented by Methodology

After identifying the areas of greatest application for each methodology, a thorough analysis was conducted of the tools that are most frequently implemented in each approach. This process allowed for an understanding of the methodological preferences and the operational benefits that these tools offer in the studied cases. By evaluating their use, one can appreciate how each philosophy contributes to improving the efficiency and effectiveness of business operations.

Table 2. Search Strategies

Methodology	Tools
Theory of Constraints	Flowchart, Bottleneck Analysis, Production Scheduling
	Root cause analysis, Performance evaluations, Training and development.
	Process mapping, Process reengineering, Problem-solving techniques.
Six Sigma	DMAIC (Define, Measure, Analyze, Improve, Control), Control charts, Statistical analysis.
	FMEA (Failure Mode and Effects Analysis), Statistical Process Control (SPC), Pareto Charts.
	Customer satisfaction surveys, SIPOC analysis, Quality circles
Lean services	5S, Kaizen (continuous improvement), Just-in-Time (JIT)
	Value Stream Mapping (VSM), Kanban, Pull System.
	Scrum, Kanban Boards, Visual Management.
Operations Management	SWOT analysis, Prioritization matrices, Strategic planning.
	Market research, Product life cycle analysis, Positioning strategies.
	Continuing education programs, competency-based assessments, mentoring, and coaching

Table 2 provides a detailed breakdown of the most commonly used tools in various application areas, organized according to four key methodologies: Theory of Constraints, Six Sigma, Lean Service, and Operations Management. Each methodology focuses on improving efficiency and effectiveness.

In the context of cooperatives, these tools are particularly valuable in addressing common challenges such as limited resource availability, the need for collective decision-making, and the pursuit of operational sustainability. For example, process mapping and bottleneck analysis help optimize workflows in environments with high operational variability. Methodologies such as Kaizen and 5S strengthen organizational culture and member engagement, while strategic approaches such as SWOT analysis enable cooperatives to better adapt to their socioeconomic environment and plan more effectively.

5. Proposed improvements

5.1. Roadmap: opportunities and interventions

In light of the challenges and deficiencies facing the cooperative sector and having rigorously analyzed the systems and processes that hinder the overall system within these organizations, a decision is made to adopt a dynamic approach that can adapt to any type of cooperative regardless of its economic activity. Based on the findings obtained, a roadmap is proposed that incorporates operational management tools, with the purpose of enhancing the quality of the services provided by cooperatives in Cartagena de Indias. Colombia.

It is important to highlight that cooperatives are complex entities that encompass various operational areas. Inefficiency in a single department can negatively impact the overall functioning of the service. Therefore, implementing effective solutions requires not only time and consistency but also optimal use of available resources. Although the implementation of these solutions may take time and could delay the achievement of immediate results, it is essential to understand that an integrated and sustained approach is not only necessary but also ensures long-term stability and effectiveness. This type of strategy allows for the construction of a solid foundation upon which cooperatives can grow, adapt, and respond to changes in the environment. By prioritizing consistency in actions and the efficient use of resources, a robust system is created that not only addresses current problems but also prevents future inefficiencies. In this way, improvements will translate into a lasting positive impact on the quality of the services offered, thereby strengthening the role of the cooperative sector in community and economic development.

5.1.1. Definition of Processes

a. Comprehensive Diagnosis of the Sector

This phase involves a thorough analysis of the current functioning of the cooperative. Assessments will be carried out to identify strengths, weaknesses, opportunities, and threats (SWOT analysis). Internal processes will also be examined, and key metrics will be established to define a baseline, facilitating the measurement of future improvements in efficiency and productivity.

b. Implementation of Efficient Tools.

At this stage, specific solutions will be designed and implemented for the problems identified in the diagnosis. Methodologies such as Lean Management will be applied. (Zulkeflee 2023) and Six Sigma, prioritizing the optimization of internal processes. Furthermore, it will ensure that the staff is trained and committed to the new operational practices, which is essential for the success of the proposed strategies. (J. &. Martínez 2023).

c. Constant Monitoring and Evaluation.

Monitoring systems will be established based on the key indicators defined in the diagnostic phase. This will allow for the evaluation of the impact of the implemented interventions and make necessary adjustments in real time. Practices and results are documented to facilitate the replicability of the road map in other cooperatives at local, international, and global levels.

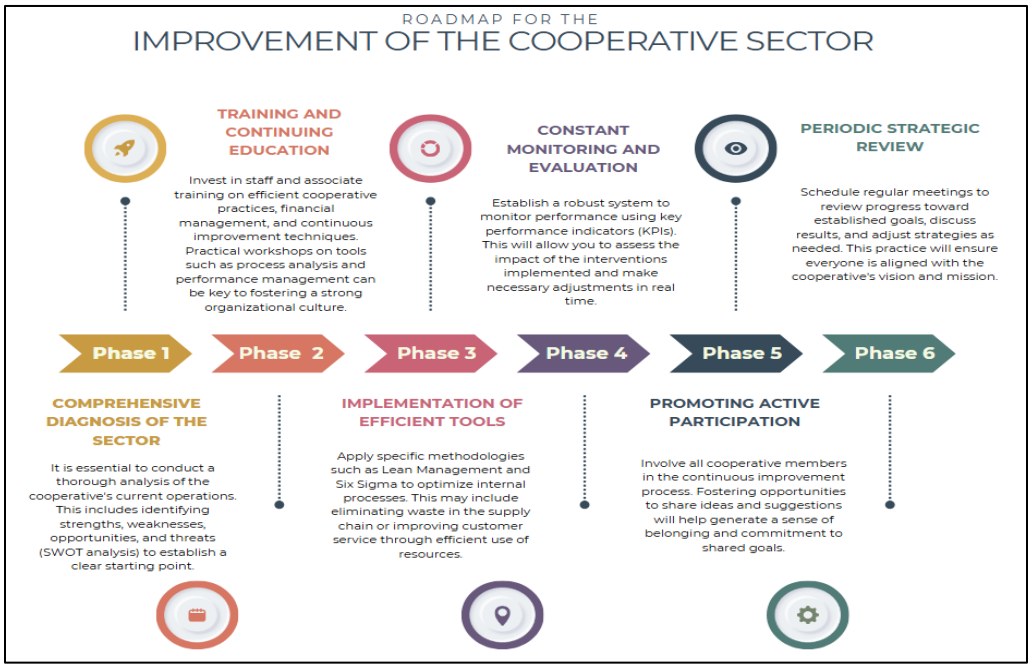

Figure 10. Roadmap.

Figure 10 describes the proposed improvement through a roadmap, which was based on a rigorous analysis of the operational context of cooperatives in Cartagena de Indias, integrating universal principles of quality management and organizational efficiency. The proposal is supported by a structured methodological approach that includes three fundamental phases: comprehensive diagnosis, implementation of efficient tools, and constant monitoring. This structure ensures a systematic and adaptive intervention, capable of adjusting to different types of cooperatives, regardless of their economic activity.

d. Validation

Validation is reinforced by the incorporation of recognized methodologies such as Lean Management and Six Sigma, which provides a solid technical foundation for process optimization. The application of these tools has not only proven effective in other productive sectors but, when adapted to the cooperative context, allows for improvements in operational efficiency, waste reduction, and enhanced service quality.

In addition, the improvement has been designed with a sustainable approach, considering that the long-term benefits outweigh the initial implementation challenges. The component of constant monitoring and evaluation, along with the definition of key performance indicators, ensures the traceability of results and allows for continuous improvement based on evidence. This feedback logic also makes the replicability of the roadmap feasible in other cooperative environments at the local, national, and international levels (Antioquia 2022) Therefore, it is concluded that the proposed improvement is not only feasible and consistent with the needs of the sector, but also theoretically validated

through proven management tools, and empirically through an adaptable and sustainable approach aimed at strengthening the cooperative model (Confecoop).

6. Conclusions

The implementation of continuous improvement methodologies, such as Lean Service, Theory of Constraints, Lean Six Sigma, and operations management in the cooperative sector has emerged as a highly promising approach to optimize processes, reduce costs, and enhance the quality of service provided. (Villamizar Villamizar y Reuto Albarracín 2020). These methodologies not only focus on operational efficiency but also promote a culture of continuous improvement that can transform the way cooperatives operate. However, this review has highlighted that the adoption of these methodologies in cooperatives faces specific challenges. First, optimizing workflows is crucial, as many cooperatives operate with interdependent processes that require effective coordination among different areas. The inherent complexity of these operational processes can hinder the effective implementation of the proposed methodologies.

The resistance to change among the members of the cooperative represents a significant obstacle. (Ramírez 2023). Often, workers are accustomed to certain practices and fear that new methodologies may disrupt their routine or jeopardize their job security. (Torres 2023). Therefore, it is essential to address this resistance through training and awareness strategies that involve all members in the change process.

The findings and recommendations of this research are not only relevant to the studied local context, but they can also serve as a valuable guide for any country managing cooperatives. By providing a strategic framework for identifying opportunities for improvement and the adaptive implementation of efficient methodologies, this research contributes to strengthening the cooperative sector globally, promoting its sustainability, competitiveness, and responsiveness to changes and demands from the environment.

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