

A Systematic Review of the Literature on Operations Management in Servuction Systems: A Case Study in the Hospitality Sector

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Abstract

The hospitality industry is characterized by being dynamic and changing, facing challenges such as skilled labor shortages, rising operating costs, competition, fluctuating demand, and rising customer expectations. Factors that directly impact the quality, productivity and profitability of services. Various studies have shown that having trained personnel and resource management contribute significantly to improving the quality of service. In this sense, the implementation of continuous improvement methodologies such as Lean Management, Theory of Constraints and Six Sigma, show positive results in the reduction of waiting times, in the optimization of processes, increase in revenue and in customer loyalty. However, the implementation of these is still limited or disjointed in many cases, lacking a unified framework that allows evaluating their effectiveness in the Latin American context and evidencing a gap in applied research at the local level.

In response to this need, this work aims to synthesize and analyze the existing literature on the management of operations in the hotel sector in the last 10 years (2014-2024) by applying the PRISMA 2020 methodology (Preferred Reporting Items for Systematic Reviews and Meta-Analysis). In order to identify how these modern management methodologies have solved problems, what benefits they have generated in the management of operations in companies in the sector. This will lead to the proposal of a roadmap that integrates these methodologies in the context of the hotel sector of Cartagena de Indias – Colombia.

Keywords

Service System Management, Lean Management, Six Sigma, Theory of Constraints, Prism Model, Hospitality Industry.

1. Introduction

The hotel sector is critical to the economy of many countries, as it not only provides accommodation for visitors, but also generates employment, driving economic growth and the development of tourism in general (Ortega & Galindo,

2024). This sector groups establishments that offer temporary accommodation services to travelers and tourists, ranging from small boutique hotels and hostels to large hotel chains and luxury resorts (Sanchez & Terán, 2018). Globally, the sector is going through a period of profound transformation, marked by its resilience after the impact of the COVID-19 pandemic and the rise of new trends in tourism demand, such as digitalization, sustainability and service personalization. (Aleksandra Babii 2021).

In this context, Colombia, in 2019, received 4.5 million non-resident visitors, however, the pandemic caused a 70% drop in 2020, likewise, according to the Ministry of Commerce, Industry and Tourism (Minitec, 2020), given the health crisis that was occurring worldwide, COTELCO (Hotel and Tourism Association of Colombia) announced that the income of hotel establishments had a loss of 4,000 million pesos (COTELCO 2021), as a result of lower hotel occupancy. However, the tourism sector has shown signs of resilience, In 2023, in Cartagena, according to the DANE Monthly Accommodation Survey (EMA), the arrival of visitors exceeded 3.5 million, which represents a significant growth compared to 2022 (Cartagena como vamos, 2023), however, there are still structural challenges that affect operational efficiency and quality of service, such as the quality of tourism employment, high informality and the need to improve tourism infrastructure to sustain the dynamism of the sector (Turismo en Cartagena crece, pero enfrenta desafíos de empleo y sostenibilidad 2025). Therefore, measures must be adopted to improve the availability of the resources required for the operation of these organizations (Saénz & Redchuk 2023)

Likewise, considering the current demands of the environment and the growing social and environmental expectations, it is recognized that the process approach also offers a suitable platform to integrate sustainability practices. These actions not only help to reduce impacts, but also strengthen corporate image, lower operational costs, ensure regulatory compliance, and generate shared value among the various stakeholders in the sector. (Sira 2024). Faced with this situation, the following research question arises

¿How to establish opportunities for improvement in the management of operations in service systems in the hotel sector in the city of Cartagena de Indias, Colombia?

1.1 Objectives

General Objective

To systematically review the existing literature on the management of operations in service systems in the hospitality sector using the Prisma 2020 model over a period of 10 years (2014 – 2024).

Specific Objectives

- To analyze the trends, methodological approaches and research gaps in the last decade on the management of operations in hospitality service systems, based on the information extracted from the selected studies.
- Propose a roadmap that integrates Six Sigma, Lean Management and Theory of Constraints methodologies in the hospitality sector, in order to optimize the management of operations in the hospitality sector, based on the findings obtained in the literature analysis.

2. Literature Review

2.1. Service Systems Management

According to (Ferié et al. 2022) servuction is defined as "the production of the service" and consists of the systematic and coherent organization of all the physical and human elements of the customer-company relationship necessary for the provision of a service whose commercial characteristics and quality levels have been determined. Its essence lies in defining, first, the service you want to offer and the type of customer to whom it is directed. From this, the necessary physical supports and the personnel in charge of contact with the customer are established so that, finally, the organizational system can be created to ensure the proper functioning of the process, all under the conception of the organization as a system for manufacturing services.

On the other hand, (Chambi et al. 2023) they emphasize that servuction is a term derived from a French neology created by Pierre Eiglier and Eric Langeard, who merged the words "service" and "production". This concept integrates the areas of marketing, operations, and customer experience into a structured system.

2.2. Lean Management

Lean Management (LM), also known as lean management, has evolved as a continuous improvement-oriented management approach, originally conceived in Toyota's production system and subsequently adopted by the American

automotive industry in the 1980s. In the last decade, it has gained prominence in the service sector, particularly in the hospitality industry, due to its ability to improve operational efficiency and raise the quality of service (Gupta et al. 2016). This model can be understood from three key dimensions: a philosophy focused on continuous improvement and the elimination of activities that do not generate value; organizational principles focused on customer satisfaction and operational efficiency; and a set of tools such as process mapping, 5S or root-cause analysis, which allow workflows to be redesigned in a more agile way (Bocquet et al. 2019). In this sense, Lean Management not only contributes to optimizing resources, but also promotes a participatory organizational culture, where staff are actively involved in the identification and solution of operational problems.

Various studies have demonstrated the effectiveness of the implementation of Lean Management (LM) in the hotel sector, highlighting significant improvements in operational efficiency and waste reduction. For example, in a hotel in Lima, Peru, it was possible to reduce almost entirely the activities that did not add value within the maintenance process, which made it possible to considerably reduce the execution time of a work order (Martínez & Ojeda 2023). Likewise, the application of lean principles made it possible to optimize inventory management. In one documented case, inventory value was reduced by 70% by eliminating unused products in the warehouse, reflecting better alignment between actual demand and supply (Saenz et al. 2024). Another relevant aspect has been the incorporation of tools such as 5S and Standardized Work in the room cleaning process, which resulted in a 40% decrease in the total time of the process (Ampuero et al. 2024). This optimization contributed not only to increased room turnover, but also to an improvement in the quality of service perceived by guests. Finally, the implementation of continuous improvement practices has driven the strategic acquisition of appropriate tools and materials, which has positively impacted room clearance times and the overall efficiency of operational processes (Vilela & De la Cruz 2023).

2.3. Six Sigma

The Six Sigma method is a management philosophy that emerged in the 1980s, promoted by engineer Mikel Harry from the analysis of variation in the processes of the Motorola company. This methodology is structured in five phases: Define, Measure, Analyze, Improve and Control (DMAIC), and focuses on optimizing processes by focusing on critical aspects for the customer. Through rigorous process measurement and defect reduction, it seeks to ensure more efficient and uniform production. (Albert et al. 2017)

Six Sigma represents a comprehensive effort to increase customer satisfaction, reduce cycle times, decrease errors, and improve the productivity and competitiveness of organizations (Marroquín 2018). Its application has become particularly relevant in the service sector, where positive results have been evidenced. For example, in a hotel in the United Arab Emirates, the implementation of this methodology led to a significant improvement in the process capacity index, resulting in increased throughput and an annual profit of \$50,000. (Ramadan et al. 2023).

Likewise, Six Sigma relies on various widely recognized tools and strategies, such as flowcharts, Pareto analysis, cause-effect charts, control charts, and project management techniques. These tools have proven to be particularly effective in the hotel sector, allowing continuous improvement of operational processes (Msilu 2023). In addition, in a study conducted in Southeast Europe, it was observed that the implementation of Lean Six Sigma had a positive impact on the quality of service. Establishments that adopted their practices reported higher levels of customer satisfaction (Ostergllava & Loku 2024). In conclusion, Six Sigma is consolidated as a powerful and adaptable methodology that drives continuous improvement and operational excellence, both in the industry and in the service sector.

2.4. Theory of Constraints

The Theory of Constraints (TOC), developed by Eliyahu Goldratt, is a process of continuous improvement based on systems thinking that seeks to increase business profits by identifying and eliminating the constraints that limit the achievement of objectives (Goldratt 1993). This theory classifies constraints into physical and policy, and states that physics can be found in resources, processes, or the market, with their identification being the key step in the approach (León et al. 2017).

Organizations that apply TOC have achieved benefits such as improved quality, reduced inventories, increased sales, better delivery compliance, and higher profits (Idarraga, 2006). Its application has also proven to be effective in non-industrial sectors, such as hospitality. For example, specific tools have been designed to adapt TOC to this type of organization, developing resource conversion models that improve efficiency and allow a better response to demand

(Pérez et al. 2017). TOC metrics have also been found to be useful for assessing supply chain performance, and the Drum-Buffer-Rope (DBM) model can effectively manage critical capacity constraints (Hou 2021).

Given its focus on logistics flow, its process orientation and its integrative capacity, TOC is considered an ideal philosophy for logistics management. However, its implementation has been limited by the lack of methodological tools that facilitate its understanding and practical application (Cruz & Pravia 2021). In conclusion, the Theory of Constraints represents a valuable tool for organizational improvement, with great potential in different sectors, as long as its implementation is facilitated.

2.5. Hospitality Industry

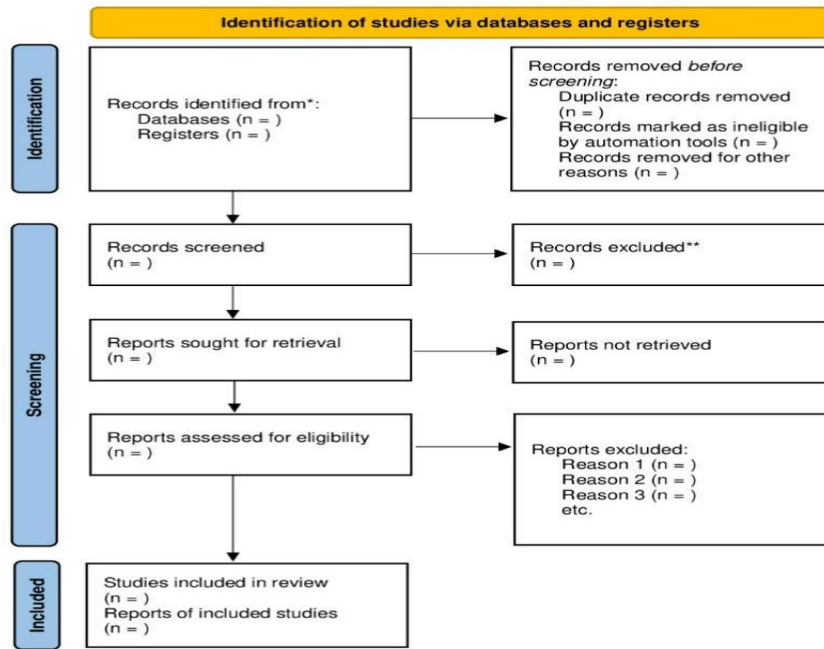
The hospitality industry encompasses a wide variety of sectors responsible for accommodating, feeding, transporting, and entertaining a large number of visitors, guests, and customers. Each of these sectors comprises different fields and offers different goods and services. While business in the hospitality industry encompasses many different services, they can be broadly classified into five sectors: food and beverage, lodging, recreation, travel and tourism, meetings and events (ESDAI 2022). In addition, recent research has highlighted the importance of applying innovative methodologies to optimize operations in this sector. In particular, the Lean Service approach integrated with the analysis of the value chain in service systems is shown to be a key tool to increase the operational efficiency and sustainability of companies in the sector. (Garzón et al. 2018) demonstrate that, by identifying and eliminating waste in processes, a correct allocation of resources is achieved that reduces waiting times and improves the quality of service.

2.5. 2020 Prisma Model

The PRISMA (Preferred Reporting Items for Systematic reviews and Meta-Analyses) model is a guide designed to help authors transparently and comprehensively report systematic reviews and meta-analyses. The PRISMA statement was initially published in 2009 and has been updated in 2020 to reflect advances in systematic review methodology and terminology used in this field. (Page et al. 2021).

3. Methodology.

This article was developed under an exploratory and descriptive research approach. The methodology used consisted of a systematic review following the perspective described in the PRISMA 2020 Declaration, which is structured in 3 stages that contain specific activities, ensuring the transparency and quality of the review. (See Figure 1)



*Consider, if feasible to do so, reporting the number of records identified from each database or register searched (rather than the total number across all databases/registers).

**If automation tools were used, indicate how many records were excluded by a human and how many were excluded by automation tools.

Figure 1. PRISMA 2020 Flowchart

3.1. Identification of the articles

3.1.1. Eligibility Criteria

In order to guide the search in the different selected databases, a central question was established, accompanied by three specific sub-questions. In addition, clear criteria were established to determine which documents to include or exclude in the review. (See Figure 2)

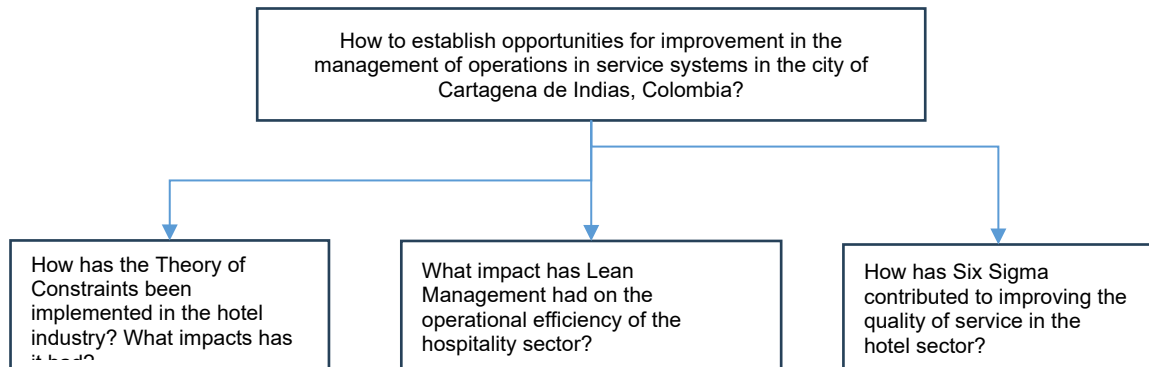


Figure 2. Question and Sub – search problem questions

3.1.1.1. Inclusion criteria

- Research published in English and Spanish (articles, theses, degree projects, among others) relevant in the context of the hospitality sector.
- Theoretical or practical publications (qualitative or quantitative) demonstrating the application of the methodologies.
- Peer-reviewed papers, with a focus on studies conducted in the last 10 years.

3.1.1.2. Exclusion Criteria

- Non-peer-reviewed articles, such as popular blogs, newspapers, or magazines.
- Studies that are outside the time range of interest, that are duplicated, and that repeat or do not contain relevant information on the sector

3.1.2. Sources of information

For the research of the studies, this search was conducted from April 3 to 8, 2025, using the databases of: Google Scholar, Scopus, ProQuest, and Springer Nature Link. This review was not registered in PROSPERO.

3.1.3 Search strategies

For the collection of the documents, different combinations of words related to the methodologies were implemented, including Boolean connectors such as (IN and AND), applying two search languages, English and Spanish. And establishing a time range from 2014 to 2024.

Table 1. Search strategies

Methodology	Database	Keywords	Files Found
Lean Management	Google Scholar	Lean Management AND hotels	300
		Implementation of Lean Manufacturing in hotels	300
	Scopus	TITLE-ABS-KEY (lean AND management AND in AND hotel) AND PUBYEAR > 2013 AND PUBYEAR < 2025 AND (LIMIT-TO (DOCTYPE, "cp") OR LIMIT-TO (DOCTYPE, "ar") OR LIMIT-TO (DOCTYPE, "cr")) AND (LIMIT-TO (LANGUAGE, "English") OR LIMIT-TO (LANGUAGE, "Spanish"))	30
Six Sigma	ProQuest	Six sigma IN hotels [Scholarly Journals OR Conference Papers & Proceedings]	610
	Springer Nature Link	Six sigma IN hospitality industry	142
	Google Scholar	Six sigma IN hotels	300
TOC	Google Scholar	Theory of constraints implementation hotel industry	300
Total			1982

3.2 Study selection process

The selected publications were independently reviewed by two evaluators, who carried out data collection. First, a title/summary evaluation of the studies was carried out to identify those that were relevant to the topic of interest, eliminating those that did not meet the eligibility criteria.

3.3 Data extraction process

Once the documents to be included in the synthesis were selected, the extraction of key data began, which was organized in Excel, including several fields such as the study title, the database from which it was extracted, the author and their nationality, the year of publication, a summary of the content, the methodology used, the study approach, the results obtained, the conclusions of the study, and the problem addressed.

In this order, to take advantage of the organized information, statistical tools were used to identify trends and opportunities of these methodologies in the hotel industry.

4. Results and discussion.

4.1 Selected studies

As a result of the identified records, 52 documents were included in this review. (See figure 3)

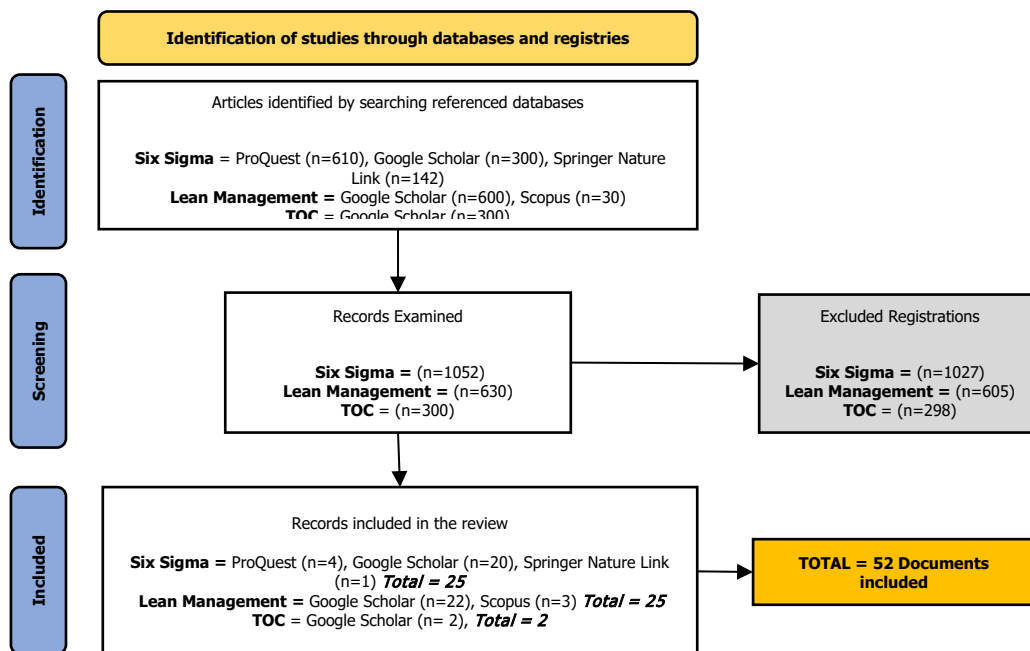


Figure 3. PRISMA flowchart of selected studies

In the search for documents related to the application of Lean Management, Six Sigma, and the Theory of Constraints (TOC) in the hotel sector, approximately 1,900 records were excluded for not meeting the previously established eligibility criteria. The most common reasons for exclusion included: lack of relevance of the title or abstract to the topic of interest; absence of interventions in service systems within the hotel context; no application of any of the methodologies under study; and unavailability of the full text for evaluation.

4.2. Information analysis.

An exploratory analysis of the information and data collected in the matrix was carried out, thus obtaining the following results:

4.2.1. Bibliometric and Document Typology Analysis

Through the different search strategies applied, a total of 1982 documents were identified. After applying the previously established eligibility criteria, 52 publications relevant to the study were selected. There were 25 documents corresponding to both the Six Sigma methodology and Lean Management (48.08% each) and 2 to the Theory of Constraints (3.85%).

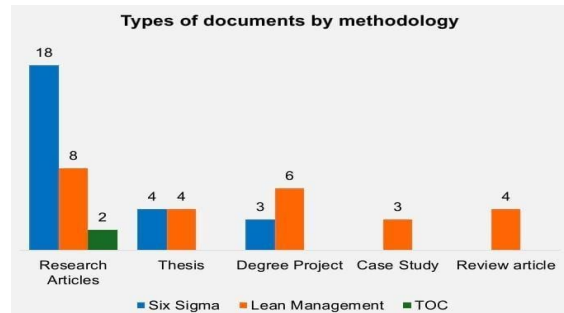


Figure 4. Types of documents by methodology

Figure 4 details the typology of the documents selected by each methodology. For Six Sigma, 18 research articles, 4 theses, and 3 undergraduate projects were analyzed. In the case of Lean Management, 8 research articles, 4 theses, 6-degree projects, 3 case studies and 4 review articles were reviewed. Finally, for TOC, 2 research articles were studied.

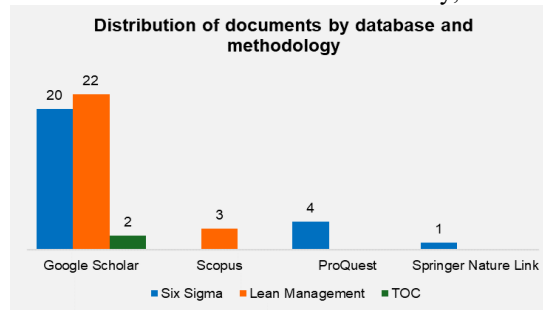


Figure 5. Distribution of documents by database and methodology

Figure 5 shows the distribution of the selected documents according to the source database and the methodology addressed (Six Sigma, Lean Management or TOC). Google Scholar stands out as the most used source, hosting the most documents, with a total of 44 publications: 22 on Lean Management, 20 on Six Sigma and 2 on TOC. It is followed by ProQuest with 4 documents (all from Six Sigma), Scopus with 3 (all from Lean Management), and Springer Nature Link with 1 (also on Six Sigma).

4.2.2. Analysis by territorial of the documents

Through this analysis, the geographical distribution of the research will be visualized, identifying the countries and continents with the greatest scientific production and application of these methodologies in the context of the hospitality sector.

Six Sigma Territorial Analysis

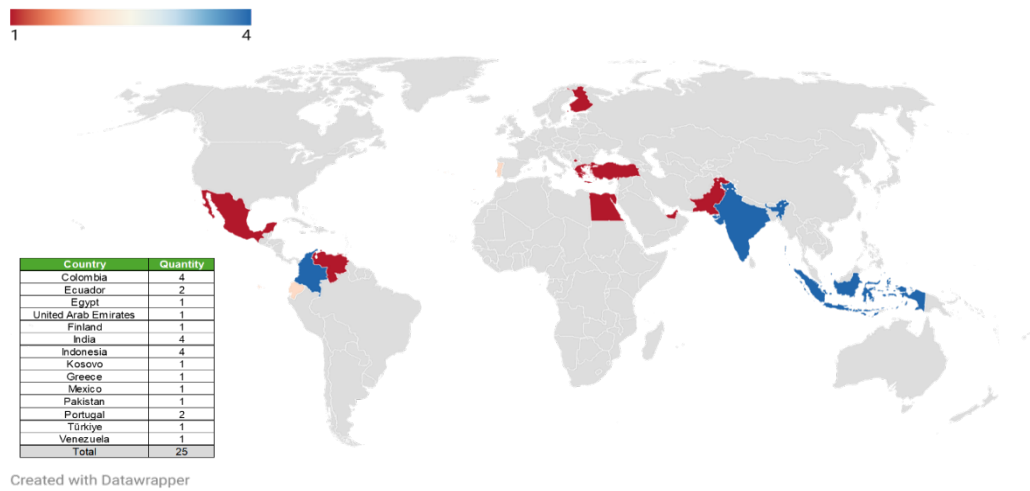


Figure 6. Territorial Analysis of the Six Sigma methodology

Figure 6 shows that Six Sigma is the methodology with the highest number of applications worldwide in the hotel sector. It has a presence on three continents, particularly in Asia, where 48% of the selected documents are concentrated, led by the countries India and Indonesia with 4 publications each, and followed by Egypt. United Arab Emirates, Pakistan and Turkey with 1 publication each. America is the second continent with the most publications (32%), distributed between Colombia with 4 documents, Ecuador with 2 and followed by Venezuela and Mexico with 1. Finally, 20% of the studies reviewed are found in Europe, coming from Portugal (2 publications), and from Finland, Kosovo and Greece with 1 publication respectively.

Lean Management Territorial Analysis

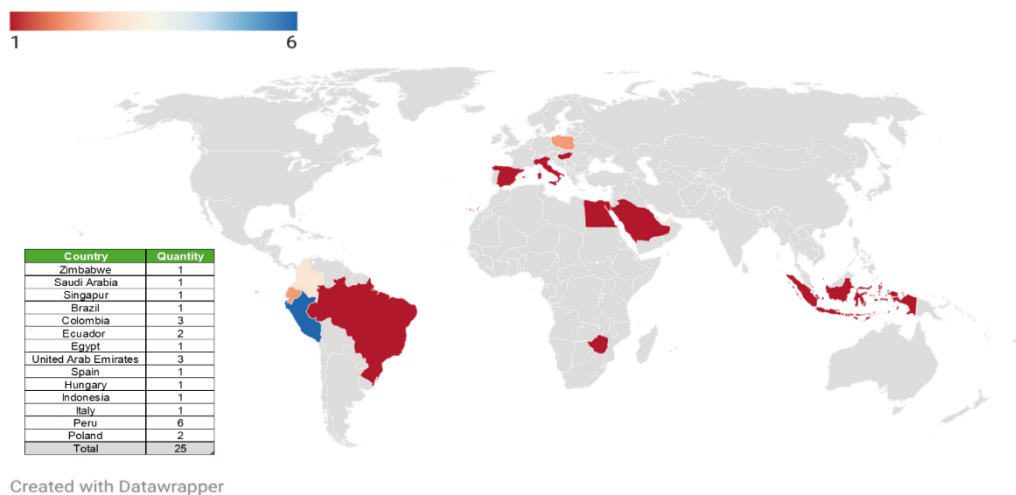


Figure 7. Territorial Analysis of the Lean Management methodology.

Figure 7 shows that the geographical distribution of the articles included in this systematic review on the application of the Lean Management methodology in the hotel sector is diverse and regionally significant. Peru stands out as the country with the highest number of publications, with 6, followed by Colombia and the United Arab Emirates with 3 publications, which suggests a growing interest or further development in Lean implementation within the hotel sector in these nations. Similarly, Poland and Ecuador also report a participation with 2 articles, and individual contributions were identified from countries such as Saudi Arabia, Brazil, Egypt, Spain, Hungary, Indonesia, Italy, Zimbabwe and

Singapore. This geographical dispersion highlights the global attention that the application of Lean principles has been gaining in the hospitality industry, but with a greater presence in the Americas (48%).

TOC Territorial Analysis

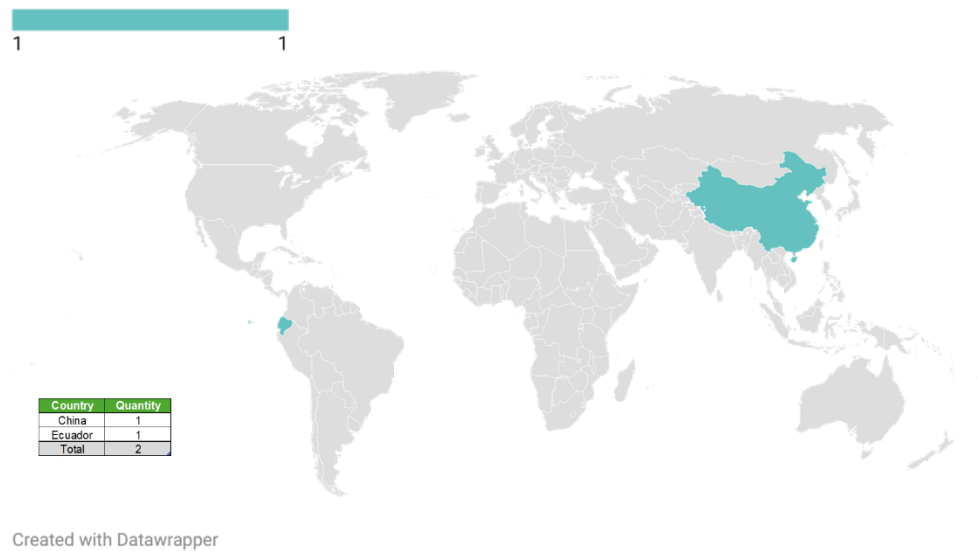


Figure 8. Territorial Analysis of the TOC Methodology.

In Figure 8, it can be seen that the Theory of Constraints is the methodology with the lowest number of applications worldwide in the hospitality sector. Only publications from Asia (China with 1 publication) and America (Ecuador with 1 publication) were identified.

4.2.3 Analysis of published documents by year

This analysis sought to detail the publication trends over time, identifying the possible cycles of interest and growth in the adoption of the methodologies studied.

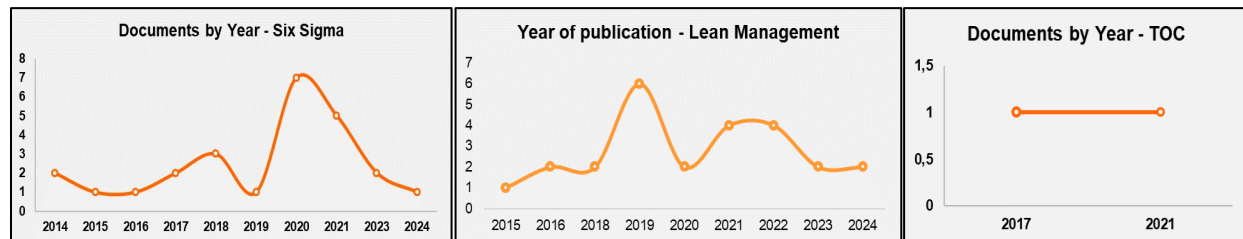


Figure 9. Analysis of documents published by year of Six Sigma, Lean Management and TOC methodologies

Figure 9. In the case of the Six Sigma methodology, a fluctuating trend is observed with stages of high academic production and others of less activity, for example, between 2014 – 2018, there is little interest in the application of this methodology (1 to 3 publications). However, in 2020, a peak was reached, with 7 publications, which may have been related to the search for operational efficiency in response to the challenges generated by the COVID-19 pandemic. Subsequently, there is a decrease in publications, 2 in 2023 and 1 in 2024, reflecting a stabilization of academic interest. In the case of Lean Management, it is shown that between 2015 – 2018 there was a constant interest, 2 publications in each year, however, from these periods fluctuations are evident, for example, in 2019 there is a peak, 6 were made. Then it went down a little in 2020, went up again in 2021 (4 articles) and maintained that number in 2022, but from there is a decrease in publications. On the other hand, the Theory of Constraints only registers two studies during the period analyzed, 1 in 2017 and another in 2021, without continuity or growth of interest over time,

this suggests that the implementation of this methodology in the hotel industry has been almost null and sporadic, possibly due to the preference of use it has given to other more consolidated methodologies such as Lean Management or Six Sigma.

4.2.4 Analysis of application of methodologies by area

This analysis identifies and describes the functional areas of the hotel sector where continuous improvement methodologies (Lean Management, Six Sigma and TOC) have been most frequently applied, obtaining a more accurate view of the scope and usefulness in the sector.



Figure 10. Analysis of the application of methodologies by area (Six Sigma, Lean Management and TOC).

Figure 10. Shows that the Six Sigma methodology is implemented in various areas of the hotel sector, standing out mainly in the area of customer service and attention, with 11 publications (44%). It is followed by General Management / Administrative Processes with 4 publications, and housekeeping together with the Food and Beverage Division both with 3 studies. In other areas, 2 applications are evidenced, such as Room Service and 1 publication such as Human Capital Management and Financial Area. These results reveal that Six Sigma is mostly used to improve customer experience and service quality, and to optimize operational processes. In the case of Lean Management, it was found that it is most frequently implemented in studies focused on service management, in the food and horeca sectors and in the supply chain (6, 5 and 5 publications respectively), indicating that research has focused on the key processes of hotel service. As for TOC, it is evident that its application has focused exclusively on the logistics area, specifically, on the supply chain. This indicates that, so far, this methodology has not been explored in other processes in the hotel sector, which represents an opportunity for future research and practical applications.

4.2.5. Analysis of the problems addressed by methodology

With this exploration, it seeks to identify the main problems of the hotel sector that have been addressed with these methodologies, thus recognizing the most frequent challenges and the areas that demand greater intervention in the processes of the sector.

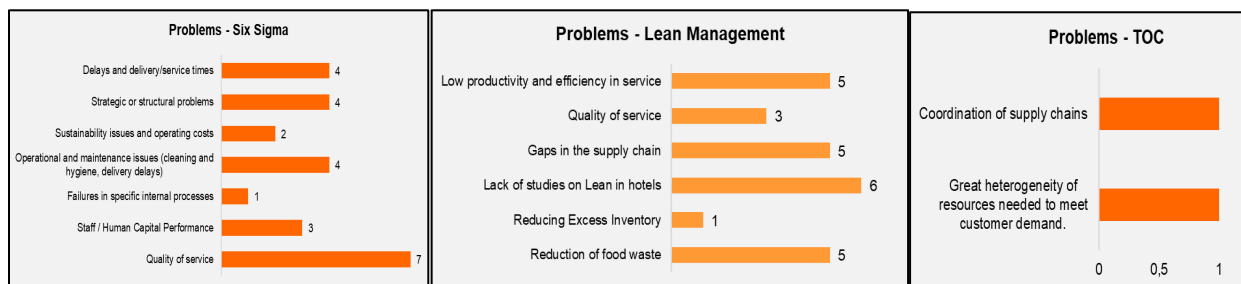


Figure 11. Problems most addressed with methodologies (Six Sigma, Lean Management and TOC).

Figure 11. Highlights that Six Sigma is mostly used in the hotel sector to solve problems related to service quality, with the aim of reducing process variability and increasing customer satisfaction. Likewise, it is applied in cases of delays in the provision of services, such as room service and in the correction of deficiencies in the service support processes. To a lesser extent, it also addresses challenges related to staff performance, resource optimization, and reducing operating costs. Regarding Lean Management, the main finding is the scarcity of studies on its application in the sector (6 articles), which suggests a need for further research. Even so, it has been implemented to reduce food waste, close gaps in the supply chain, and increase productivity (5 documents each). Results that reflect that, although

Lean Management has been applied in some key processes, there are still opportunities for exploration, especially in under-researched areas and in the improvement of operational efficiency in the hotel sector. In contrast, the Theory of Constraints has been applied in a more punctual way, focusing on supply chain management, both at the operational level and at the coordination level in the hotel context.

4.2.6. Analysis of the approach to documents

Through this analysis, the aim is to identify the strategic objective towards which the applications of these methodologies are oriented, that is, whether to improve the quality of service, increase profitability, optimize productivity or strengthen the competitiveness of companies in the hotel sector.

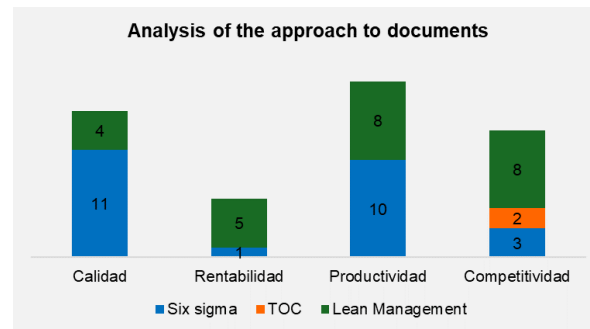


Figure 12. Document approach

Figure 12. Shows that most of the documents analyzed are mainly aimed at improving productivity, representing 35% of the total. It is followed by those focused on quality with 29%, competitiveness with 25%, and finally profitability with 11%. Likewise, when analyzing the methodologies according to the focus of the documents, it was found that Six Sigma is predominant in works focused on both productivity and quality, with 10 and 11 publications respectively. In the case of Lean Management, this methodology is mainly applied in studies related to productivity and competitiveness (8 publications each), although it is also used to a lesser extent in research focused on profitability and quality. Finally, the TOC methodology has been used exclusively in studies with a focus on competitiveness, which suggests a still limited application compared to the other methodologies analyzed.

4.2. Roadmap: Opportunities for Improvement

According to the results obtained in this review, and considering the relevance of the hotel sector in the economy of various countries, such as Colombia, it is necessary to implement strategies that improve the operability of organizations and allow them to face the challenges and different changes in the environment. In this sense, a roadmap is proposed that integrates Six Sigma, Lean Management and Theory of Constraints methodologies in order to optimize the management of operations in the hospitality sector, in the city of Cartagena de Indias.

In this order of ideas, the proposed roadmap is structured in four sequential phases that allow operational challenges to be addressed in a systematic way: 1) Diagnosis and analysis of the environment, in this stage the current context of the hotel and the tourism sector in general is evaluated, identifying operational challenges and establishing a baseline for improvement, for this, market trends are analyzed, operational processes are mapped, etc. 2) Identification of opportunities for improvement, with what is obtained in the diagnosis, Bottlenecks, excessive wait times, and poorly managed resources are detected using tools such as the Effort vs. Effort Matrix. Impact, surveys, the 5 phases of the OCD, among others. 3) Intervention and improvement strategies, in this phase the previously identified solutions are implemented, applying the continuous improvement approach. 4) Impact measurement and continuous improvement, finally, key performance indicators (KPIs) such as registration time, customer satisfaction and operational efficiency are defined, with the purpose of monitoring and evaluating the impact of the implemented improvements on a regular basis and adjusting strategies according to results and feedback. (See Figure 13)

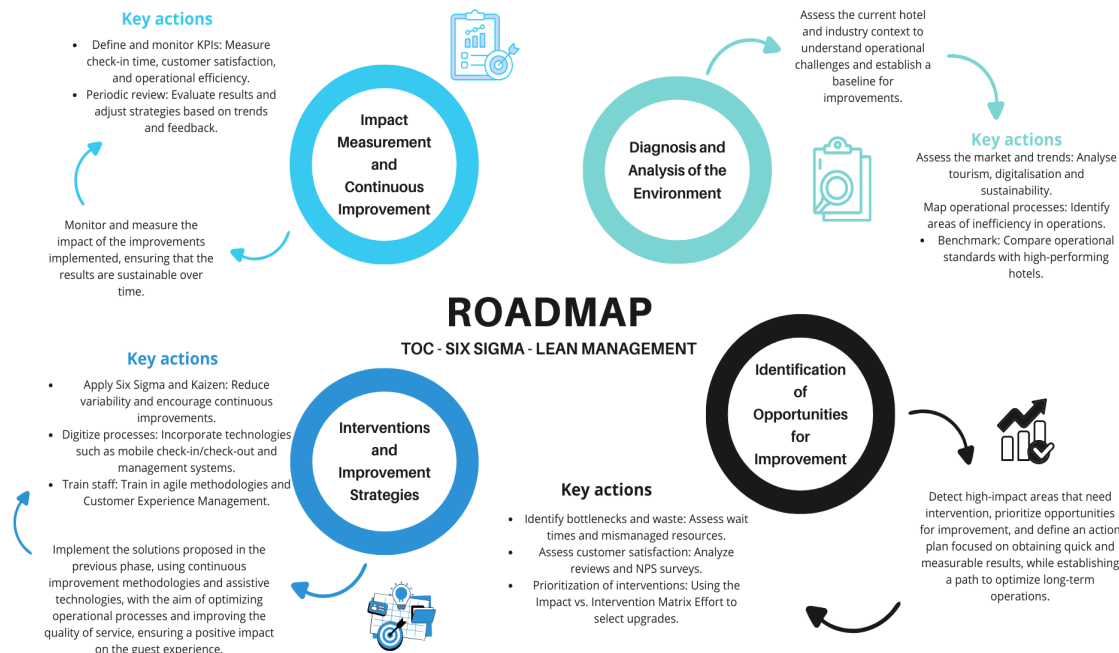


Figure 13. Roapmap: Opportunities for Improvement

5. Conclusions

The hotel sector has shown a remarkable capacity for adaptation and recovery after the crisis caused by the COVID-19 pandemic. However, despite the progressive recovery of indicators such as the occupancy rate and the arrival of tourists, structural challenges persist that negatively impact operational efficiency and quality of service. Among these challenges are long waiting times at reception and check-in/out, inefficient inventory management, quality control in room cleaning and food, inadequate use of resources in housekeeping and restaurants, poorly trained personnel, as well as deficiencies in supply chain management, among others. The management of operations in service systems is positioned as a strategic pillar to improve quality, increase productivity and strengthen the competitiveness of hotels in the sector, by integrating processes, people and technology in the provision of services.

The analysis of the reviewed documents shows that, within the operations management methodologies, Lean Management and Six Sigma are the most used in the hotel sector, due to their effectiveness in addressing the previously mentioned problems. In contrast, the Theory of Constraints (TOC) has a considerably more limited application. For example, the Six Sigma methodology has a greater adoption in the Asian (48%) and American (32%) continents, standing out in countries such as India, Indonesia, Egypt, the United Arab Emirates, Pakistan, Turkey, Colombia, Ecuador, Mexico and Venezuela. Over time, there is evidence of a fluctuating trend in publications, with periods of high academic production interspersed with periods of less activity. During the COVID-19 pandemic, there was an increase in interest in this methodology, driven by the need to optimize operational efficiency in the face of emerging challenges. Likewise, Six Sigma has been implemented mainly in environments related to customer service and administrative processes.

Its use as a tool to improve productivity and quality within hotel organizations stands out, consolidating itself as an effective strategy to face operational problems and raise quality standards in hotel services. For its part, Lean Management in the hotel sector has shown a greater presence at a global level, with 48% of publications coming from the American continent, with Peru standing out with 6 studies and Colombia with 3. This methodology has been used mainly in service management, supply chain and food waste reduction, reflecting its positive impact on key areas of operation. Although fluctuating interest was observed between 2015 and 2022, with a peak of 6 publications in 2019, the results show that Lean still has a wide margin for exploration, especially in less studied processes in the sector. In contrast, the Theory of Constraints has a much more limited application, with only two studies registered: one in China (2017) and another in Ecuador (2021). Both focus exclusively on the supply chain, with no evidence of application in

other areas of the sector. This underrepresentation and lack of continuity over time indicate that TOC has not yet been considered as a relevant tool in hotel management, which opens a window for future research to evaluate its usefulness in broader operational processes within the industry.

This systematic review shows that the implementation of these methodologies is still limited or disjointed in many cases and lacks a framework that facilitates their implementation in these service environments. On the other hand, at a practical level, hotel managers must consider that the structured integration of these methodologies can represent a key competitive advantage. The proposed roadmap in this study—articulating Six Sigma, Lean Management, and TOC in a four-phase model—provides a practical guide to address current challenges and anticipate future changes in the tourism environment. Implementing this roadmap would allow for data-driven decision-making, resource optimization, improving customer experience, and strengthening long-term operational sustainability.

Consequently, it is recommended that hotel managers, especially in strategic destinations such as Cartagena de Indias, adopt this hybrid approach not only as a tool for continuous improvement but also as an essential component of strategic planning and organizational innovation. Similarly, future research could focus on developing case studies that evaluate the actual implementation of this methodological integration, as well as designing maturity models that allow measuring the progress of organizations in the adoption of these practices.

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