

Lean Management Practices Applied in Retail Sector Businesses: A Systematic Review of Literature

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Abstract

Retailers face a series of problems due to the increase in electronic competition and the change in consumer habits caused by the global situation. Given this, a possible solution is the application of Lean tools, methodologies, and initiatives which also allow for generating competitive advantages in retail businesses. Therefore, this document aims to carry out a Systematic Literature Review, considering 32 articles selected from the Scopus and Web of Science, focused on the application of Lean methodologies and tools in the retail sector. The results of the research show agreement with previous articles and lead to the conclusion that the use of Lean tools in the retail sector is possible and recommendable since it brings various benefits to companies.

Keywords

Improvement tools, retail, Lean, continuous improvement.

1. Introduction

The retail sector refers to the fraction of the economy that sells products or services directly to end consumers (Qin and Liu 2021). Due to the high generation of jobs and the promotion of consumption that characterize this industry, the retail trade, highlighting the retail food market, contributes significantly to the economic development of a country (Cortés et al. 2022). For instance, in 2019, the retail sector accounted for approximately 43% of the global Gross Domestic Product (Vodafone Bussiness 2019).

In the past few years, there has been an intense increase in competition for retailers with the rise of electronic commerce or e-commerce (Qin and Liu 2021), aside from the changes in consumption habits caused by the COVID-19 pandemic. Likewise, with the expansion of electronic commerce and the growth of digital sales channels, the operations of modern retailers are becoming more complicated and need more orderly organization models to carry out their operations in the best way and generate operational efficiencies. Continuous improvement and other Lean tools are alternative solutions to the problems and needs of the retail sector (Frei et al. 2022; Marques et al. 2022; Qin and Liu 2021), as well as a source of competitiveness to generate advantages and operational efficiencies (Negrão et al. 2020; Saudi et al. 2019).

With the importance of the retail sector in global economic development, its growth trends, and the problems retailers have presented in the last few years; Lean methodologies represent an excellent opportunity for developing and generating competitive advantages in retail businesses. However, the existing literature focused on the subject is still scarce since the expansion of Lean outside of manufacturing operations occurs gradually.

1.1 Objectives

This article aims to carry out a Systematic Literature Review focused on applying Lean methodologies and tools in the retail sector using the prism method. Then, it seeks not only to expose the findings but also to compare these with those of previous studies in order to obtain representative and valuable conclusions for the academic community. Additionally, it aspires to serve as a reference for future research focused on the continuous improvement of companies with characteristics like those reviewed in this document.

2. Literature Review

Schuzle and Stormer (2012) state that Lean focuses on reducing and eliminating activities that do not add value to business processes. Furthermore, Zhang et al. (2020) define Lean implementation as "the elimination of waste through preventive measures to reduce environmental pollution while reducing costs". Although initially, Lean methodologies were applied only in manufacturing companies and processes; their use has spread over the years to all kinds of industries, including the retail sector (Afum et al. 2021).

Lean implementation in a company or organization could use different tools or practices, among which the 5S methodology, Kaizen method, Kanban cards, and Value Stream Mapping (VSM) stand out. According to Sumant and Thanki (2014), VSM is a methodology that systematically measures and integrates activities that add a competitive advantage to the production process. In contrast, the Kaizen method focuses on the workforce proactively collaborating to improve the process through small but constant changes. On the other hand, Kanban is an agile method that uses instructive cards to regulate logistics components through the entire production process; moreover, this Lean tool can also help with the proper sizing of inventory levels and production control of the system (Braga et al. 2020). Lastly, the 5S methodology is considered a vital starting point inside Lean management philosophies and involves the five measurements of workplace organization: sort, rectify, shine, standardize, and manage (Saudi et al. 2019).

Other frequently used terms for Lean implementation are the Lean Six Sigma (LSS) and Lean Supply Chain (LSC) methodologies. The LSS corresponds to the combination of Lean with the Six Sigma quality management tool; this fusion generates an excellent instrument to reduce the waste of a process and its variations and defects (Ali et al. 2021). Meanwhile, LSC refers to the influence and application of Lean principles in the supply chain's activities, resulting in operational efficiencies (Saudi et al. 2019; Trabucco and De Giovanni 2021).

3. Methods

This article carries out a systematic literature review to achieve the proposed objective. After a rigorous search, 36 articles were selected using Scopus and Web of Science databases considering the originality of their articles and the coverage of papers in indexed journals. First, searches were conducted in both databases using the keywords classified in Table 1. Secondly, the inclusion and exclusion criteria, detailed in Table 2, were applied to define more precisely the base articles of this work.

Table 1. Keywords and justification of choice

Keywords	Explanation
Lean retail, Lean food market, Lean commerce	Lean is the essence of continuous improvement, the main theme of this review. In addition, the terms that accompany it in searches are related to the terms "retail" or "bodegas" in Spanish, which does not have a precise translation in English.
5s retail, 5s commerce, Kaizen retail, Kanban retail, Value Stream Mapping retail, Lean tools retail	Lean has a report of tools such as the 5S methodology, Kaizen, Value Stream Mapping, and Kanban. In addition, similar terms related to "retail" accompany these words.
Lean management retail, Lean Six Sigma retail, Lean Supply Chain retail.	Documents related to the term Lean, but in the most complex sense, that is, more focused on efficient management, process improvement methodologies, and adjusted work systems used to benefit a company's value chain.

Table 2. Inclusion and exclusion criteria

Criteria	Justification
Type of document	This criterion considers articles from indexed journals and excludes book chapters, conference articles, and reviews.
Year of publication	Only articles published at most four years ago, including the current year, that is, articles published between 2019 and 2022, are considered.
Language	This criterion considers only English-language articles.
Keywords of the author	This criterion includes articles with keywords from the author and the database that are related to Lean and the retail sector (Lean, retail, 5s, Six Sigma, Kaizen, Kanban, market, and commerce).
Title of the article	This criterion excludes articles whose titles are not related to the research topic (terms mentioned above).
Abstracts	This criterion includes articles with abstracts related to the research title and excludes those focusing on topics such as medicine and education.

4. Data Collection

The following Prism diagram (Figure 1) summarizes the search and selection process described.

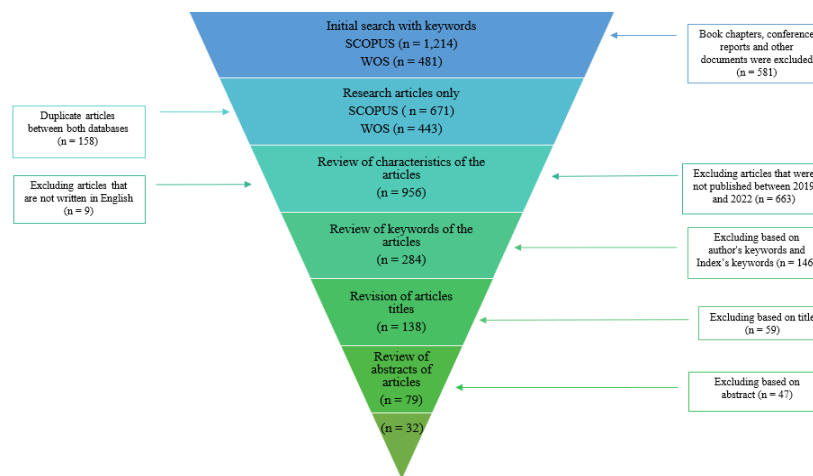


Figure 1. Prism Diagram

As shown in Figure 1, the initial search yielded a result of 1,695 documents. Then the filter by document type excluded 581 articles, resulting in 1,114 articles. Duplicate articles in both databases are then deleted (158 excluded). Subsequently, filters were applied by year of publication (n = 663 excluded) and by language (n = 9 excluded), resulting in 284 papers. Next, excluded 146 articles based on the keywords of the author and Index, obtaining 138 eligible articles. Likewise, we discarded 59 articles because their titles were outside the central theme of this work. Finally, we discarded 47 articles based on the content of their abstracts, obtaining 32 articles for the systematic literature review.

5. Results

5.1 Year of publication

First, considering the years of publication of the articles, it is observed that there is a smaller number of papers in 2019 (5, 15.6%) compared to 2020 (13, 40.6%), as seen in Figure 2. Therefore, there is a growing trend (4 years) in the year of publication of documents related to Lean management in the retail sector.

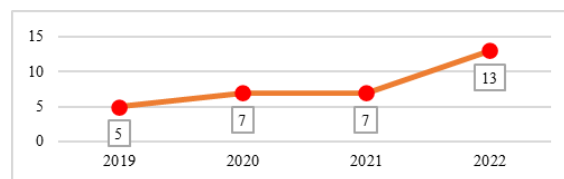


Figure 2. Articles by year of publication

5.2 Author

Secondly, 101 authors participated in the creation of the 32 articles analyzed in this research. Most of these articles were written by 2, 3, or 4 authors (21.9%, 46.9%, and 15.6%, respectively), as seen in Figure 3. These authors are associated with universities, educational centers, and institutes. Also, only three authors (3.0%) belong to research centers, and the rest belong to different academic departments of universities or institutes.



Figure 3. Articles according to the number of authors

5.3 Country of the case study and country of origin of the author

Thirdly, Figure 4 shows that most articles carry out their case studies and research in Portugal and Italy (12.5% and 9.4%). And the countries with the least frequency for the application of the cases are Ghana, Pakistan and the United States, representing 18% altogether.

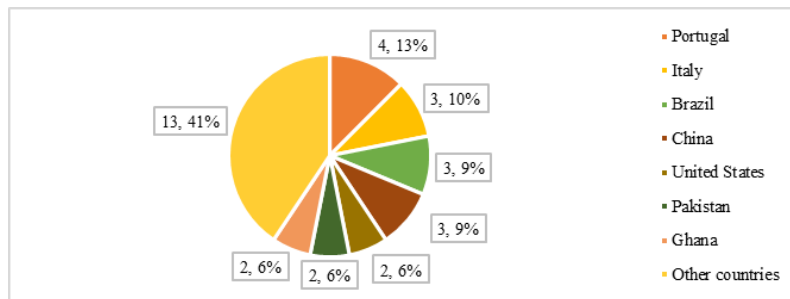


Figure 4. Country of the case study for each article

On the other hand, it can be seen in Figure 5 that most of the authors come from Portugal, China and Brazil (17.8%, 12.9% and 11.9%, respectively), and come from less than the United States, United Kingdom and Italy (18%).

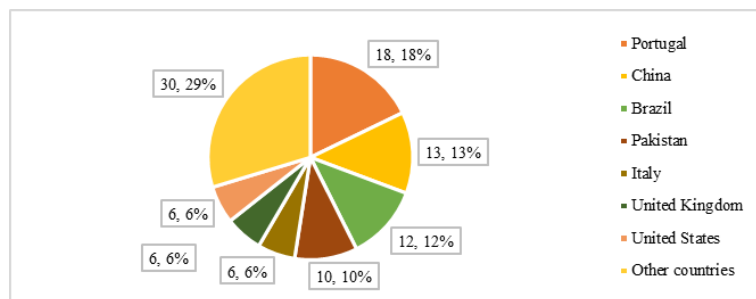


Figure 5. Country of origin of the author

As for the case study countries for each article, the category "Other countries" represents countries whose frequency is equal to 1. Moreover, as for the author's countries of origin, this category represents those whose frequency is less than 6. In addition, the country of origin is the country of affiliation of the author, authors, or associated university.

5.4 Type of study and research methodologies

Fourthly, of the 32 articles analyzed, 18 papers (56.3%) are of the Research type, and the rest of the Case Study type (14, 43.8%). Also, of the ten different research methodologies, the most outstanding were: A case study (8, 25.0%), Multiple case study (5, 15.6%), and Questionnaire and statistical model (5, 15.6%). In addition, the cross-analysis between study type and research methodologies; as seen in Figure 6 and Figure 7, reflected that the most outstanding methodology for Case Study type articles is the Case Study (8, 57.1%), and for research, is the Questionnaire and statistical model (5, 27.8%) and the statistical model (3, 16.7%).

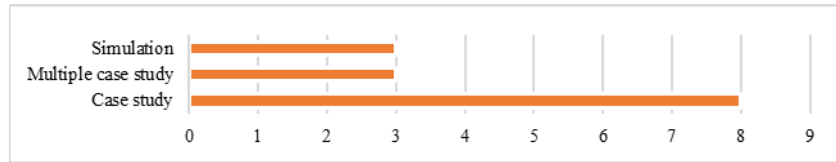


Figure 6. Research methodology for Case Study articles

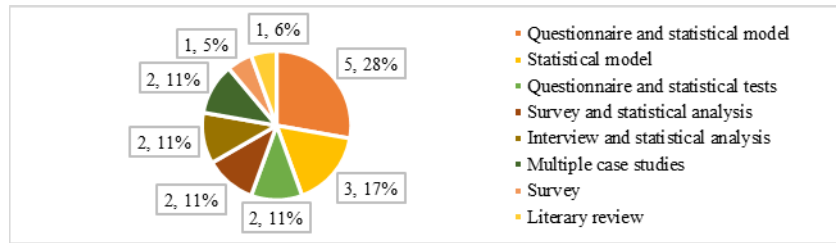


Figure 7. Research methodology for Research articles

5.5 Typology

Fifthly, the topics most frequently covered in the selected articles are Lean Tools and Lean Supply Chain (8, 25.0% each), followed by Lean management and Lean thinking (5, 15.6% each) and, finally, the typologies of Lean Six Sigma and Value Stream Mapping (4, 12.5% and 2, 3.6% respectively). Descriptions of these topics are in Table 3. Also, Figure 8 shows the variation of the tools during the years, having greater diversity in 2022 (13, 40.6%), highlighting the tools of Lean Tool and Lean Six Sigma (4, 30.8%, and 3, 23.1%, respectively).

Table 3. Description of the typologies

Typology	Description
Lean Thinking	The articles mainly used this methodology, which was deployed and detailed in the research.
Value Stream Mapping	Articles that mainly used the VSM either individually or as an auxiliary tool. It was necessary to separate it as a new typology for its frequency of appearance compared to other tools.
Lean Tools	Documents about the application of Lean Tools in a variety and various companies.
Lean Supply Chain	Articles focused on the company's supply chain and logistics activities.
Lean Six Sigma	The articles that used this methodology and developed it in research.
Lean Management	Articles that focused or related to the term, in general, applied this management in their case of study or research without specifying another tool read.

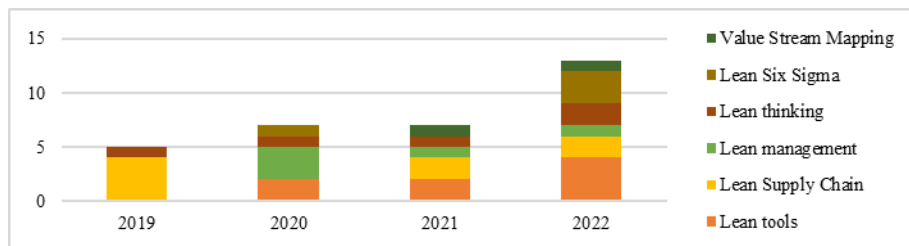


Figure 8. Typology of articles according to their years of publication

On the other hand, Agyabeng-Mensah et al. (2020), Awad et al. (2022), Kozak et al. (2020), Mohaghegh et al. (2021), and Schonberger (2020), focused on issues related to eliminating what is not productive for the company, that is, issues linked to Lean management. These articles include the impact of Lean Management on different processes, such as logistics processes through a case study and administrative and financial processes through research and statistical models. Also, the authors who focused on the application and conceptualization of process methodology such as Lean Six Sigma were Aljazzzen and Schmuck (2022), Chandan et al. (2022), Marrucci et al. (2020), and Rungruengkultorn and Boonsiri (2022). The LSS can be used both in case study types, as a strategy for the continuous improvement of processes, and in research using the DMAIC model (Define, Measure, Analyze, Improve, and Control) to collect data and information.

Chuang et al. (2019), Das (2019), Frei et al. (2022), Kawa and Maryniak (2019), Kolawole et al. (2021), Panayiotou and Stergiou (2022), Saudi et al. (2019), and Trabucco and De Giovanni (2021) focused on the relationship between Lean and Supply Chain Management. These authors sought impacts on the supply chain or its development and improvement by applying Lean (case studies). They analyzed through model surveys and statistical tests (evidence) good Lean practices in logistics processes (research). Also, the constant optimization of a company's processes uses Lean Thinking; Ali et al. (2021), Guimaraes et al. (2022), Jie and Gengatharen (2019), Proença et al. (2022), and Santos et al. (2020), were the ones who investigated on the subject. These articles eliminated invaluable processes, maximized productivity, and optimized productive flows and management logistics. They concluded that understanding these findings would enable critical positioning and improvements in the industry of their respective countries.

Lean management has a repertoire of tools that allow implementation; Afum et al. (2021), Braga et al. (2020), Liu et al. (2022), Marques et al. (2022), Marques et al. (2022), Pereira et al. (2021), Rodriguez et al. (2022) and Zhang et al. (2020) deepened or implemented these in their research. For example, the Gemba Kaizen was implemented, which allowed reducing the rate of contraction (an indicator of sustainability related to food waste) through a 3-stage Kaizen event (preparation, improvement workshop, and follow-up) and the Hoshin Kanri, whose deployment allowed the creation of a strategic ecosystem for the management of operations in the case study company and facilitated the achievement of its strategic objectives and the improvement of performance. Value Stream Mapping is a widely used improvement tool and part of the Lean spectrum. Qin and Liu (2022), and Sadiq et al. (2021) focus on the application of this tool, which allowed to visualize, understand, evaluate and improve logistics and production processes in each case of study.

5.6 Lean tools

Sixthly, the Lean tools, and methodologies applied in each article were analyzed. This category includes articles in which multiple companies could apply one or more of the following tools: Visual management, JIT, Kanban, Zero inventory management, TPM, VSM, Production Line Balance Design, Pulling Production, Improvement Continuous, Multi-skilled Employee, Standardized work, 5S, Continuous flow, Small-batch, Equipment Layout, Leveled Production, SMED, Poka-Yoke, Quality circles, Jidoka, JIT, TQM, Cellular layout, Inventory management technologies (Barcode, WMS, RDIF), Layout optimization for storage spaces, Standardized Picking Methods, ABC, Cross Docking Technique, Employee involvement, Kaizen, Seven Wastes of Lean Manufacturing, Lean Six Sigma, and Gemba walk. In particular, the joint application of one or more Lean tools (Various Lean Tools category) has the highest frequency (46.9%), as seen in Figure 9. On the other hand, the application of VSM stands out both employed individually or jointly with an additional tool (9.4% and 12.5%, respectively), mainly due to its relative facile use and the fact that it is a frequently used tool for problem analysis and solution formulation (solution consisting of the application of the additional tool).

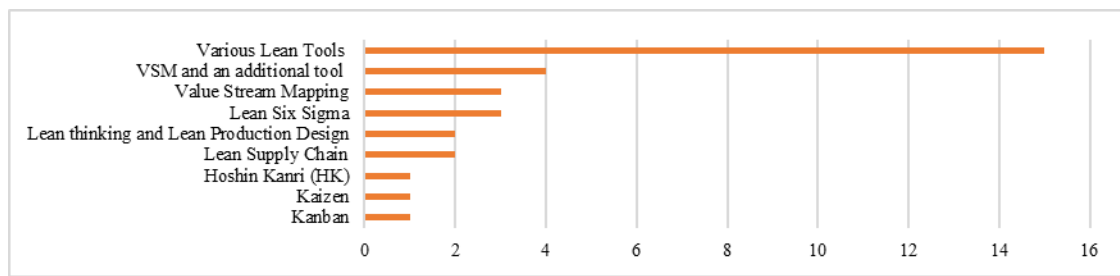


Figure 9. Lean tools

5.7 Part of the value chain

Seventhly, it sought to analyze the part of the value chain in which the Lean tool was applied; for this, the findings were classified according to the categories defined by Jimenez et al. (2021). The results show that Lean tools are most frequently applied in logistics operations and processes (62.5%); as can be seen in Figure 10, this is related to the influence of supply chain management (logistics operations) on retailer costs (Kawa and Maryniak, 2019). On the other hand, the Lean tools most applied in this part of the value chain (Figure 11) are those belonging to the Various Lean tools category (generally due to the breadth of this category), and the LSC and LSS methodologies (related to the reduction of variations in logistics operations and reduction of delivery times with the elimination of unnecessary activities).

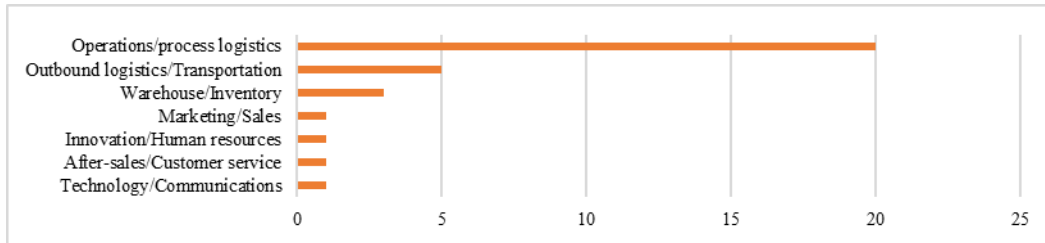


Figure 10. Parts of the value chain involved

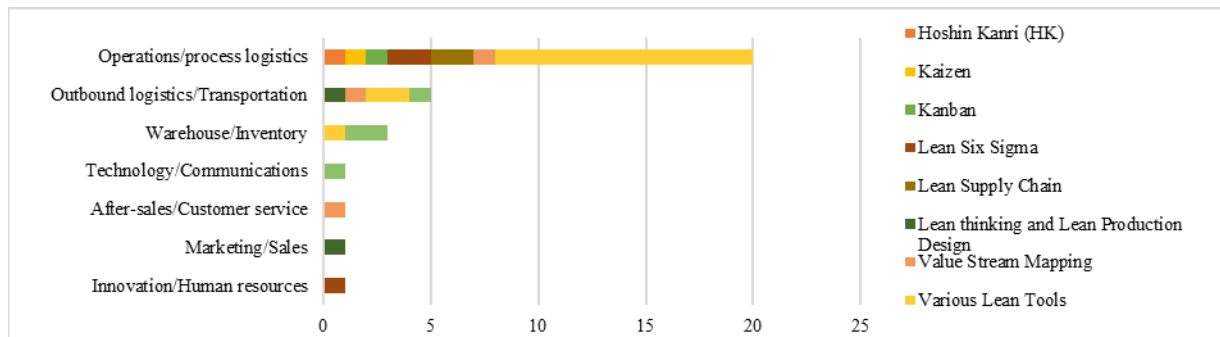


Figure 11. Lean tools applied in each part of the value chain

5.8 Issue Resolution Status

Eighthly, it was analyzed whether the problems dealt with in each article were effectively solved after implementing Lean. The results show a high effectiveness rate of the Lean tools, finding that in 78% of the cases, the problems were solved entirely, while the remaining 22%, the problems were partially solved. The Lean tools that showed less effectiveness were Various Lean Tools, Kaizen, and VSM with an additional tool, as seen in Figure 12.

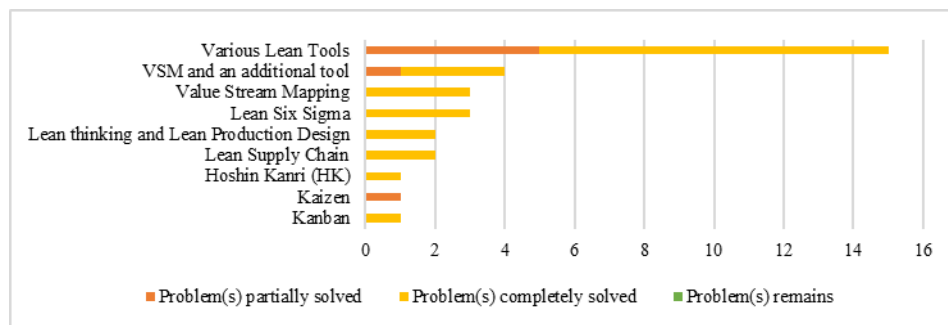


Figure 22. Issue Resolution Status according to the Lean tool applied

6. Discussion

The results presented above will be compared with those obtained by Jiménez et al. (2021) and Lagorio and Pinto (2021) to validate the hypotheses, interpretations and trends observed. The systematic literature review (SLR) of Lagorio and Pinto's research (2021) analyzes 56 articles that discuss the contributions and role of logistics in the food and grocery retail sector, highlighting the main trends over the years, applying research methods, and identifying future research directions. On the other hand, the SLR of Jimenez et al. (2021) covers only 26 articles whose publications were between 2000 and 2020, focusing on the application of the Lean methodology and how this allows better business management, cost reduction, increased productivity, improved customer service, reduced inventories and shorter lead times in the retail sector.

Analyzing of the years of publication of the papers, it can be interpreted that the more current the year of search, research or publication of the document, there will be a greater number of articles related to the topic of the present work. Lean's position has remained strong for three decades and continues to gain momentum; this is spreading beyond its initial environment in Toyota Motor Manufacturing stores, that is, to new areas of a company such as supply chain, marketing, sales, finance, among others, and new industries, such as the health, construction, and food industry (Netland and Powell 2016). This can be confirmed by comparing the present work with the SLRs mentioned above. Comparing with Jiménez et al. (2021), this result was similar because 50% of his articles were published in the last five years and 60.71% of them between 2015-2020. The same interpretation was obtained by comparing with Lagorio and Pinto (2021) because 60.7% of the articles they analyzed, were published in the last four years, considering a research horizon from 2008 to 2017.

As for the number of authors, the results showed that there is more research done by 3, 4 or more authors due to the complexity of the Lean topic and the large amount of information on definitions, development, application, and new trends, so it would be difficult and tedious to do it individually or between 2 authors. This amount also relates to the support of the institutions and/or universities of each author since these organizations promote and recognize the research of their teachers or members as part of the academic prestige. This trend in the number of authors is seen in the review of the SLR of Jiménez et al. (2021), in which 61.52% of its 26 articles were written by 3 and 4 authors and that 88.46% of these are linked to universities, schools, centers and research institutes. On the other hand, we found a similarity of 2 articles analyzed or 6 authors in the SLR of Jiménez et al. (2021), but no similarity of authors was found with the SLR of Lagorio and Pinto (2021), demonstrating the influence of the established analysis period.

Most of the articles in this paper carry out their case studies and research in Portugal and Italy. Also, in the research by Lagorio and Pinto (2021), most of the cases used in the articles were in the UK (35.7%) and Sweden (7.1%).

This shows the complexity of the European continent and the competitive and highly dynamic market environment of both countries (AECOC 2018), where the retail sector plays a vital role in its economy (Lagorio and Pinto 2021). In addition, the logistics of the retail business, especially the Lean Supply Chain, is more complex in different areas of Europe, which leads to more research on the natural conformation of the continent, its morphology, historical centers, narrow streets, high population density, varieties of commercial activities, and accessibility regulated by restrictive political norms (Golini et al. 2018). Regarding Portugal, The Trade Statistics (INE 2019) report of the National Institute of Statistics of Portugal indicates that total food sales in large commercial establishments (excluding small stores) reached \$19.5 million, reflecting a 3.4% increase over 2018. In addition to Portugal, Brazil is a significant country due to the constant growth of the retail sector in this country; consumption is estimated to grow by 45%, equivalent to 60 billion dollars in new purchases by 2020 (Cunha et al. 2015). This projection reflected the retail situation in Brazil in 2019, a year in which the country ranked 16th with a score of 46.6 in the Global Retail Development Index (Kearney 2019). This ranking evaluates the retail trade of different countries based on 25 variables, such as country risk, market attractiveness, market saturation, and sales growth. Finally, this finding in the research demonstrated the context of the retail sector in 2021, the year in which the Brazilian Association of Supermarkets reported supermarket revenues of US\$113,2 million, with 92,588 stores and serving 28 million consumers daily (Fonseca 2022).

On the other hand, as for the authors' country of origin, most of the authors of this work come from Portugal, China, and Brazil. Concerning Portugal, this percentage associates the fact that the tools and techniques of Lean Management were moderately adapted in the past, so different authors in this country currently focus on its dissemination and implementation in the Portuguese industrial context (Martins et al. 2021). This trend changed in a short time because in the SLR of Lagorio and Pinto (2021), the authors came more from the United Kingdom (23.2%), Germany (12.5%) and Italy (8.9%).

As for the type of study of the articles, more research-type articles were obtained since they tried to collect all the theoretical information of Lean Management in the retail sector. The approach used varies depending on the author

and according to the type of Lean to analyze (management, manufacturing, thinking, etc.); for example, 75% of the articles by Jiménez et al. (2021) are of the type of case study since they focused on the application of Lean methodologies (in general). On the other hand, concerning research methodologies, the most used were the single case study (25.0%), multiple case study (15.6%) and the questionnaire and statistical model (15.6%). Despite the research-type articles, the methodologies focused on the case study and multiple case study were vital in this type of review to see the development of the Lean tools and how they have been applied.

There are more typologies in the last year of analysis due to the number of articles related to Lean in the retail sector. This may also be influenced by the study's approach; Lagorio and Pinto (2021) focused more on retail logistics, so their typologies are related to problems of distribution, logistics in stores, collaboration in the supply chain, etc. On the other hand, Jiménez et al. (2021) focused on Lean methodologies has typologies such as Lean Principles, seven residues of Lean Manufacturing, Value Stream Mapping, 5S, etc.; and due to the similarity with the present work regarding the Lean theme, these investigations have the same categories as Lean Six Sigma and Value Stream Mapping.

Regarding the Lean tools, the results show that the implementation of Various Lean Tools in currently the most popular form of Lean implementation. Additionally, it has been possible to identify a new trend: to use VSM as an auxiliary tool meaning to be implement as a support to another tool, this is attributed to its relatively easy use and aptness for problems identification and solution formulations rather than solutions implementation. The results also show an increase in the popularity of LSC, which is mainly related to the increase in the importance of logistics processes in the cost and profit of retail business since the COVID-19 pandemic; and LSS, related to the changes in consumption habits that center the demand based on the quality of products and services.

Regarding the part of the value chain where the Lean tool is applied, the current research results differ slightly from those obtained by Jimenez et al. (2021). Jimenez et al. (2021) found that Lean tools were frequently applied in marketing and sales, outbound logistics, and warehousing and inventory; however, in the current research, logistics operations and processes were identified as the most affected part of the value chain. The different results come as a consequence of the increase in the importance of logistics processes and supply chain in companies due to its direct relationship with the increase in costs, alongside the popularization of the LSC. On the other hand, following Jimenez et al. (2021), outbound logistics, storage, and inventory also stood out in this SLR, showing consistency in the results as they are all key processes of retail businesses.

The results show that the effectiveness of the application of Lean tools is 78% if the main goal is to solve the problems entirely, and the remaining 22% corresponds to the achievement of a partial resolution of the problems. Furthermore, the most effective tools are the implementation of Various Lean Tools, VSM (alone and as an auxiliary tool) and LSS this may indicate that the effectiveness of Lean increases with the combination of different Lean tools as long as these complement each other. Additionally, Jimenez et al. (2021) recognize that the main benefit of the Lean application is the improvement of business administration and the reduction of inventories.

7. Conclusion

The objective of this research consists in analyzing the results obtained through the prism method about Lean tools and their application in the retail business. We complemented the results found through the prism method with comparisons between the research of Jimenez et al. (2021) and Lagorio and Pinto (2021). The consistency obtained against the results of previous research corresponds to the permanence of crucial processes and characteristics inherent to retail businesses. In contrast, the discrepancies obtained are consequences of the evolution of the retail sector and changes in the environment. In line with the findings presented, it is expected that the application of Lean by retailers presents significative development and that this SLR serves as a reference for future investigations.

In summary, while the year of publication of the SLR is recent, a more significant number of articles related to the research topic were found since the extension of the use of improvement tools outside the manufacturing sector increased from 2015 (Jimenez et al. 2021; Lagorio and Pinto, 2021). On the other hand, we observe the popularity of using the VSM as an individual tool and in conjunction with an additional tool. Further, the LSS methodology is essential in retail businesses due to the changes in consumption that center demand based on the quality of products. Additionally, the part of the value chain of the companies most frequently applying the retail tools went from being the area of marketing and sales (Jimenez et al. 2021) to the area of Processes and logistics operations. Nevertheless, critical processes of retail businesses are Outbound Logistics and Storage and inventory activities. Likewise, Portugal and Brazil are the countries where the case studies are applied and where the authors come from due to their complex area and the constant growth of the retail sector. On the other hand, the number of authors is linked to the density of information and the support of the institutions of each of the researchers, so there is a greater number of authors per article. In addition, having more case study research articles does not limit the use of methodologies such as multiple

case studies that help to know the application of Lean and its results in a real case. Moreover, it was found that the effectiveness of Lean implementation increases with the combination of different Lean tools if these complement each other.

Finally, some gaps identified in the present investigation could serve as a starting point for future investigations. First, exploring e-commerce or digital platforms in retail development. Although e-commerce grew considerably with the pandemic of COVID-19, at the time of the writing of this article, the current information in this area still needs to be made available to make an SLR of this subject; therefore, this paper proposes the topic as possible future research. In turn, there needs to be more information regarding the use of improvement tools for the optimization of spaces or redistribution, being an important issue related to storage and inventory, which could be solved by the implementation of various Lean tools such as 5S or seven wastes. Our research has limitations since it only focuses on applying Lean tools (excluding other improvement methods such as space optimization or space redesigning methodologies) and the search for articles is only made using Scopus and Web Of Science (excluding other databases) limiting the articles available for analysis.

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