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The perspective of key stakeholders on the sustainable design of reverse logistics in e-commerce: an interpretive sensemaking review

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Abstract:

The uncontrolled increase in returns in e-commerce has become a challenge for supply chains and key stakeholders (e-retailers, customers, transport companies, and institutions). The literature, however, has not yet offered a systematic understanding of this subject. In this context, this article aims to better comprehend sustainable reverse logistics by defining the elements involved and the stakeholders' perspective. To do so, a systematic literature review is carried out through a sensemaking interpretative review, defining seven elements of sustainable reverse logistics (return policy, return location, demand and return location density, validation point, return destination, transportation strategy, and information management). Furthermore, the perspective of each stakeholder is presented. In this sense, e-retailers, as ultimate decision-makers, are involved in all seven elements. When this process is outsourced, transport companies also have an impact on all relevant elements. Customers have an impact on almost all elements, as they demand a high level of service. Institutions, as regulators seeking more sustainable cities, apply measures that influence almost all relevant elements. This analysis also highlights the importance of collaboration between stakeholders and specific gaps in the literature. Finally, this research provides a suitable tool for managers to establish a sustainable reverse logistics that meets the preferences of each stakeholder.

Key words:

Reverse logistics, sustainability, e-commerce, stakeholders, systematic literature review, interpretive sensemaking review.

1. Introduction

E-commerce has undergone a period of growth in recent years. This growth can be attributed to two key factors: recent changes in consumer behavior and the flexible offers provided by e-retailers (Buldeo Rai et al., 2019b). First, there has been a notable increase in consumer trust when engaging in online transactions (e.g., Fernández Vázquez-Noguerol et al., 2022). Second, e-retailers are offering free delivery and returns in different locations to encourage online sales (Le et al., 2022). However, this flexibility in return policies has also triggered an increase in returns (Frei et al., 2020).

In this sense, although the current cost of reverse logistics management is already considerable (e.g., Rodríguez-García et al., 2023), this cost could increase in the coming years by as much as 45% between 2022 and 2029 (Statista, 2023). Consequently, this situation presents a significant challenge for the management of online supply chains (de Leeuw et al., 2016; Frei et al., 2020). This problematic is giving rise to a

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number of shortfalls in existing strategies, particularly in terms of sustainability (Frei et al., 2020). Thus, the costs associated with reverse logistics have increased significantly, particularly in relation to the transportation of online orders and returns. This has also led to an important environmental and social impact (de Araújo et al., 2018; Frei et al., 2020; Wang et al., 2021). In this sense, in addition to the complexity of reverse logistics management, these impacts are generated and have repercussions on several stakeholders who, in turn, play a pivotal role in the entire process. The main stakeholders are e-retailers, customers, transport companies, and institutions.

Thus, these stakeholders are currently unable to manage and redesign their reverse logistics in a manner that would enable them to address and thereby mitigate the impact of such an operation on sustainability (Sallnäs & Björklund, 2020). In this sense, some of them have implemented certain measures, though these have not always proved effective. For example, e-retailers have tried to make changes in their return policies, abandoning free returns and prioritizing returns at their physical stores (e.g., Inditex). However, this has only shifted the impact of reverse logistics to another point in the supply chain, increasing pressure on stores and prompting an increase in consumer journeys by private vehicles (Buldeo Rai, 2019).

Under pressure to redesign the reverse logistics strategies from a sustainable perspective, the literature has slowly begun to pay attention to this operation (XiaoYan et al., 2012; de Araújo et al., 2018). In particular, recent literature has focused on consumers' perspectives on the level of service provided by e-retailers and transport companies (Buldeo Rai et al., 2019; Kawa & Światowiec-Szczepańska, 2021). In addition, to a lesser extent, certain articles have also analyzed how this level of service and the current reverse logistics design affect certain elements of sustainability (mainly environmental and economic ones) (Frei et al., 2020; Zennaro et al., 2022).

Although this contribution is interesting, there is a lack of focus in the extant literature on the complete design of reverse logistics, with the majority of studies focusing on returns policy or service level rather than the broader issue. Furthermore, the analysis of its impact on sustainability is also limited, as the current focus is on certain aspects of the economic and environmental pillar. Finally, the role of the main stakeholders has not been fully addressed, highlighting the lack of research on the role of transport companies and institutions. In this sense, the objective of this study is to understand the role and vision of the different stakeholders in the complete design of sustainable reverse logistics. To this end, the following research question is defined:

RQ. How do the perspectives of key stakeholders influence the design of sustainable reverse logistics in e-commerce?

To address this objective, a systematic literature review will be employed. Furthermore, the analysis of the results of this review will be carried out using the paradigm of an interpretive sensemaking review (e.g., Durach et al., 2021).

The article is structured as follows. The second section presents a review of the existing literature on sustainable reverse logistics. Section three introduces the methodology followed in the article. The fourth section presents the results of the interpretive sensemaking review. Section five presents the research gaps, and the final section provides the conclusions and the limitations of this study.

2. Literature review

Reverse logistics is the transfer process in which customers return goods that do not meet their order requirements (Han, 2006; Arab et al., 2020). Due to an uncontrolled rise in returns, this process has become a challenge from a sustainable perspective (economic, environmental, and social) (de Leeuw et al., 2016; Frei et al., 2020). Thus, both e-retailers and scholars have started to pay attention to returns. First, e-retailers are trying to reduce online returns by introducing changes to their return policy (i.e., removing the free return policy) (e.g., Janjevic & Winkenbach, 2020). Second, due to the great impact reverse logistics has on sustainability, scholars have started to explore this important topic (de Araújo et al., 2018; XiaoYan et al., 2012). However, prior research on sustainable reverse logistics is relatively scarce, and the perspectives of the three pillars of sustainability and all relevant stakeholders are neglected.

The literature around sustainable reverse logistics has focused on how returns, and their excessive growth, have made current reverse logistics strategies unsustainable. Thus, de Araújo et al. (2018) and Frei et al. (2020) focused on the major repercussions reverse logistics has on the economic

and environmental pillars of sustainability. First, returns considerably increase supply chain costs. Second, this process produces an increment in kilometers due to dedicated journeys and flows. Furthermore, Borghetti et al. (2022) mentioned the impact reverse logistics has on the social pillar of sustainability. Thus, returns increase pressure on stores, as customers can return their online purchases there, worsening working conditions. Furthermore, a growth in the number of returns and kilometers is also related to cities becoming more dangerous (e.g., Wang et al., 2021).

Furthermore, a major part of the existing research has focused on the implications of the reverse logistics on customers and their behavior. In this sense, the decisions made around this process are extremely relevant to e-customer satisfaction (Hsu, 2008; Cao et al., 2018). Thus, customers value positively the flexibility of the return policy as a factor to buy online (e.g., Cao et al., 2018). In this regard, return policy refers to the rules the e-retailer establishes to manage how e-customers can return purchases (Nguyen et al., 2018). Around this topic, research has analyzed the different elements that can be integrated in this policy (e.g., Frei et al., 2022; Frei et al., 2023). Researchers have therefore highlighted the type of articles to be returned (and for what reasons) (e.g., Frei et al., 2022; Park & Waqar, 2022), the period during which returns are accepted (e.g., Kawa & Światowiec-Szczepańska, 2021; Zennaro et al., 2022), the costs of these returns (e.g., Buldeo Rai et al., 2019b; Sallnäs and Björklund, 2020; Kawa & Światowiec-Szczepańska, 2021), and the time needed to manage them (e.g., Kawa & Światowiec-Szczepańska, 2021; Frei et al., 2023).

Also related to customer satisfaction and the return policy, multiple researchers have investigated the impact of the return location (and the multiple alternatives e-retailers could provide to customers) on customer satisfaction and sustainability (e.g., Buldeo Rai et al., 2019; Zhang et al., 2023). Return location refers to the place where consumers can drop off their returned products. Thus, this place, which represents the beginning of the reverse logistics process, could be the customer's home, a store, a collection point or a locker (Buldeo Rai et al., 2019; Buldeo Rai et al., 2019b; Frei et al., 2020). The literature has focused here on comparing certain alternatives (i.e., stores, collection points, collection at customers' homes), trying to define which solution could be more sustainable. For example, Buldeo Rai et al. (2019) mentioned that the use of collection points could produce a reduction of CO_2 emissions. However, this alternative would only be beneficial when online orders volume is high. Furthermore, Zhang et al. (2023) highlighted that the use of stores or collection points for returns could be a sustainable solution if customers commute by bike or on foot. In this context, e-retailers face a complex decision. Providing flexibility to the consumer by allowing returns at multiple points increases consumer satisfaction (Buldeo Rai et al., 2019b; Jiang et al., 2019; Kawa & Światowiec-Szczepańska, 2021), but the ideal design from a sustainable point of view is based on selecting as few alternatives as possible (e.g., Frei et al., 2022).

In addition to all this, Yao (2005) analyzed other elements that influenced the sustainability of reverse logistics. Thus, Yao (2005) mentioned that the demand density (how many returns in a set geographic area) and the density of collection points (the number of return locations in a set geographic area) have an important impact on sustainability due to the constraints they impose on sustainable design of reverse logistics.

From a more limited point of view, the literature has also paid some attention to two key elements in the design of reverse logistics: validation point and final destination. The former represents the point where the company checks the feasibility of the return (de Araújo et al., 2018). Here, the e-retailer should check the state of the product and if it fits in the return policy (de Araújo et al., 2018). According to the literature, this validation can be developed at a store, a collection point, the customer's own home, or a distribution center or warehouse (e.g., de Araújo et al., 2017; Frei et al., 2022). Although the literature is scant on this topic, researchers have mentioned the importance of taking the right decision when selecting this location from a sustainable perspective (de Araújo et al., 2017). Furthermore, this validation point also has an important impact on the definition of the final destination (Frei et al., 2022).

Second, the final destination (or return destination) is the point where any reprocessing and storage takes place. According to the literature, multiple alternatives are available: a store, an online distribution center, a traditional warehouse, or a manufacturer's warehouse (e.g., Yao, 2005; Weixin, 2006; Frei et al., 2020). Although this element has an important impact on the reverse logistics sustainability, the literature has only focused on the process developed at this place (e.g., Yao, 2005; Zhang et al., 2023). Thus, researchers

mentioned and compared different solutions such as reprocessing, reintegration in the company's stock, disposal, etc. (e.g., Bernon et al., 2011; Ponce-Cueto & Molenat Muelas, 2015; Frei et al., 2020a; Zhang et al., 2023), concluding that it would be cheaper to dispose of the returned product (due to transportation, handling, and administrative costs) than reprocess or reintegrate the product into stock. However, this would not be among the more sustainable options (as products could end up in landfills).

The transportation strategy of the e-retailer is what the literature considers to be the integrator of all these points (return location, validation point, return destination). This element refers to how returned products are transported from the return location to the return destination (vehicles, routes, dispatching slots, and so on). The literature has thus focused on defining the great impact this element has on sustainability. For example, Frei et al. (2020) and Park & Waqar (2022) mentioned that the environmental impact of the transportation strategy mainly depends on the distances to be traveled. Furthermore, authors such as Frei et al. (2023) mentioned the impact of this element on the costs of the reverse logistics. On the other hand, researchers also centered their efforts on defining when the outsourcing of this transport could be sustainable (e.g., Bernon et al., 2011; Buldeo Rai et al., 2019a; Wang et al., 2021). Authors such as Bernon et al. (2011), Buldeo Rai et al. (2019a) and Wang et al. (2021) mentioned the benefits of outsourcing the return transport, highlighting a reduction in costs, the higher achievement of sustainability goals, the greater stop density, the lower fuel consumption, or the opportunity to reach the critical mass of goods. On the other hand, de Borba et al. (2020) and Zennaro et al. (2022) mentioned when the use of this alternative could be sustainable. De Borba et al. (2020) highlighted that the decision should be made based on the capacity to integrate the direct and reverse flows. Zennaro et al. (2022) indicated that the higher the variability in return volume, the more the convenience in outsourcing.

The literature, from a reverse logistics design and evaluation perspective, mentioned the importance of information and KPI (key performance indicator) management (e.g., Frei et al., 2020; Viu-Roig & Alvarez-Palau, 2020). This refers to the capacity to collect, manage and turn data into relevant knowledge on the return process (e.g., Frei et al., 2020; Viu-Roig & Alvarez-Palau, 2020). In this sense, researchers mentioned how this knowledge is crucial in identifying key areas for improvement (e.g., Frei et al., 2020). Thus, this data and knowledge should be used to enable the impact of the reverse logistics strategy on sustainability to be quantified and reduced (e.g., Frei et al., 2020).

In order to facilitate comprehension of the extant literature on sustainable reverse logistics in e-commerce, Table 1 presents a summary of the key points discussed in this section.

Table 1. Summary of previous literature about sustainable reverse logistics in e-commerce.

Reverse logistics element	Previous research	References
Return policy	Customer behavior and satisfaction, return policy (articles to be returned, return period, return cost, reimbursement period) and its flexibility	Cao et al., 2018; Frei et al., 2022; Hsu, 2008
Return location	Customer satisfaction, comparison between multiple return locations (customer's home, store, collection point, locker)	Frei et al., 2020; Buldeo Rai et al., 2019; Zhang et al., 2023
Demand and return location density	Influence of demand and return location density on sustainability	Yao, 2005
Validation point	Impact of the validation point (store, collection point, customer's home, distribution center, warehouse) on sustainability and the final destination	de Araújo et al., 2017; Frei et al., 2022
Return destination	Process (reprocessing, reintegration in stock, disposal) developed on the return destination (store, online distribution center, traditional warehouse, manufacturer's warehouse)	Bernon et al., 2011; Frei et al., 2020a; Zhang et al., 2023
Transportation strategy	Impact of the transportation strategy (vehicles, routes, dispatching slots…) on sustainability. Definition of when its outsourcing could be sustainable	Buldeo Rai et al., 2019a; Park & Waqar, 2022; Wang et al., 2021
Information and KPIs management	Importance of data collection and management to control the reverse logistics	Frei et al., 2020; Viu-Roig & Alvarez-Palau, 2020

Finally, it should be noted that all this research and the seven elements that were identified in the literature (return policy, return location, demand and return location density, validation point, return destination, transportation strategy, and information and KPI management) were evaluated in previous literature through the lens of different stakeholders. Thus, the perspective mainly used has been that of consumers and e-retailers. However, the main stakeholders that need to be integrated into reverse logistics are retailers, customers, transport companies, and institutions.

3. Methodology

A systematic review of the literature was carried out through a three-stage procedure: literature search and selection, literature coding and analysis, and reporting the findings (Tranfield et al., 2003). The structure followed in this research can be seen in Figure 1.

For data collection, a keyword-based search ("sustainability", "sustainable performance", "reverse logistics", "return management", "return logistics" and "e-commerce") was conducted in two databases: Scopus and Web of Science. In addition to these keywords, specific search criteria were used to eliminate all non-academic (excluding conference papers and including only articles published in journals) and non-English language articles. Thus, a preliminary list of 132 articles was obtained (already excluding duplicates). Table 2 presents a summary of the searches carried out and the results obtained. From this list, a filtering process was performed. Thus, the 132 articles were read to select only those that addressed the topic of interest (sustainable reverse logistics in e-commerce). Two criteria were used. First, the articles had to focus on the topic of interest (e.g., Akhtar, 2023). Second, the quality of research content was checked (e.g., Richter & Brühl, 2021; Wang et al., 2021), taking into consideration the integration with theory and the use of multiple data sources (e.g., Richter & Brühl, 2021). Thus, a final list of 32 articles was obtained.

This final list may appear to contain a small number of articles; a fact that could translate into a sign of low academic rigor. However, Durach et al. (2017) and Durach et al. (2021) pointed towards the importance of selecting the right papers to be included in a literature review. Thus, they mentioned potential issues that could arise when integrating too many academic papers.

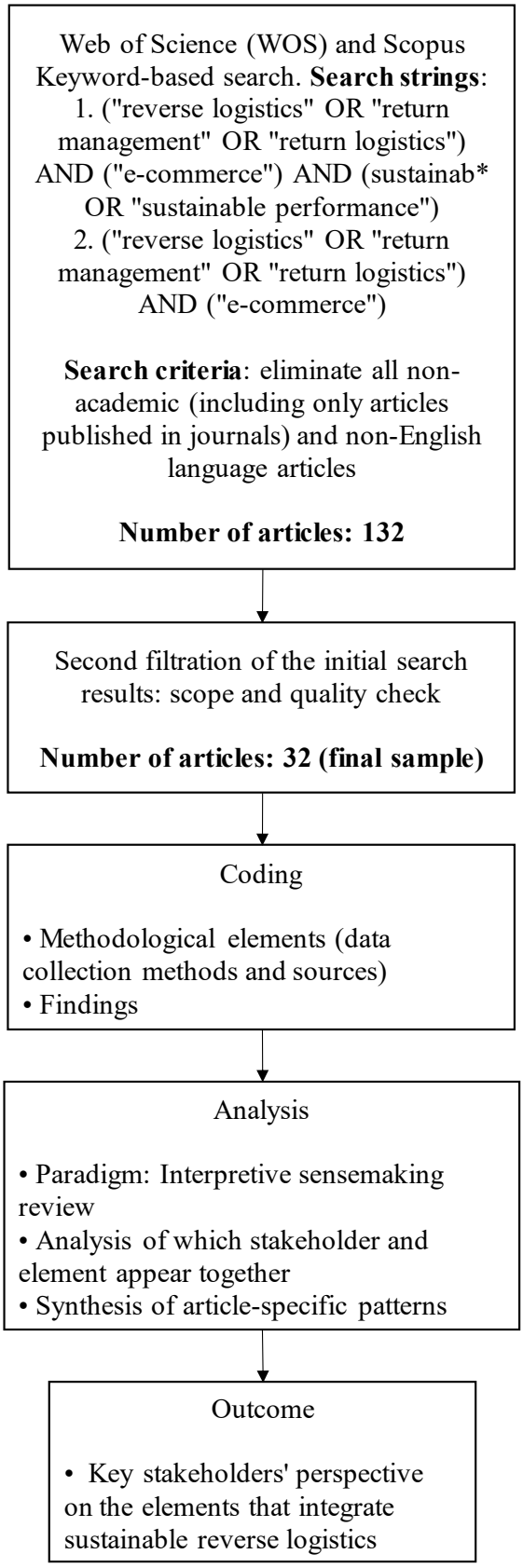

Figure 1. Methodology strategy.

Table 2. Summary of literature searches.

	Number of papers with search criteria without filtering	
Combination of keywords	Scopus	Web of Science
(“reverse logistics” OR “return management” OR “return logistics”) AND (“e-commerce”) AND (sustainab* OR “sustainable performance”)	30	47
(“reverse logistics” OR “return management” OR “return logistics”) AND (“e-commerce”)	102	125
Integration of both searches without duplicate articles	110	125
Total articles	132	

Following the selection of these 32 articles, all relevant information contained in them was coded for further analysis. This coding included two areas: methodological elements (data collection methods and sources) and findings (e.g., Richter & Brühl, 2021). In the case of the findings, the coding paid particular attention to the elements related to sustainable reverse logistics (identified in the previous section), the key stakeholders, and their relationships.

After this coding, in order to analyze this information, the paradigm of interpretive sensemaking review was implemented. This paradigm helps to analyze previous evidence, recognizing patterns and conditions (e.g., Richter & Brühl, 2021). Particularly, the main task of interpretive sensemaking reviews is to understand the subjective perspective of key stakeholders on sustainable reverse logistics (e.g, Durach et al., 2021). To do that, an extensive analysis of the information was carried out. Thus, through interpretive sensemaking review, the perspective of key stakeholders on each element of sustainable reverse logistics was identified (e.g., Darby et al., 2019). First, article by article, we analyzed which stakeholders and elements appear together, and the conditions for this. Second, article-specific patterns were synthesized, comparing the article-specific conditions at the cross-article level. In turn, the perspective of key stakeholders on these elements and relationships was developed (e.g., Darby et al., 2019).

4. Interpretive sensemaking analysis: the role of the different stakeholders (Findings)

As mentioned before, four key stakeholders participate, in some way, in sustainable reverse logistics in e-commerce. They influence the design of reverse logistics strategies, making an impact on every element that was presented in Section 2. In this context, these stakeholders need to coordinate in order to carry out the processes that go to make up reverse logistics in e-commerce. Therefore, to ensure suitable sustainable management in this operation, it is necessary to include the view and the role of these stakeholders in the theoretical model. This individual analysis of each stakeholder, conducted by an interpretive sensemaking review, answers the research question.

The stakeholders related to sustainable reverse logistics that have been identified in the literature are consumers (Cao et al., 2018; Buldeo Rai et al., 2019), transport companies (Wang et al., 2021; Park & Waqar, 2022), institutions (Buldeo Rai et al., 2019a; Lai et al., 2022), and online retailers (Dutta et al., 2020; Frei et al., 2020)

4.1. Online retailers

The retailer, being responsible for the online sale, intervenes in all the elements that structure and have an impact on sustainable reverse logistics (return policy, return location, demand and return location density, validation point, return destination, transportation strategy, and information and KPI management). In this sense, this stakeholder is ultimately responsible for selecting and designing each of these elements, being the key actor in choosing a sustainable reverse logistics strategy.

To do so, e-retailers should create a balanced return policy, offering one or two options to consumers (Sallnäs & Björklund, 2020; Frei et al., 2023). To reduce the sustainable impact, in-store returns should be promoted as the primary return location (Buldeo Rai et al., 2019b). Furthermore, this selection of return location should try to achieve a high collection point density that will mitigate the impacts of a fragmented demand (de Borba et al.,

2020). According to Frei et al. (2022), the selection of the validation point is key to the appropriateness of the destination point. It also has a high-cost impact (de Araújo et al., 2018). Related to return destination, according to de Araújo et al. (2018), as the volume of returns increases, a centralized structure impacts positively on the sustainability performance. When designing the transportation strategy, outsourcing it may have advantages for the sustainability of reverse logistics (e.g., de Araújo et al., 2018). However, in order to achieve these benefits, it will be necessary to integrate order delivery and returns collection flows (de Borba et al., 2020; Lai et al., 2022). Finally, structured and clear information management, integrated with KPIs management, will facilitate the creation of sustainable reverse logistics (e.g., de Araújo et al., 2018; Frei et al., 2020).

In addition to this selection, the retailer is also responsible for integrating all the other stakeholders in the chain and coordinating that integration (e.g., Sallnäs & Björklund, 2020). Due to the different interests of each stakeholder, conflicts can arise in this coordination process. Customers will focus on getting the best possible service level at the lowest possible cost, regardless of the burden around them (Sallnäs & Björklund, 2020). Transport companies will try to offer an acceptable service while minimizing their logistics costs (Zennaro et al., 2022). Finally, institutions will try to keep the focus on the wellbeing of their cities and citizens, paying less attention to the needs of retailers, transport companies, and consumers (Buldeo Rai et al., 2019a). However, retailers should keep the focus on the multiple perspectives and try to find common ground that favors the sustainability of the reverse logistics as a whole.

To do so, e-retailers should design each element from the perspective of the stakeholder to whom it matters the most, balancing this design based on the most important interests of the other stakeholders (e.g., Sallnäs & Björklund, 2020). Return policy, return location, and validation point should be designed based on the customers' interests. The perspective of transport companies should be considered when defining the return logistics strategy. Furthermore, regulations created by institutions should be considered throughout the return policy, return location, and logistics strategy. Finally, sustainable performance should be evaluated and achieved from all stakeholders' perspectives. At the same time, the demand and return location density is a constraint that cannot be changed but does affect the design of reverse logistics (especially to transport companies).

In this sense, e-retailers have a difficult role in creating sustainable reverse logistics strategies that benefit and meet the expectations of all stakeholders.

4.2. Customers

Customer demands have evolved and now focus on a high level of service (quick, non-stop) and an agile, rapid retailer response (Sallnäs & Björklund, 2020). Given this new paradigm, online retailers must offer customers a clear and flexible return policy that concisely defines what they can return, how long they have to return it, and how much it will cost them (Cao et al., 2018). Along the same lines, the design of the return locations (e.g., at home, collection point, locker, store) and the speed of reimbursement (immediate or after validation (24/48h, 3 or more days)) are also relevant when the consumer perspective on the returns service is considered (e.g., Stock & Mulki, 2009).

The importance of these elements lies not only in their impact on the service levels perceived by the customer but also in their relationship with the sustainability of the reverse logistics (Janjevic & Winkenbach, 2020). In this sense, offering a flexible policy and multiple return locations creates a logistics complexity which results in higher costs, a high environmental effect, and a greater social impact (e.g., Frei et al., 2023).

Although adequate design of these elements is key for customer satisfaction, management of information and communication with customers also represents an important pillar for them (Sallnäs & Björklund, 2020). It is therefore vital not only to inform the customer about the state of their return (e.g., package tracking, estimated time of reimbursement), but also to give them information regarding the sustainability of the different return options available (e.g., type of vehicle used, expected carbon emissions) (e.g., Cao et al., 2018; Buldeo Rai et al., 2019b). Furthermore, this control and management of information, calculating KPIs of interest and providing this information to consumers has a positive impact on the sustainable management of reverse logistics in e-commerce (de Araújo et al., 2018).

4.3. Transport companies

Due to their reduced capacity to deal with returns and the high costs that internal management of reverse logistics would mean to them, retailers tend to rely on outsourcing this operation to transport companies,

among others (Janjevic & Winkenbach, 2020; Zennaro et al., 2022). Thus, outsourcing reverse logistics has been identified as one of the most important management strategies among current e-retailers (Wang et al., 2021).

The use of outsourcing has repercussions on reverse logistics design as this design will depend on the capacities and services of third parties. Thus, when selecting a transport company, there will be an effect on the e-retailer's transportation strategy, on the return location, on the validation point, and on the return destination (Sallnäs & Björklund, 2020; Viu-Roig & Alvarez-Palau, 2020). In this sense, the transport company will select the number and type of vehicles used, as well as the route design for the collection of returns (transportation strategy) (Viu-Roig & Alvarez-Palau, 2020).

Furthermore, this third party could also define (limiting or adding) locations where the customers can drop off their returns (return location) (Sallnäs & Björklund, 2020). E-retailers could benefit from a network of lockers or collection points provided by the transport company. This would also influence the e-retailer's return location density.

Such dependence on this network could also influence the definition of the validation point(s). Thus, transport companies could limit or facilitate the selection of certain points that are most beneficial to their own logistics strategy.

Furthermore, all this influence also has an impact on the customer and the return policy. Thus, a certain transport strategy could have an impact on the speed with which the return is collected and refunded to the customer (e.g., Wang et al., 2021). However, on the other hand, e-retailers may suffer from limitations imposed by the provider (e.g., not offering pick-ups in certain geographic areas).

Finally, on the same lines as the return location, transport companies could influence the selection of the return destination (Viu-Roig & Alvarez-Palau, 2020).

In addition to this impact on sustainable reverse logistics design, outsourcing this operation also has an effect on sustainability. In this regard, this decision could mitigate the impact on the economic (cost reduction and improvement on service level), and environmental (reduction in fuel consumption) pillars (Bernon et al., 2011; Wang et al., 2021). However, this would only be achieved if integration of the delivery and return collection flows is obtained (de Borba et al., 2020; Lai et al., 2022).

Given the great impact that outsourcing has on this operation and consumer demands regarding the use of more sustainability-aware suppliers, it becomes relevant to ensure that the most appropriate suppliers are chosen (Janjevic & Winkenbach, 2020; Wang et al., 2021). This selection should therefore be based, among other things, on the service level to the consumer, the cost, CO_2 emissions, or the operational risk (Wang et al., 2021).

Furthermore, it is also necessary to establish relationships based on trust and coordination mechanisms between e-retailers and transport companies (Viu-Roig & Alvarez-Palau, 2020). Those mechanisms should reflect the information to be shared by each party, which is vital in order to ensure the service level on offer and to make the correct selection of sustainable logistics strategies that suit all parties (Sallnäs & Björklund, 2020; Viu-Roig & Alvarez-Palau, 2020).

4.4. Government and Institutions

Although the role of institutions in sustainable reverse logistics in e-commerce is still little studied (Harrington et al., 2016), their function as regulators has been developed by the institutions themselves, paying increasing attention to the need to improve the sustainability of this operation (Zennaro et al., 2022). Local authorities have focused on improving the quality of life of their citizens by regulating logistics and transport (Buldeo Rai et al., 2019a).

Given this approach, the institutions have developed their concern based on return costs, the environmental impact of the transport involved in collections (e.g., noise and air pollution), and on social aspects (quality of life, infrastructures, health and safety) (Harrington et al., 2016; Viu-Roig & Alvarez-Palau, 2020).

In the face of these concerns, the interests of institutions focus on reducing and eliminating the negative effects of returns in their areas, maximizing the satisfaction of consumers and citizens, and developing local trade (Harrington et al., 2016). Furthermore, it is also imperative that institutions ensure that the environmental, social, and economic needs are considered in decisions that affect the design of reverse logistics in e-commerce (Harrington et al., 2016).

To deal with these interests, public authorities should take on an active role, facilitating the implementation of sustainable initiatives by creating policies and regulations that ease, limit, or manage returns (Viu-Roig & Alvarez-Palau, 2020). In this regard, a wide range of regulations attempt to alleviate the effects of this operation on return location and destination, influencing the design of the retailer's return policy, return location, and logistics strategy (Allen et al., 2018; Lai et al., 2022). Policies should be highlighted concerning the obligation of offering a certain level of service (e.g., minimum returns time), banning or favoring certain vehicle types (transportation strategy), or promoting the use of specific, more sustainable, return location and destination (e.g., lockers or stores) (Harrington et al., 2016; Allen et al., 2018; Viu-Roig & Alvarez-Palau, 2020).

However, even the role of institutions is extremely relevant when implementing sustainable reverse logistics strategies as their legislation does not always achieve the objective for which it was created (e.g., Lozzi et al., 2021). In this sense, some legislation is created with the aim of improving the lives of citizens by reducing the transport impact associated with returns (Zennaro et al., 2022). However, the ultimate consequence of this legislative measure may be detrimental to other stakeholders (e.g., Lozzi et al., 2021), which could in turn have a detrimental effect on urban areas and their inhabitants. Therefore, the creation of legislation must also include the perspectives of all relevant stakeholders.

Although these measures can be effective, to ensure their success, it is necessary to establish collaboration networks between institutions, retailers, and transport companies to ensure information sharing and joint KPIs management (Buldeo Rai et al., 2019a; Viu-Roig & Alvarez-Palau, 2020). Thus, the institutions should not only regulate and establish policies but also find consensus among stakeholders to improve the quality of life of the whole community and reduce the possibility of any misalignment between measures and community needs (Harrington et al., 2016; Viu-Roig & Alvarez-Palau, 2020).

As mentioned in this section, based on a literature review using interpretative sensemaking analysis, it is evident that each of the key stakeholders has a perspective and impact on the different elements that integrate sustainable reverse logistics. It is important to mention the role of e-retailers as integrators of a collaborative structure among all stakeholders that takes into account the needs of each one of them. In this sense, Table 3 shows how the importance of the seven elements changes depending on the stakeholder analyzed.

5. Research gap and future agenda

Although research on sustainable reverse logistics in e-commerce has expanded considerably in recent years, the analysis presented in this article has revealed a varying level of scrutiny and coverage for each stakeholder (e-retailers, customers, transport companies, and governments and institutions).

In this context, this research has shown that certain stakeholders such us customers and retailers have been extensively analyzed. First, a significant proportion of existing research has concentrated on the implications of reverse logistics for customers and their behavior (e.g., Hsu, 2008; Cao et al., 2018). The research has focused on customer preferences and the impact of these preferences on the design and sustainability of reverse logistics (e.g., Buldeo Rai et al., 2019; Zhang et al., 2023). For example, the existing literature has evaluated the influence of different return policies (i.e., home or in-store collection) on sustainability (e.g., Bernon et al., 2016). Nevertheless, the extent to which customers would respond to different sustainable modifications to return policies and return locations has yet to be elucidated. In this sense, as relevant elements of sustainable reverse logistics, the return policy and location should be redesigned from a sustainable perspective. Consequently, some researchers have already proposed how these elements could be redesigned to reduce the impact of these operations on the three pillars of sustainability (e.g., Buldeo Rai et al., 2019; Frei et al., 2020). However, previous literature has not yet investigated the implications of these changes on customer behavior. Therefore, further empirical research is required to address this research gap.

Second, the role of online retailers in the design of reverse logistics and its implications for sustainability has already been the subject of previous research (e.g., Sallnäs and Björklund, 2020; Frei et al., 2023). A number of researchers have concentrated their attention on the perspective of e-retailers with regard to specific aspects of reverse logistics, including return policy, return locations and transport strategy. However, as previously stated, this research has focused on the impact of these elements specifically on the economic and

Table 3. Stakeholders' perspectives on the variables conforming sustainable reverse logistics.

Relevant elements according to literature	STAKEHOLDERS			
	E-retailer	Customer	Transport companies	Government and Institutions
Return policy	Balanced return policy (one or two options) (Sallnäs and Björklund, 2020; Frei et al., 2023)	Clear, flexible returns policy. Agile management of returns and reimbursement (Cao et al., 2018; Buldeo Rai et al., 2019b)	Possible impact on the agility of the return process (Wang et al., 2021)	Regulations that attempt to maximize consumer and citizen satisfaction (e.g., minimum returns time) (Harrington et al., 2016; Allen et al., 2018; Viu-Roig & Alvarez-Palau, 2020)
Return location	In-store returns as primary return location (Buldeo Rai et al., 2019b)	Multiple (and free) return locations (Cao et al., 2018; Buldeo Rai et al., 2019b)	Definition (limitation or addition) of the locations where the customer can drop off their returns (Sallnäs & Björklund, 2020; Viu-Roig & Alvarez-Palau, 2020)	Regulations that attempt to mitigate the negative effects of reverse logistics by restricting or facilitating certain return locations (e.g. use of lockers or stores) (Allen et al., 2018; Lai et al., 2022)
Demand and return location density	High collection point density to mitigate the impact of a fragmented demand density (de Borba et al., 2020)	Multiple (and free) return locations near their home or office (Cao et al., 2018; Buldeo Rai et al., 2019b)	Dependence on the transport company's network of lockers or collection points (Viu-Roig & Alvarez-Palau, 2020)	Regulations that attempt to mitigate the negative effects of reverse logistics by restricting or facilitating certain return locations (e.g. use of lockers or stores) that could impact on return location density (Harrington et al., 2016; Allen et al., 2018; Viu-Roig & Alvarez-Palau, 2020)
Validation point	High impact on the appropriateness of the destination point and costs (de Araújo et al., 2018; Frei et al., 2022)	Minimum validation time, ensuring maximum reimbursement speed (Cao et al., 2018; Buldeo Rai et al., 2019b)	Definition (limitation or addition) of the points where the product is validated (Sallnäs & Björklund, 2020; Viu-Roig & Alvarez-Palau, 2020)	Not applicable
Return destination	Centralized structured as the volume of returns increases (de Araújo et al., 2018)	Not applicable	Influence on the selection of the return destination (Sallnäs & Björklund, 2020; Viu-Roig & Alvarez-Palau, 2020)	Regulations that attempt to mitigate the negative effects of reverse logistics by restricting or facilitating certain return destinations (e.g., use of stores) (Allen et al., 2018; Lai et al., 2022)
Transportation strategy	Integration of delivery and collection flows (de Araújo et al., 2018; de Borba et al., 2020; Lai et al., 2022)	Not applicable	Selection of the number and type of vehicles used, as well as the route design for the collection of returns (Sallnäs & Björklund, 2020; Viu-Roig & Alvarez-Palau, 2020)	Regulations that attempt to mitigate the negative effects of reverse logistics by influencing the transport strategy (e.g., type of vehicle used) (Harrington et al., 2016; Allen et al., 2018; Viu-Roig & Alvarez-Palau, 2020)
Information and KPIs management	Structuration to facilitate the creation of sustainable reverse logistics (de Araújo et al., 2018; Frei et al., 2020)	Information on the state of the return and the sustainability of the various available return options (Cao et al., 2018; de Araújo et al., 2018; Buldeo Rai et al., 2019b; Sallnäs & Björklund, 2020)	Establishment of relationships based on trust and coordination mechanisms to share information and manage KPIs (Sallnäs & Björklund, 2020; Viu-Roig & Alvarez-Palau, 2020)	Establishment of relationships based on trust and coordination mechanisms to share information and manage KPIs. Regulate and establish policies in consensus with stakeholders (Buldeo Rai et al., 2019a; Viu-Roig & Alvarez-Palau, 2020)
SUSTAINABLE REVERSE LOGISTICS	Sustainable design keeping a focus on the perspective of each stakeholder. Sustainable performance should be evaluated and achieved from all stakeholders' perspective (Sallnäs & Björklund, 2020)	High service level and agile, rapid retailer response (Cao et al., 2018)	Transport companies: focus on offering an acceptable service while minimizing their logistics costs (Bernon et al., 2011; Wang et al., 2021) E-retailers: selection of transport companies based on, among others, customer service level, cost, CO_2 emissions, or operational risk (Janjevic & Winkenbach, 2020; Wang et al., 2021)	Focused on reducing and eliminating the negative effects of returns in their cities (in terms of environmental and social aspects), maximizing consumer and citizen satisfaction, and economic development of local trade (Harrington et al., 2016; Viu-Roig & Alvarez-Palau, 2020)

environmental pillars of sustainability. In this sense, previous research has failed to analyze how these and other elements (validation point, return destination, demand density and return location, information and KPIs management) should be designed to create sustainable reverse logistics strategies. It is therefore recommended that future research should focus on establishing conceptual, empirical, and quantitative research that could define and quantify the optimal sustainable design for these operations.

Third, the situation for transport companies is analogous to that of online retailers. The current research agenda has concentrated on the current design of specific elements that depend on this stakeholder and their influence on sustainability (e.g., Sallnäs & Björklund, 2020; Viu-Roig & Alvarez-Palau, 2020). However, there is a paucity of research examining how these elements (in particular, the validation point, return destination, demand density, and return location, and their integration) should be designed to promote the creation of sustainable reverse logistics strategies from the perspective of transport companies. It is therefore recommended that future research concentrates on the development of conceptual, empirical, and quantitative studies which could define and quantify the optimal sustainable design for this operation from the perspective of this stakeholder.

With regard to institutions, previous research is extremely fragmented. In this sense, research has focused on the significance of this stakeholder's role and viewpoint on sustainable reverse logistics (e.g., Buldeo Rai et al., 2019a; Zennaro et al., 2022). Nevertheless, there is an important gap with regard to the measures that this stakeholder is implementing with the objective of reducing the sustainability impact of reverse logistics. Moreover, it will also be important to quantify how these measures really impact on reverse logistics sustainability. Ultimately, future research should concentrate on identifying the most effective measures for mitigating the impact of this operation on sustainability. To address this gap, further conceptual, empirical, and quantitative research is required.

Furthermore, in addition to research conducted on a specific stakeholder, there is a gap in the literature regarding the importance and benefits of collaboration and integration between stakeholders. This is a crucial factor in the sustainable design of reverse logistics (e.g., Sallnäs & Björklund, 2020). It is therefore recommended that conceptual and empirical research should focus on defining the optimal approach for initiating and developing this collaboration.

Finally, all this new research should also integrate a new perspective that has been neglected in previous research. Thus, the social pillar and the integration of the three pillars of sustainability (economic, environmental, and social) should be taken into account when developing any research about sustainable reverse logistics in e-commerce.

6. Conclusions

Even though the literature had slowly begun to pay attention to sustainable reverse logistics in e-commerce (de Araújo et al., 2018; XiaoYan et al., 2012), there is still a lack of focus in the extant literature on the complete design of sustainable reverse logistics and the key stakeholders. In this sense, the previous literature has focused on returns policy or service level, on certain aspects of the economic and environmental pillar, and on the role of specific stakeholders (retailers and customers), neglecting the perspective of the rest (transport companies, governments and institutions).

Therefore, this study, through a systematic literature review and the paradigm of interpretive sensemaking review, has identified the role and vision of the different stakeholders in the design of sustainable reverse logistics. Thus, the findings provide a detailed description of how each stakeholder understands and influences the sustainable design of reverse logistics strategies in e-commerce. In this sense, the role of four stakeholders (e-retailers, customers, transport companies, and governments and institutions) was presented and analyzed, identifying their points of interests and design preferences. This paper has, therefore, structured existing knowledge by providing a new perspective on the role of these stakeholders on sustainable reverse logistics. In this sense, these perspectives were analyzed based on seven elements identified in the literature (return policy, return location, demand and return location density, validation point, return destination, transportation strategy, and information and KPI management).

Specifically, this study analysed and structured how each stakeholder (retailers, customers, transport companies, and governments and institutions) interpret and influence each relevant element of sustainable reverse logistics. Retailers intervene in all

the elements that structured the sustainable reverse logistics. Thus, e-retailers are ultimately responsible for selecting and designing each of these elements, being the key actor in choosing a sustainable reverse logistics strategy and fomenting collaborative relationships between stakeholders. Due to this responsibility, when e-retailers rely on outsourcing the reverse logistics to transport companies, these providers will also have an effect on all relevant elements of reverse logistics as their design will be limited to the capacities and preferences of transport companies (they tend to work towards an acceptable service while minimizing their logistics costs). The elements more affected by this stakeholder are the return location, the validation point, the return destination and the transportation strategy.

On the other hand, customer demands also influence sustainable reverse logistics. Thus, this stakeholder requires a high service level and agile, rapid retailer response that can be translated into a flexible return policy, multiple (and free) return locations near their home or office, maximum reimbursement speed, and reliable information. However, these requirements could have an impact on reverse logistics design and on its sustainability. Finally, government and institutions have a regulatory role focused on improving the quality of life of their citizens. To do that, they tend to implement a wide range of regulations, influencing the design of the retailer's return policy, return location, and logistics strategy, seeking more sustainable cities.

In addition to the role of each stakeholder, this article also highlighted the importance of collaboration between stakeholders to create sustainable reverse logistics strategies. Thus, this sustainable design should keep a focus on the perspective of each stakeholder and sustainable performance should be evaluated and achieved from all stakeholders' perspectives.

Although the role of each stakeholder has been defined on the basis of existing literature, gaps that need further attention have also been identified. There are four particularly noteworthy omissions. First is the lack of research on the impact of certain sustainable reverse logistics strategies on consumer behavior; second, on how each element of the sustainable reverse logistics should be designed according to the perspective of e-retailers and transport companies; third, on which measures should be implemented by institutions; and finally, on the importance and requirements of collaboration between stakeholders. Furthermore, all new research that will try to overcome these gaps should use the perspective of the three pillars of sustainability and the four stakeholders.

This study also presents managerial contributions. Even though implementing sustainable strategies is complicated, understanding the perspective of each stakeholder and the need for collaboration between stakeholders is a fundamental step towards creating more sustainable reverse logistics strategies. The findings can guide retailers toward this sustainable design. Thus, using this research to prioritize the design of each element based on the priorities of each stakeholder could help to create sustainable strategies that meet each stakeholder's preferences.

Finally, this study also has some limitations. Although the use of a systematic literature review as a methodology has been applied rigorously, it does pose a challenge in preserving the meanings of the original texts (e.g., Richter & Brühl, 2021).

7. Data Availability

The data is available upon request.

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9. Authors contribution

First author developed state-of-the-art and actively participated in the identification of the elements of reverse logistics and their impact on each of the stakeholders. She also participated in the research discussions and conclusions.

Second author proposed the research methodology and participated in the identification of the elements related to reverse logistics. He participated in the research discussions and established the research gaps and future agenda.

Third author set out the general framework of the research, stating the importance of analyzing reverse logistics from a sustainable point of view and its impact on different stakeholders. He then participated in all the research discussions based on the results obtained and in the definition of the future agenda.

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