The role of consumers in the adoption of R-strategies: A review and research agenda

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ABSTRACT

The circular economy is increasingly being considered as a potential model to replace the prevailing end-of-life approach by establishing a closed-loop flow. The importance of different supply chain (SC) actors in this process has been recognized as a critical aspect of the development of sustainable production-consumption models. Consumers play a crucial role in this context, as they have a dual function: ensuring the correct disposal of used products; and consuming products from circular sources. However, the different roles consumers play (refuse, rethink, reduce, reuse, repair, refurbish, remanufacture, repurpose, recycle, recover) in circular SCs are still unclear. Through a systematic literature review, this paper aims to contribute to a better understanding of the influence of consumers on the adoption of circular supply chain (CSC) practices and to identify the main drivers and barriers regarding the adoption of circular practices. The results demonstrate that the topic is recent and has gained ground in the literature. An in-depth qualitative analysis was carried out with the 74 papers identified and shows that the most commonly addressed R-strategies are reuse, recycle and repair. The main motivations and challenges towards a greater adoption of circular practices are related to (or lack of) environmental beliefs and financial benefits.

1. Introduction

The depletion of natural resources and the environmental degradation is one of the main drivers for the transition from a linear economy towards a more circular one, fostering the implementation of closed-loop supply chains (Genovese et al., 2017; Nasir et al., 2017). As such, the discourse on sustainability has expanded beyond individual organizational actions to include considerations at the supply chain (SC) level (Genovese et al., 2017). Recent events like the COVID-19 pandemic and the war in Ukraine have exposed the vulnerabilities of current SC models in terms of sustainability and resilience, presenting several challenges for managers (Messina et al., 2022). One of these challenges is the transition from a product end-of-life concept to a more circular one, which implies to replace the predominant end-of-life approach by establishing close-loop materials flows. This shift requires the integration of some circular economy (CE) principles within the SC, thus fostering the emergence of circular supply chains (CSCs), in which all different SC actors need to collaborate (de Angelis et al., 2018). Indeed,

Farooque et al. (2019) propose a definition of circular supply chain management (CSCM) that reinforces the involvement of different stakeholders, including manufactures, consumers and users to achieve circularity goals towards a zero-waste vision.

Even though much pressure has been put on the role of companies and governments to increasingly adopt CE strategies and practices (Vadakkepatt et al., 2021), the reality is that consumers have significant influence in promoting sustainability through reducing the consumption of new materials and waste generation, while enhancing circularity through recycling and reuse (Ghisellini et al., 2016), or, more broadly, by adopting circularity strategies, here called R-strategies (Diaz et al., 2021; Kirchherr et al., 2017; Potting et al., 2017). There are different frameworks in the literature that describe these circularity strategies, which vary according to the number of R-strategies that they consider (Reike et al., 2018). In this review, we consider the framework that includes a set of 10 R-strategies, as proposed by Potting et al. (2017) and adopted in subsequent studies (e.g., Morseletto, 2020): refuse, rethink, reduce, reuse, repair, refurbish, remanufacture, repurpose, recycle,

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recover. Each R-strategy involves the engagement of different SC actors and requires different attitudes from them, facilitating the development of CSCs.

The concern with food waste recycling (Allison et al., 2022) and waste minimization of mobile phones and sunglasses (Hou and Sarigöllü, 20201), the willingness to reuse second-hand products or cell phones (Wibowo et al., 2022; Wilts et al., 2021), the consumers' decision to repair products (Sonego et al., 2022) are just a few examples of the role of consumers in adopting R-strategies. By participating in closed-loop strategies, consumers play a dual role in facilitating the development of CSCs (Shevchenko et al., 2023; Sonego et al., 2022). Indeed, the process of collecting products or parts involves the collective efforts of manufacturers, retailers, recycling companies, and other stakeholders throughout the SC (Ali et al., 2021; Mykkänen and Repo, 2021; Wilts et al., 2021), to ensure the availability of materials that can be incorporated into R-strategies while reducing uncertainties in terms of volume, timing and quality. Hence, consumers' involvement is crucial, for instance by appropriately disposing of end-of-life products or by purchasing products that have undergone circular processes.

In this sense, we recognize the key roles consumers play in adopting CE practices and how they can influence the successful implementation and development of CSCs. Without the active role of consumers by returning the products (or parts of products) at their end-of-life to undergo reuse, repair, remanufacture, refurbish or recycling, the existence of CSCs would be compromised as some products would not be reintroduced again into the chain.

Consumers can also ensure the well-functioning of CSCs through their purchasing decisions, namely by opting to buy reused or remanufactured products instead of new ones. However, consumers' decisions to purchase or to embrace circularity strategies are influenced by a myriad of intrinsic or extrinsic aspects (Ryan and Deci, 2000), which includes the information available, such as prices, product quality and variety, as well as personal appraisal of economic, social and psychographic aspects (Coderoni and Perito, 2020). Additionally, the translation of consumers' growing environmental awareness into consumption habits is a complex and unclear subject that has recently garnered academic attention as it can act as a major driver of market change (Niinimäki et al., 2020). These changes in demand have implications for the whole SC, but SC stakeholders, especially consumers, remain unaware of the full range of consequences resulting from their habits. While green and sustainable consumption behavior has been extensively discussed in the literature across a variety of industrial sectors and contexts (e.g., Diaz et al., 2021; Lieder and Rashid, 2016), the role of consumers in the adoption of circular R-strategies is a relatively recent and understudied topic. Therefore, it is imperative to further examine the role of consumers in the CE, especially through the adoption of the 10 R-strategies, and the underlying psychological attitudes toward circular behaviors (Patwa et al., 2021).

Through a systematic literature review (SLR), this paper aims to contribute to a better understanding on how consumers adopt circular R-strategies by addressing the following research questions: RQ1: *What is the role that consumers play in the adoption of circular R-strategies?* and RQ2: *What are the main drivers and barriers for consumers to adopt certain circular R-strategies?*

This paper is structured as follows: after this introduction, section 2 presents the methodology used for this systematic literature review. Next, in section 3 we present a descriptive analysis of the articles reviewed, and in section 4 we provide a qualitative in-depth analysis. Finally, we discuss directions for future research, and we present the main conclusions of the research.

2. Methodology

We have adopted a SLR method, following the five steps proposed by Denyer and Tranfield (2009): (1) definition of the research questions; (2) location of studies; (3) selection and evaluation of studies; (4) analysis

and synthesis; and (5) presentation of results. The adopted method aims to ensure that the review is transparent, auditable and replicable (Denyer and Tranfield, 2009).

First, two research questions, already stated in the introduction, were defined to guide the literature review process and to clarify the contributions of the paper. Then, to locate studies, we selected the Scopus database, as it is widely recognized in academia as being one of the largest databases (Baas et al., 2020), listing a greater number of indexed journals in comparison to other databases (Paul and Criado, 2020). Three categories of keywords were defined, covering words related to.

1. Circular economy: the term circular* was used to cover all possibilities;
2. Consumer: the terms "consumer*" OR "customer*" OR "user" OR "client" were used;
3. R-strategies: all ten R-strategies were included, using the terms "refuse" OR "rethink" OR "reduce" OR "reuse" OR "repair" OR "refurbish" OR "remanufacture" OR "repurpose" OR "recycle" OR "recovery".

The search sought to explore the intersection of the three groups of keywords (Category 1 AND Category 2 AND Category 3), using the "TITLE-ABS-KEY" field for searching. Some inclusion and exclusion criteria were applied. The search was limited to the following subject areas: Environmental science; Business, Management and Accounting; Engineering; Social sciences; Economics, Econometrics and Finance; and Decision sciences. Additionally, only articles and reviews written in English and published in journals were selected. There were no restrictions regarding the date of publication and the type of journal. This initial search, conducted in February 2023, yielded a total of 766 documents.

Regarding the selection and evaluation of studies, we started by saving all articles' information into an electronic spreadsheet, and their abstracts and keywords were read by all authors to assess their relevance for this review. All abstracts that did not relate to the scope of this study were removed. Using this criterion, 124 papers out of the initial pool of 766 were selected for a full-text reading. All those 124 articles were downloaded. Following the recommendation of previous studies (Paul and Criado, 2020; Zimmermann et al., 2016), and to enhance the reliability of the selection, those 124 manuscripts were independently evaluated by all four researchers. Any doubts and disagreements were discussed among all authors until consensus was reached (Paul and Criado, 2020). The articles were only included after unanimous agreement from all researchers. In order for papers to be selected, they needed to satisfy two criteria. First, the papers had to answer the research questions established. Secondly, the articles needed to address the context of SCs in the adoption of the r-strategies, tackling the participation of different SC actors. This final step left us with 74 papers. The description of this selection process is shown in Fig. 1.

Our final sample of 74 articles were analyzed and synthesized in two steps: (1) a descriptive analysis of the literature, aimed at understanding the intellectual structure of the studies relating the role of consumers and circular R-strategies; and (2) a qualitative in-depth analysis of the papers, aiming to address the two research questions.

The first step of the analysis focused on the categorization of studies according to the following aspects: year of publication, publication source (journals), authors, geographic location of the authors, research methodologies employed, theoretical perspective and industrial sectors. The second step, essentially qualitative, sought to identify and synthesize the main contributions of articles in addressing the research questions. Three main aspects were considered: (1) the role of consumers in the adoption of circular R-strategies; (2) the drivers for the adoption of circular R-strategies; and (3) the barriers hindering the adoption of circular R-strategies. Our analysis was focused on the consumer and the consequences of their participation in circular strategies to SCs.
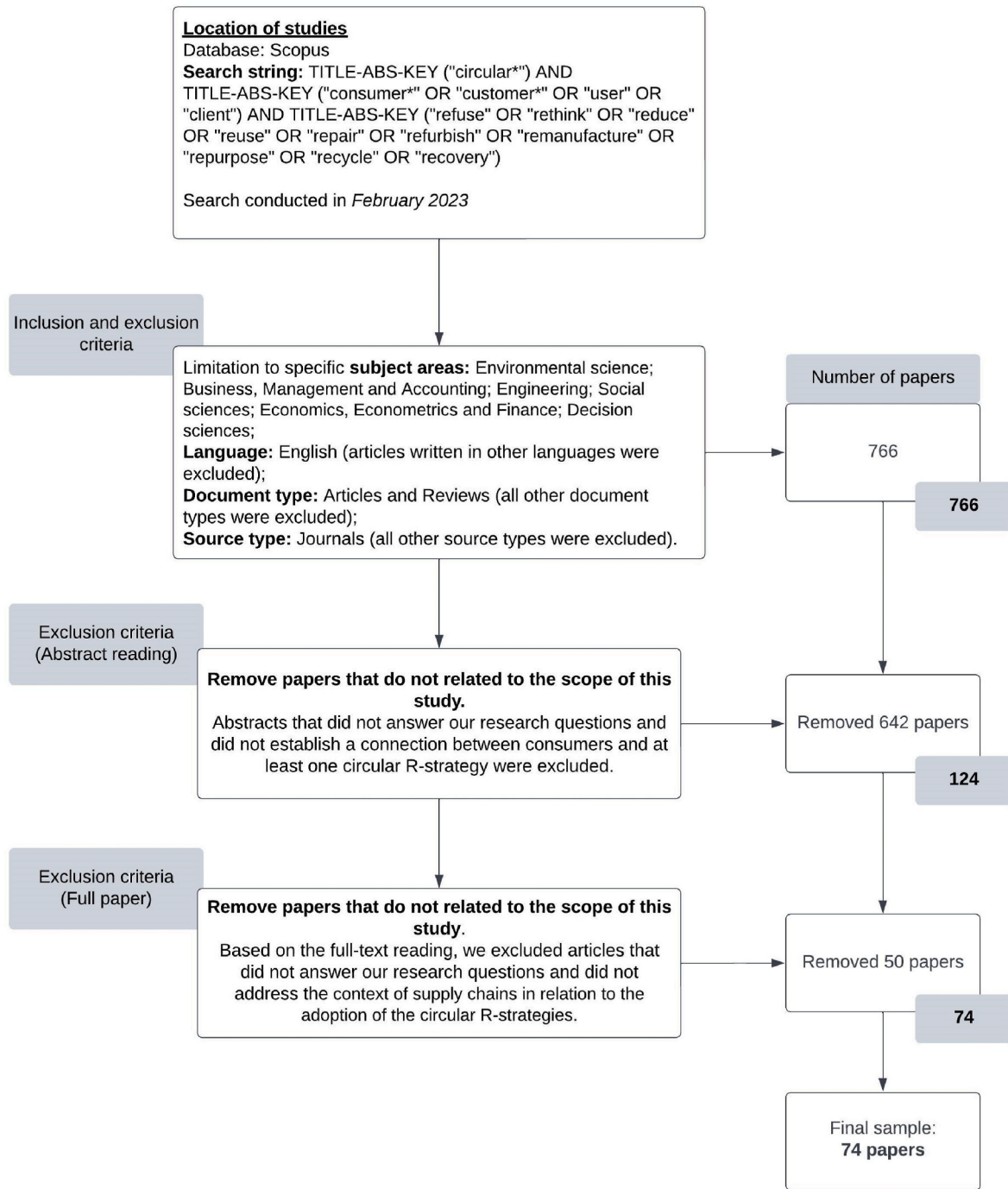
Fig. 1. Selection process adopted in this SLR.

Thus, an aggregative synthesis approach that incorporates quantitative and qualitative elements was employed (Denyer and Tranfield, 2009). An explanatory approach was also used to synthesize the studies, while trying to determine causal mechanisms in the data and explain how they work (Denyer and Tranfield, 2009). The presentation of the results is reported in section 3 and 4.

3. Characterization of the studies

In this section we provide a descriptive analysis of the articles included in the systematic literature review. This analysis aims to contextualize the topic focusing on the date of publication, publication sources, citations, methodologies used, theoretical perspectives and

industrial sectors.

3.1. Date of publication

The analysis of the role of consumers in the adoption of circular R-strategies is a recent one in the literature and has been gaining traction in the last years. Even though the first articles were published in 2016, we witness a significant and substantial increase in publications since 2021. We observe, as shown in Fig. 2, that 21 articles were published between 2016 and 2020 and 53 articles were published between 2021 and 2023. So, more than 70% of the articles were published in the last two years (2021–2023), which stresses this topic's novelty and its growing importance.
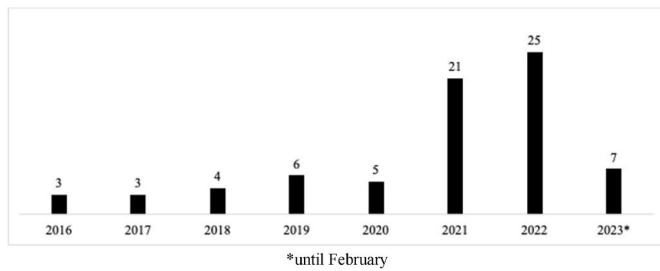
Fig. 2. Number of articles per year of publication.

3.2. Publication source

The 74 articles of our sample were published in 29 different journals, which indicates the relevance of this theme, as well as its multidisciplinary approach. Only 7 of these 29 journals have published more than one article, as shown in Fig. 3, namely Journal of Cleaner Production (22 articles), Sustainability (15), Sustainable Production and Consumption (4), Business Strategy and the Environment (3), Resources, Conservation and Recycling (3), Waste Management (3), and Waste Management and Research (2). Hence, we notice a clear focus on sustainability aspects, as well as topics related to resource management.

3.3. Most cited papers

Table 1 lists the 10 most influential papers in this review, including authors, year of publication, titles, sources, total global citations (TGC) and the average citations per year (ACY). TGC represents the number of times an article has been cited in the SCOPUS database (Fahimnia et al., 2015).

Regarding the articles' temporal distribution, we observe that most-cited papers were published between 2016 and 2021 and that 7 of them were published in the Journal of Cleaner Production. Interestingly, the most cited article (considering the TGC) was published in 2016, when the research on this topic begun, suggesting the importance of earlier articles in shaping this research stream. It also confirms that the interest in this topic has been evolving over time. However, if we take into consideration the ACY, the paper with most citations is the one by Patwa et al. (2021), which may indicate the importance of emerging economies in the circular consumption context.

In general, the focus has been on connecting CE and sustainable or circular consumption, while addressing specific industries and markets. We notice a particular emphasis on the consumer electronics' industry. Indeed, five of the ten most cited articles examine the circular consumer behavior in relation to smartphones. This set of articles also suggests that the literature has been focusing on understanding the consumer perception and acceptance of circular products, addressing the main barriers, drivers and incentives.
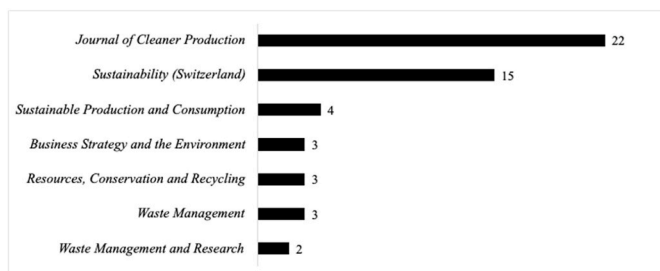

Fig. 3. Main sources of publication.

Table 1
Top 10 most cited papers in our review.

Authors	Titles	Source title	TGC	ACY
Van Weelden et al. (2016)	Paving the way towards circular consumption: Exploring consumer acceptance of refurbished mobile phones in the Dutch market	*Journal of Cleaner Production*	177	25
Patwa et al. (2021)	Towards a circular economy: An emerging economies context	*Journal of Business Research*	120	60
Coderoni and Perito (2020)	Sustainable consumption in the circular economy. An analysis of consumers' purchase intentions for waste-to-value food	*Journal of Cleaner Production*	97	32
Boesen et al. (2019)	Environmental sustainability of liquid food packaging: Is there a gap between Danish consumers' perception and learnings from life cycle assessment?	*Journal of Cleaner Production*	92	23
Mugge et al. (2017)	How to sell refurbished smartphones? An investigation of different customer groups and appropriate incentives	*Journal of Cleaner Production*	85	14
Wilson et al. (2017)	The hibernating mobile phone: Dead storage as a barrier to efficient electronic waste recovery	*Waste Management*	78	13
Wieser and Tröger (2016)	Exploring the inner loops of the circular economy: Replacement, repair, and reuse of mobile phones in Austria	*Journal of Cleaner Production*	71	10
Lakatos et al. (2018)	Studies and investigation about the attitude towards sustainable production, consumption and waste generation in line with circular economy in Romania	*Sustainability (Switzerland)*	61	12
Atlason et al. (2017)	Product design in the circular economy: Users' perception of end-of-life scenarios for electrical and electronic appliances	*Journal of Cleaner Production*	56	9
Otto et al. (2021)	Food packaging and sustainability – Consumer perception vs. correlated scientific facts: A review	*Journal of Cleaner Production*	52	26

TGC = Total Global Citation; ACY = Average citations per year.

3.4. Research methodologies

Regarding the nature of the analyzed studies, there was a predominance of quantitative empirical studies – 47 of the 74 articles, as shown in Table 2. Among these, 44 studies were based on quantitative research, while 3 applied conjoint analysis. Different types of analysis and characteristics of the samples were identified. Our review also included a total of 11 qualitative studies: one grounded theory, including visits to 1000 participant's houses that were interviewed face-to-face (Jaeger-Erben et al., 2021); and eight studies that collected data through interviews, focus groups and case studies. We also identified 10 literature reviews on related topics, including both systematic literature reviews and narrative reviews. Furthermore, six out of the 74 articles adopted a mixed methods research design.

3.5. Theoretical perspectives

Our review unveiled the lack of a dominant theory in the study regarding the role of consumers in the adoption of circular R-strategies.

Table 2

Research methodologies adopted in the reviewed articles.

Methodologies	References	No. Of times
Quantitative	Amend et al. (2022); Arredondo-Soto et al. (2022); Atlason et al. (2017); Bigerna et al. (2021); Botelho et al. (2016); Boyer et al. (2021); Bressanelli et al. (2022); Cao et al. (2022); Chun et al. (2022); Coderoni and Perito (2020); Coderoni and Perito (2021); Das and Dutta (2022); De Guimarães et al. (2023); de Wagenaar et al. (2022); Diddi and Yan (2019); Fachbach et al. (2022); Guo and Huang (2023); Herédia-Colaço (2023); Hou and Sarigöllü (2021); Islam et al. (2022); Ki et al. (2021); Koshta et al. (2022); Koszewska et al. (2020); Kurisu et al. (2020); Lakatos et al. (2018); McQueen et al. (2022); Mugge et al. (2017); Mukucha et al. (2023); Mykkänen and Repo (2021); Northen et al. (2023); Ofori and Opoku Mensah (2022); Ottelin et al. (2020); Patwa et al. (2021); Rafiq et al. (2022); Ratay and Mohnen (2022); Roche-Cerasi et al. (2021); Rogers et al. (2021); Sabbaghi and Behdad (2018); Sarigöllü et al. (2021); Shamsi et al. (2022); Wibowo et al. (2022); Wieser and Tröger (2016); Wilson et al. (2017); Wilts et al. (2021).	44
Conjoint analysis	Boyer et al., 2021; Hunka et al. (2021); Lieder et al. (2018).	3
Qualitative (e.g., case studies, in-depth interviews, focus groups)	Ackermann et al. (2018); Cole et al. (2019); Du Rietz (2022); Jaeger-Erben et al. (2021); Machado et al. (2019); Nazli (2021); Ta et al. (2022); Uriarte-Ruiz (2022); van den Berge et al. (2023); Van Weelden et al. (2016); Zeeuw van der Laan and Aurisicchio (2019).	11
Literature review (Systematic and Narrative)	Ali and Choe (2022); Arrigo (2021); Dermody et al. (2020); Islam et al. (2021); Otto et al. (2021); Rabiu and Jaeger-Erben (2022); Shevchenko et al. (2019); Shevchenko et al. (2023); Sonego et al. (2022); Sultana et al. (2023).	10
Mixed methods approach	Ali et al. (2021); Allison et al. (2022); Boesen et al. (2019); Charnley et al. (2022); Korsunova et al. (2021); Laitala et al. (2021).	6

From our sample of 74 articles, more than 20 theories were cited as shown in Table 3.

3.6. Industrial sectors

Our review demonstrates that the electronics sector (mentioned b 27 articles) is heavily analyzed in regards to circularity, with smartphones being the most frequently examined technology (mentioned by 16 articles). The second most addressed sector was the fashion industry (11 articles), that mainly discussed the acceptance of second-hand clothes and tools/platforms to promote and disseminate circularity behaviors amongst consumers. Finally, the "various" category includes different types of household appliances and goods, such as tools, sports equipment, and others. The five most cited sectors can be viewed in Table 4.

Table 3

Theoretical perspectives.

Theoretical perspective	No. Of articles	References
Theory of Planned Behavior	6	Bigerna et al. (2021); Chun et al. (2022); Guo and Huang (2023); Koshta et al. (2022); Ofori and Opoku Mensah (2022); Shevchenko et al. (2019)
Random Utility Theory (RUT)	2	Boyer et al. (2021); Hunka et al. (2021).
EKB (Engel-Kollat-Blackwell) model	2	Mugge et al. (2017); Van Weelden et al. (2016)
Fogg Behavior Model	2	Ackermann et al. (2018); Nazli (2021).
ABC (Antecedents-Behaviors-Consequences) model	2	Rafiq et al. (2022); Shevchenko et al. (2019)
Social Practice Theory (SPT) or Practice Theory	2	Rabiu and Jaeger-Erben (2022); Uriarte-Ruiz (2022).
Capability-Opportunity-Motivation-Behavior (COM-B)	2	Allison et al. (2022); de Wagenaar et al. (2022)
Kano model	1	Atlason et al. (2017)
KAB (Knowledge-Attitude-Behavior) model	1	Rafiq et al. (2022)
Psychological licensing theory	1	Boyer et al. (2021)
Moral Responsibility Theory of Corporate Sustainability (MRCS)	1	Ki et al. (2021)
Rational choice theory	1	Jaeger-Erben et al. (2021)
Economic transaction cost theories	1	Wilts et al. (2021)
Theory of Earmarking	1	Du Rietz (2022)
Consumer Theory of Microeconomics	1	Guo and Huang (2023)
Habit theory	1	Herédia-Colaço (2023)
Loss aversion	1	Das and Dutta (2022)
Social desirability bias	1	Coderoni and Perito (2020)
Item response theory	1	Boesen et al. (2019)
Value-Belief-Norm-theory	1	Fachbach et al. (2022)

Table 4

Main industrial sectors.

Sector	N papers	References
Electronics	28	Amend et al. (2022); Arredondo-Soto et al. (2022); Atlason et al. (2017); Bigerna et al. (2021); Botelho et al. (2016); Boyer et al. (2021); Boyer et al., 2021; Bressanelli et al. (2022); Chun et al. (2022); Cole et al. (2019); De Guimarães et al. (2023); Hunka et al. (2021); Islam et al. (2021); Jaeger-Erben et al. (2021); Koshta et al. (2022); Kurisu et al. (2020); Lieder et al. (2018); Mugge et al. (2017); Ratay and Mohnen (2022); Sabbaghi and Behdad (2018); Shevchenko et al. (2019); Sonego et al. (2022); Uriarte-Ruiz (2022); van den Berge et al. (2023); Van Weelden et al. (2016); Wibowo et al. (2022); Wieser and Tröger (2016); Wilson et al. (2017).
Various	17	Ackermann et al. (2018); Ali and Choe (2022); Cao et al. (2022); Fachbach et al. (2022); Hou and Sarigöllü (2021); Laitala et al. (2021); Lakatos et al. (2018); Mykkänen and Repo (2021); Nazli (2021); Ottelin et al. (2020); Patwa et al. (2021); Rabiu and Jaeger-Erben (2022); Rafiq et al. (2022); Rogers et al. (2021); Sarigöllü et al. (2021); Wilts et al. (2021); Zeeuw van der Laan and Aurisicchio (2019).
Fashion	11	Arrigo (2021); Charnley et al. (2022); de Wagenaar et al. (2022); Diddi and Yan (2019); Ki et al. (2021); Koszewska et al. (2020); Machado et al. (2019); McQueen et al. (2022); Shamsi et al. (2022); Sultana et al. (2023); Ta et al. (2022).
Packaging	7	Boesen et al. (2019); Du Rietz (2022); Herédia-Colaço (2023); Mukucha et al. (2023); Northen et al. (2023); Otto et al. (2021); Roche-Cerasi et al. (2021).
Food	4	Ali et al. (2021); Allison et al. (2022); Coderoni and Perito (2020); Coderoni and Perito (2021).

4. Qualitative in-depth literature analysis

4.1. The role of consumers in the adoption of circular R-strategies

The analysis shows that the most referred R-strategy is reuse, mentioned in 33 out of the 74 papers (45%); followed by recycle and repair, studied in 26 (35%) and 24 papers (32%) respectively. Remanufacture is mentioned in 13 studies (18%), followed by refurbish, addressed in 11 studies (15%). Finally, the less referred strategies are refuse, rethink and reduce, mentioned in four (6%), five (7%) and eight (11%) papers respectively. Repurpose is, undoubtedly, the less mentioned strategy, being analyzed in only two papers. The majority of the articles reviewed address more than one R-strategy in their analysis, suggesting the adoption of comprehensive perspectives on circular supply chains.

Although recycling is the most widespread R-strategy, both in the literature and in practice (Morseletto, 2020; Potting et al., 2017), the results suggest that the role of consumers is more prevalent when it comes to the adoption of the reuse strategy. Reuse is addressed in different sectors and contexts and refers to the use of a previously disposed product by a different consumer, maintaining the original function of the product. It is usually related to second-hand markets (e.g., e-commerce platforms or thrift stores), and with take-back programs promoted by retailers. Reuse in the electronics sector is explored in several papers, especially in the smartphones market (e.g. Hunka et al., 2021; Ratay and Mohnen, 2022; Wieser and Tröger, 2016), where consumers can determine both the availability of products to resale and the demand for second-hand products. As a strategy mostly based on products that are still in good condition, different consumption profiles determine the existence of this market, where: one consumer consider that the product is outdated (or do not meet its needs) and other consumer consider that the characteristics of the product, although not new, still satisfy its needs.

In the packaging industry (e.g. Northen et al., 2023; Otto et al., 2021), reuse is explored mainly in the comparison between single-use and multiple-use packaging, exploring different materials (such as plastics, glass, and paper) and their related environmental impact. Some studies show that consumers' perceptions regarding the impact of packaging materials do not match the reality demonstrated by science (Boesen et al., 2019). Reuse is also analyzed in the fashion sector, whose growth trend works as a counterpoint to the fast fashion industry (de Wagenaar et al., 2022; Machado et al., 2019); and in the food and agri-food sector, related to the concept of waste to value food (Coderoni and Perito, 2020, 2021).

As the most disseminated R-strategy, recycle is addressed in a variety of sectors, demonstrating the importance of the correct disposal of products or parts by the consumers at the end of the product life cycle (Botelho et al., 2016; Kurisu et al., 2020; Zeeuw van der Laan and Aurisicchio, 2019). On the other hand, the recycled and recyclable labels of products can have an impact on the purchasing decision. In this sense, education, the existence of comprehensive public policies, and the availability of information can be paramount to influence consumers to recycle (Atlason et al., 2017; Boesen et al., 2019).

Repair is predominantly analyzed in the electronics (e.g., Boyer et al., 2021; Cole et al., 2019; Uriarte-Ruiz, 2022) and in the textile sectors (e.g., Diddi and Yan, 2019; McQueen et al., 2022). As it allows a product to be used again with its original purpose, repair can be performed by the consumer (or by a service provider to the consumer) to its own use, or by a retailer of repaired products. In both cases, it requires a predisposition of consumers towards repairability. Diddi and Yan (2019) highlight the increase of visual mending in the textile industry, which is a way of repairing a product differentiating it from the original and giving new value to the resulting unique product.

Remanufacture refers to the creation of new products, using discarded products (or its parts), while keeping the original function of the disposed product. In the reviewed papers, it is mainly linked to the electronic sector. With regard to disposal, consumers generally do not target end-of-life products specifically for manufacturing (Atlason et al., 2017; Wilson et al., 2017) and, in this sense, the decision to apply or not this strategy lies with companies (mainly manufacturing companies). On the other hand, because it is a relatively unfamiliar and understood strategy, consumers do not have a clear attitude towards the consumption of remanufactured products. It is important to mention that a product originating from a remanufacturing process, in principle, is sold as new and, as such, has the same guarantees as new products. Thus, the consumption of these products is directly linked to the way they are advertised (Islam et al., 2021).

When an old product is updated or modernized and returns to the market with the same or similar functions, a refurbish strategy is applied. Most of the analyzed papers address the growing of the market of refurbished mobile phones and computers (e.g. Mugge et al., 2017; Van Weelden et al., 2016; Wieser and Tröger, 2016). Van Weelden et al. (2016) highlight that consumers' responses towards refurbished products are still complex and diverse, depending on several aspects.

Considering the most valuable R-strategies, refuse, rethink and reduce are mentioned by four, five and eight articles, respectively. Consumers play a fundamental role in refusing to purchase certain types of products or materials recognized as not being environmentally friendly, or even from companies that do not respect the principles of social conscience. Sultana et al. (2023) examine the textile (leather) sector and argue that consumers' pressure on manufacturers to find alternative green chemicals has great potential to create more sustainable SC models. Northen et al. (2023) studied the consumer behavior on refusing plastics products, such as shopping bags, straws and take-away cups, and concluded that this behavior has s great impact on companies' strategies. Consumers and companies' attitudes towards refusing this type of products have been heavily impacted by public policies in the last years, especially in Europe (European Commission, 2019).

Consumers circular demands also influence companies to develop new ideas and solutions to intensify products' use, including the creation of new business models that allow the sharing of products between consumers (Lieder et al., 2018) and to reduce waste (Coderoni and Perito, 2021). Similarly, consumer behavior can lead companies to establish new ways to reduce the use of natural resources and materials in the production process (e.g. Lakatos et al., 2018; Mukucha et al., 2023; Patwa et al., 2021).

Recover, or the incineration of non-recyclable material to produce energy, is considered to be the last option in the spectrum of CSC strategies and was mentioned in seven articles on sectors such as agri-food and packaging. In this strategy, the role of consumers is relevant exclusively in the disposal of products when they reach their end of life. Finally, repurpose was analyzed in only two articles as one of the possible options that consumers have to increase the useful life of a product (Ali and Choe, 2022; Shevchenko et al., 2023). Table 5 presents the frequency that each strategy was mentioned by the papers by years and the related industrial sectors.

4.2. Drivers for the adoption of circular R-strategies

The purchasing decision is driven both by the consumer perceived value and by the consumer motivation (Holbrook, 2006). Consumer perception of value implicates a trade-off between perceived benefits and perceived sacrifice, that can result in a positive relationship between perceived benefits and perceived value; or in a negative relationship between perceived sacrifice and perceived value (Teas and Agarwal, 2000). Thus, the perception of value of a product, service or activity to a consumer is dependent on his object-subject interaction within a particular situation (Holbrook, 2006). Motivation, on the other hand, goes beyond this interaction and arise in part from the satisfying experiences achieved through such interactions (Roberts et al., 2014). Motivation includes the impetus or energy that drives someone to do something - in this case, to consume a product or service (Ryan and Deci,

Table 5
Frequency of each R strategy in the literature.

Strategies	N papers	Industrial sector/products	2016	2017	2018	2019	2020	2021	2022	2023
Refuse	4	Plastics, textile, multiple	–	–	–	–	–	–	1	3
Rethink	5	Agri-food, household materials, washing machines, multiple	–	–	1	–	1	1	1	1
Reduce	8	Plastics, packaging, multiple	–	–	1	–	–	2	2	3
Reuse	33	Electronics (smartphones robot vacuum cleaners), agri-food, packaging, plastics, textile, multiple	1	2	1	4	2	11	9	3
Repair	24	Electronics (smartphones, robot vacuum cleaners, computers), textile, washing machines, household materials	1	–	2	2	3	8	6	2
Refurbish	11	Electronics (smartphones, computers, vacuum cleaners), textile, multiple	2	1	–	–	2	1	4	1
Remanufacture	13	Electronics (smartphones, computers), washing machines, textile, multiple	1	2	1	–	–	4	3	2
Repurpose	2	Multiple	–	–	–	–	–	–	1	1
Recycle	26	Packaging (plastics, paper, metal, glass), plastics, electronics (smartphones, computers), textile, multiple	1	1	2	4	2	5	7	4
Recover	7	Agri-food, packaging, electronics	–	–	–	2	1	1	2	1

2000).

Motivation can reflect different perceptions of value, such as economic, social, hedonic and altruistic, and can be defined as intrinsic or extrinsic (Ryan and Deci, 2000). Intrinsic motivation is generally defined as performing an activity for its inherent satisfaction, rather than for eventual consequences. When intrinsically motivated, a person is driven to act by aspects such as challenge, enjoyment, or other feelings of self-satisfaction, rather than external product characteristics, pressures, or rewards (Ryan and Deci, 2000; Shang et al., 2009). On the other hand, extrinsic motivation is driven by external awards and is typically characterized as a pale and impoverished form of motivation (Ryan and Deci, 2000).

The analysis of the articles revealed different types of motivations related to the consumers' adoption of circular practices. Although several extrinsic types of motivation have been identified (oftentimes derived from financial benefits), many authors suggest that consumers who adopt circular practices (or consume circular products) are often motivated by strong beliefs resulting from cultural, educational and even generational and gender-related aspects.

4.2.1. Intrinsic motivation

Several authors highlight the existence of behavioral factors associated with the motivation to adopt environmentally friendly practices and environmental beliefs and awareness (e.g. Koshta et al., 2022; Mugge et al., 2017; Sarigöllü et al., 2021). To these authors, consumers are intrinsically motivated to purchase circular products. On the other hand, some authors point out that environmental benefits are unknown to most consumers, as circular products (e.g. reused, repaired, refurbished, remanufactured) are commonly associated to cost savings. Boyer et al. (2021) argue that people may be willing to pay more for some level of circularity, as it makes them feel better about their actions, but this predisposition depends on several aspects, including their basic knowledge about environmental benefits. Some authors go beyond environmental aspects and argue that consumers can be driven by moral norms in the adoption of circular practices (Islam et al., 2021; Ki et al., 2021; Van Weelden et al., 2016). Ackermann et al. (2018), Diddi and Yan (2019) and Ta et al. (2022) suggest that these types of intrinsic motivation can be "awakened" by the satisfying felling of social acceptance and by the need to be part of a community, increasing the sense of belonging.

Demographic factors, including gender, age and education, are also acknowledged as significant motivators influencing consumers' circular behavior. Lakatos et al. (2018) specifically focuses on generational factors that play a critical role in driving consumers towards the adoption of circular practices, concluding that Generation Y exhibits a greater inclination toward reducing resource consumption, recycling and reuse compared to Generations X and Z. Despite the recognition of the benefits associated with these behaviors, actual adoption of circular economy practices remains limited (Lakatos et al., 2018). This highlights the

importance of bolstering consumer education to cultivate a stronger circular economy mindset and greater accountability and responsibility among consumers, both in terms of product usage and disposal (Lakatos et al., 2018). Northen et al. (2023) also examines the impact of individual demographic characteristics on the adoption of circular practices, suggesting that age has the greatest impact on consumer behavior, influencing single-use plastic consumption, use, reuse and recycling behaviors. In regard to gender, women are more receptive than men towards the adoption of R-strategies and are willing to pay more for environmentally friendly products (e.g. Atlason et al., 2017; de Wagenaar et al., 2022; Mukucha et al., 2023).

Considering that knowledge affects the perception of the consumers and their attitude towards environmental and social causes, education has a direct effect on circular consumer behavior (e.g. Allison et al., 2022; Guo and Huang, 2023; Hou and Sarigöllü, 2021). Education can play a key role in fostering the adoption of circular economy practices, particularly in developed countries (Patwa et al., 2021). However, its impact also extends to emerging economies, where education can act as a catalyst for transitioning towards circularity, by influencing consumers' adoption of circular practices. For instance, Boesen et al. (2019) suggest that well-educated young urban consumers (in this case living in Denmark) are willing to adopt circular practices. This study shows that consumers base the perception of the environmental sustainability (in this case of liquid food packaging) both on the material type and on what they can do at the end-of-life/disposal stage. Otto et al. (2021) also indicate that consumers evaluate the packaging sustainability based on its supposed recyclability, reusability, biodegradability and natural looking packaging material and design. However, the consumer perception differs from the scientific conclusion of environmentally friendly sustainable packaging (Otto et al., 2021). Finally, nostalgic feelings, emotional attachment and symbolic values are perceived as intrinsic motivations for reuse and second-hand shopping (Ali and Choe, 2022; Machado et al., 2019; Nazli, 2021).

4.2.2. Extrinsic motivation

Financial benefits are important drivers of product consumption from circular sources (e.g., Botelho et al., 2016; Rogers et al., 2021; Sabbaghi and Behdad, 2018). The lower prices of repaired, refurbished, reused or remanufactured products compared to new ones may trigger the purchasing behavior, even for consumers that are not intrinsically motivated to buy.

Environmental benefits can also be understood as extrinsic motivation when the benefits can be clearly measured and communicated. Some studies suggest that consumers that do not have the predisposition to consider environmental aspects in their purchasing decision can be extrinsically motivated if the benefits are communicated on a persuasive manner (e.g., Mugge et al., 2017; Sabbaghi and Behdad, 2018; Ottelin et al., 2020). According to Patwa et al. (2021), effective communication (including advertisement and promotion) on the environmental benefits

of a product can influence consumers into buying products from a certain brand or to adhere to a social or environmental cause. For Mugge et al. (2017), the environmental benefits are unknown to most consumers, as many R-strategies are commonly marketed primarily from a cost savings perspective.

Coderoni and Perito (2020) highlight the importance of marketing policies to engage consumers in sustainable practices, especially when trying to deliver products to a mainstream public. Consumers are more likely to accept circular products when they have information on their environmental benefits. The influence of the social environment, including family and friends, and the desire to be part of a community can also be vital to consumers' engagement, and act as a social pressure towards the adoption of R-strategies (Ackermann et al., 2018; Arrigo, 2021; Islam et al., 2021).

The perceived value of a product can be another driver to the adoption of some R-strategies. Diddi and Yan (2019) concluded that the decision to repair (mend) clothes is closely related to the perceived value of the product, that reflects aspects such as the high price paid for the product when it was new, personal attachment to the garment, and a well-fitting design. In general, the better the (perceived) product quality, the higher its life cycle, which encourages circularity, namely repair, as the product tends to last longer (Cole et al., 2019; Laitala et al., 2021).

Van Weelden et al. (2016) identified the absence of undesirable innovative features and unique product features as drivers to buying refurbished products. The unique product features or its design is also highlighted by Ackermann et al. (2018) and Ali and Choe (2022). Lieder et al. (2018) suggest that there is an interest in service-oriented offers that include paying for access rather than for ownership, associated to the quality and the prices to be paid for the service. Table 6 shows the main drivers to the adoption of circular practices identified in the literature.

4.3. Barriers hindering the adoption of circular R-strategies

In the same way that the adoption of circular practices is motivated by a variety of factors, several studies identified barriers that can hinder consumers' adoption of circular R-strategies. For instance, many authors highlight the lack of environmental beliefs as one of the main challenges to a broader adoption of circular behaviors (e.g., Ali and Choe, 2022; Ta et al., 2022; Wilts et al., 2021). Similarly, other barriers hindering the adoption of R-strategies include the lack of information on circularity benefits (e.g. Arredondo-Soto et al., 2022; Boesen et al., 2019; Coderoni and Perito, 2020), along with the lack of environmental literacy (e.g., Allison et al., 2022; Boesen et al., 2019; Lakatos et al., 2018), which encompasses consumers' knowledge and awareness of environmental issues, and their capacity to make informed decisions, actively contributing to avoiding environmental degradation (Maurer and Bogner, 2020; Roth, 1992).

The lack of clear financial benefits also works as a barrier to circular behaviors (e.g., Arredondo-Soto et al., 2022; Uriarte-Ruiz, 2022; van den Berge et al., 2023). Guo and Huang (2023), for instance, highlight the high costs for battery replacement as a challenge that has to be faced to reduce its environmental impact.

Skepticism or distrust towards the performance and durability of repaired, reused, or refurbished products among consumers can weaken the demand for these products (e.g., Boyer et al., 2021a,b; Cole et al., 2019; Wieser and Tröger, 2016). Hibernation, i.e., the tendency of people to keep old products at home, even when they are not being used anymore, is another major challenge for the circularity of electronic products, especially smartphones and computers (e.g., Kurisu et al., 2020; Sabbaghi and Behdad, 2018; Wibowo et al., 2022). This phenomenon can occur due to the lack of knowledge about correct disposal, the desire to have a spare product or even the ease of storing small products at home (Wibowo et al., 2022). The growing of hibernation is also related to the premature replace of smartphones that are in still in working conditions (Uriarte-Ruiz, 2022).

Table 6
Drivers and motivations to the adoption of circular practices.

Type of driver/ motivations	Driver/Motivation	References
Intrinsic	Environmental beliefs/ awareness	Ali and Choe (2022); Boyer et al., 2021; Coderoni and Perito (2021); De Guimarães et al. (2023); de Wagenaar et al. (2022); Diddi and Yan (2019); Guo and Huang (2023); Herédia-Colaço (2023); Islam et al. (2021); Koshta et al. (2022); Machado et al. (2019); Mugge et al., 2017; Nazli (2021); Rabiu and Jaeger-Erben (2022); Rafiq et al. (2022); Sarigöllü et al. (2021); Shamsi et al. (2022); Ta et al. (2022); Van Weelden et al. (2016); Wilts et al. (2021)
	Moral norms	Islam et al. (2021); Ki et al. (2021); Van Weelden et al. (2016)
	Education	Allison et al. (2022); Boesen et al. (2019); Coderoni and Perito (2021); Guo and Huang (2023); Hou and Sarigöllü (2021); McQueen et al. (2022); Otto et al. (2021); Patwa et al. (2021); Rafiq et al. (2022)
	Generation (age)	Ali et al. (2021); Boesen et al. (2019); Coderoni and Perito (2021); Lakatos et al. (2018); Northen et al. (2023).
	Gender	Allison et al. (2022); Atlason et al. (2017); de Wagenaar et al. (2022); McQueen et al. (2022); Mukucha et al. (2023); Rabiu and Jaeger-Erben (2022)
	Nostalgic feelings, emotional attachment and symbolic value	Ali and Choe (2022); Machado et al. (2019); Nazli (2021)
	Social acceptance/be part of a community (sense of belonging)	Ackermann et al. (2018); Diddi and Yan (2019); Ta et al. (2022)
Extrinsic	Financial benefits	Ackermann et al. (2018); Arredondo-Soto et al. (2022); Arrigo (2021); Botelho et al. (2016); Charnley et al. (2022); Chun et al. (2022); Du Rietz (2022); Hunka et al. (2021); Lieder et al. (2018); Mugge et al. (2017); Mukucha et al. (2023); Nazli (2021); Ratay and Mohnen (2022); Rogers et al. (2021); Sabbaghi and Behdad (2018); Shamsi et al. (2022); Ta et al. (2022); Uriarte-Ruiz (2022); van den Berge et al. (2023); Van Weelden et al. (2016); Wilts et al. (2021)
	Insurance/warranties	Arredondo-Soto et al. (2022); Boyer et al. (2021); Ratay and Mohnen (2022); van den Berge et al. (2023)
	Environmental benefits (when measurable)	Hunka et al. (2021); Mugge et al. (2017); Ottelin et al. (2020); Sabbaghi and Behdad (2018); Sultana et al. (2023); Van Weelden et al. (2016)
	Social pressure	Ackermann et al. (2018); Arrigo (2021); Dermody et al. (2020); Islam et al. (2021)
	Absence of undesirable innovative features	Van Weelden et al. (2016)
	Unique product feature/ design	Ackermann et al. (2018); Ali and Choe (2022); Van Weelden et al. (2016)
	High performance (refurbish)	Van Weelden et al. (2016)

Table 6 (*continued*)

Type of driver/ motivations	Driver/Motivation	References
	Persuasive/effective communication	Arredondo-Soto et al. (2022); Boesen et al. (2019); Coderoni and Perito (2020); de Wagenaar et al. (2022); Patwa et al. (2021); Sultana et al. (2023); Uriarte-Ruiz (2022)
	Availability of disposal methods	Atlason et al. (2017); Du Rietz (2022); Kurisu et al. (2020); Northen et al. (2023); Shevchenko et al. (2019)
	Service level (reuse and shared products)	Amend et al. (2022); Lieder et al. (2018)
	Perceived value of a product (motivates to keep it longer)	Cole et al. (2019); Diddi and Yan (2019); Laitala et al. (2021)
	Competence and skills (to repair, refurbish, repurpose)	McQueen et al. (2022); Nazli (2021); Rabiu and Jaeger-Erben (2022)
	Effective legislation	Guo and Huang (2023); Northen et al. (2023)

The feeling of exclusion for not having a "new" model is as an aspect hindering the purchase of second-hand products (e.g., reused, repaired, refurbished) (Uriarte-Ruiz, 2022). This aspect can be understood as the opposite of the driver of having a product with unique and even "classical" features, as addressed by some authors and mentioned in the previous section. Finally, food neophobia and food technology neophobia may hinder the uptake of new foods that could potentially reduce waste by means of the adoption of different R-strategies (Coderoni and Perito, 2021). Table 7 present the barriers identified in the papers.

5. Discussion and future research

The adoption of a CE approach, extending the life cycle and circularity of materials and products, presents a major challenge for industrial companies striving for sustainability. The application of recycling strategies, either through the use of recycled materials, or developing a product that is easy to be recycled, is widely used by the industry (Johansen et al., 2022; Kirchherr et al., 2017). However, when we consider initiatives for circular consumer practices (Rabiu and Jaeger-Erben, 2022), activities go beyond product requirements, design or manufacturing process, addressing changes in consumer behavior. As such, in order to effectively extend the life cycle of their products, companies need to understand consumers' willingness to engage in circular practices.

While considerable attention has been given in the literature to understanding circular consumer practices such as reuse, recycling and repair, our SLR reveals a gap in the analysis of the importance of consumer behavior regarding other critical R-strategies, namely refuse, rethink and reduce (strategies closely linked to consumer attitudes and conscious consumption), as well as refurbish and remanufacture (strategies involving returning a product after its end-of-life to be used again with its original functions). Nevertheless, it is important to mention that consumer behavior related to the aforementioned strategies is starting to be addressed, to some extent, in the literature, although not always explicitly. The rethink strategy, for example, is strongly linked to collaborative consumption and sharing economy, themes of growing interest in literature and practice (Grieco and Palagonia, 2024). These approaches reflect a new paradigm, where consumers/users give up ownership of the good without ceasing to have their needs satisfied. Issues linked to mobility (e.g. carsharing) are among the most explored in this segment (Wali, 2023). Likewise, literature related to anti-consumption has grown as a way of materializing consumer behavior linked to strategies such as rethink, refuse, and reduce. Environmental concerns motivate consumers' intention to drastically reduce

Table 7

Barriers and challenges to the adoption of circular practices.

Barrier/challenge	References
Lack of environmental beliefs/ awareness	Ali and Choe (2022); Arrigo (2021); Boyer et al., 2021; Cao et al. (2022); Coderoni and Perito (2021); De Guimarães et al. (2023); de Wagenaar et al. (2022); Diddi and Yan (2019); Guo and Huang (2023); Herédia-Colaço (2023); Islam et al. (2021); Koshta et al. (2022); Machado et al. (2019); Mugge et al. (2017); Nazli (2021); Rabiu and Jaeger-Erben (2022); Rafiq et al. (2022); Sarigöllü et al. (2021); Shamsi et al. (2022); Ta et al. (2022); Van Weelden et al. (2016); Wilts et al. (2021)
Lack of clear financial benefits	Ackermann et al. (2018); Allison et al. (2022); Amend et al. (2022); Arredondo-Soto et al. (2022); Arrigo (2021); Botelho et al. (2016); Boyer et al. (2021); Charnley et al. (2022); Chun et al. (2022); De Guimarães et al. (2023); Du Rietz (2022); Guo and Huang (2023); Hunka et al. (2021); Lieder et al. (2018); Mugge et al. (2017); Mukucha et al. (2023); Nazli (2021); Ratay and Mohnen (2022); Ratay and Mohnen (2022); Rogers et al. (2021); Sabbaghi and Behdad (2018); Shamsi et al. (2022); Ta et al. (2022); Uriarte-Ruiz (2022); van den Berge et al. (2023); van den Berge et al. (2023); Van Weelden et al. (2016); Wilts et al. (2021)
Lack of environmental literacy	Allison et al. (2022); Boesen et al. (2019); Cao et al. (2022); Coderoni and Perito (2021); Guo and Huang (2023); Hou and Sarigöllü (2021); Islam et al. (2021); Lakatos et al. (2018); McQueen et al. (2022); Otto et al. (2021); Patwa et al. (2021); Rafiq et al. (2022)
Skepticism or distrust regarding "not new" products (performance and durability)	Boyer et al. (2021); Charnley et al. (2022); Chun et al. (2022); Coderoni and Perito (2020), 2021; Cole et al. (2019); De Guimarães et al. (2023); Hunka et al. (2021); Mugge et al. (2017); Van Weelden et al. (2016); Wieser and Tröger (2016)
Lack of governmental incentives/ public policies	Guo and Huang (2023); Shevchenko et al. (2019)
Feeling of exclusion	Boyer et al., 2021; Charnley et al. (2022); Chun et al. (2022); Uriarte-Ruiz (2022)
Lack of information on the benefits of circular products	Arredondo-Soto et al. (2022); Boesen et al. (2019); Coderoni and Perito (2020); de Wagenaar et al. (2022); Patwa et al. (2021); Sabbaghi and Behdad (2018); Sultana et al. (2023); Uriarte-Ruiz (2022); van den Berge et al. (2023)
Unavailability or lack of information on the appropriate disposal methods	Atlason et al. (2017); Botelho et al. (2016); Cao et al. (2022); Du Rietz (2022); Du Rietz (2022); Guo and Huang (2023); Kurisu et al. (2020); Northen et al. (2023); Sabbaghi and Behdad (2018); Shevchenko et al. (2019); Uriarte-Ruiz (2022)
Low service level or long time to the service (e.g. repair)	Amend et al. (2022); Charnley et al. (2022); Ratay and Mohnen (2022)
Lack of competence and skills (to repair, refurbish, repurpose)	McQueen et al. (2022); Nazli (2021); Rabiu and Jaeger-Erben (2022); van den Berge et al. (2023)
Risk of obsolescence due to the rapid technological advance	Cole et al. (2019); Hunka et al. (2021); Uriarte-Ruiz (2022); Van Weelden et al. (2016)
Hibernation	Kurisu et al. (2020); Sabbaghi and Behdad (2018); Wibowo et al. (2022); Wilson et al. (2017)
Food neophobia and food technology neophobia	Coderoni and Perito (2020), 2021

consumption, driven by moral foundations, anticipated guilt and personal responsibility (Culiberg et al., 2023). Besides, anti-consumption behavior is often linked to culture, morality and, in some cases, religiosity (Maseeh et al., 2022). However, the different designations attributed to R-strategies and their related practices may lead to fragmentation within the literature, suggesting a need for further exploration.

Our review unveiled the critical role of environmental beliefs, literacy or awareness (or lack of) and the existence of clear financial benefits (or lack of) as important aspects that determine consumer behavior, acting as drivers and/or barriers of consumers' adoption of circularity strategies. Although education and demographic features, including age and gender, have been identified as determinants for environmental awareness, the role of public policies and marketing can also contribute to enhance it. The articles reviewed mentioned public policies only in relation to the availability of disposal methods for end-of-life product, and legislation on packaging and single-use plastic products (Guo and Huang, 2023; Northen et al., 2023). We believe that the role of public policies, legislation and even standards go far beyond the current issues addressed in the literature and that policymakers must understand their decisive position towards a more sustainable society. Future research could focus on the role of public policy and legislation not only in creating the conditions for the adoption of circular strategies, but also on how they can actively engage people in the CE.

Similarly, the literature on the role of marketing actions influencing environmental behavior is often limited to the existence of persuasive or effective communication on the benefits of R-based products (e.g., Arredondo-Soto et al., 2022; Boesen et al., 2019; Coderoni and Perito, 2020; Roche-Cerasi et al., 2021; Uriarte-Ruiz, 2022). To shape consumer behavior effectively, marketing strategies should prioritize educating consumers (building circular literacy) among end-users (e.g. Makijenko et al., 2016). Future research could explore how communication campaigns can be used to raise environmental awareness and promote circular practices among consumers.

Regarding the main theories behind studies in this field, our analysis showed that only 42% of the articles (31 out of 74 papers) had a theoretical concept that guided its analysis. Considering that the topic under study is recent, future research could address conceptual and theoretical developments to deepen the understanding of the role of consumers in adopting circular practices. There are many theories that could be used to explain the role, drivers and barriers of consumer behavior in circular economy. Without being exhaustive, we decided to explore the theories that were presented in only one or two articles of the SLR, and are in line with our research questions: Psychological Licensing Theory; Rational Choice Theory; Social Practice Theory (SPT); Random Utility Theory (RUT), which are in line with RQ1; and Moral Responsibility Theory of Corporate Sustainability (MRCS) that is in line with RQ2.

The psychological licensing theory helps to explain why consumers engaging in a positive environmental behavior can indulge in a negative behavior afterward (Nisan, 1991), which is what occurs when customers are willing to pay more for products with low levels of recirculated content over brand-new products (Boyer et al., 2021). As such, topics such as how consumers: (1) counterbalance previous non-sustainable purchasing behaviors with the acquisition of R-based products; (2) diminish some guilt experience for buying products that contribute to resource depletion and waste generation; (3) pre-emptively defend themselves against potential criticism from others by choosing R-based products.

The rational choice theory assumes that individuals make decisions based on logical cost-benefit analysis, i. e, they weigh the potential benefits and drawbacks and choose the option that offers the most utility (satisfaction, benefit, or environmentally friendly behavior) to them (Cooper, 2010). As such, future studies could explore concepts such as green circular behavior and develop strategies that appeal to consumer's rational needs and desires.

The social practice theory aims to understand how social statures and individual agency interact to shape daily activities. SPT explores consumption in general (Mylan, 2015; Warde, 2005) and sharing and CE in particular (Corsini et al., 2019) as (a) it views social life as a collection of interconnected practices that involve shared understandings, materials, and competences and (b) individuals adapt practices based on their own experiences and goals. As such, it is important to understand how consumer practices can underpin marketers to develop campaigns that resonate with consumers' behaviors and habits that escape their control (Uriarte-Ruiz, 2022).

The random utility theory suggests that even when individuals have clear preferences, there is still an element of chance involved in their final choice, which emphasizes that consumers would choose the most preferred option in repeated choices (maximization of utility) and any variation in this behavior is due to random factors (Boyer et al., 2021). As such, it would be important to model consumer behavior regarding circularity and what factors diminish incomplete information or random influences.

The moral responsibility theory of corporate sustainability claims that businesses have a moral obligation to consider the social and environmental impacts of their practices beyond just profit maximization (Fischer and Ravizza, 1998; Ha-Brookshire, 2017). As such, to address the drivers and barriers on the adoption of circular strategies, further studies could: (1) emphasize the importance of ethical responsibility in contributing to the well-being of society and the environment; (2) investigate how consumer behavior change influences the adoption of R-based strategies within the SC and their consequences in deploying supplier selection procedures, supplier collaboration, traceability and ecocentricity; and (3) create a framework that prioritizes sustainable and ethical-related considerations to encourage the widespread adoption of R-based products throughout the SC and to respond more properly to sustainable consumers.

Regarding the research methods used, our review unveiled that more than half of the articles on this topic predominately adopted quantitative methodologies, collecting data through surveys. This brings some limitations, since surveys measure intentions or beliefs, and not real actions. Hence, future studies should explore more qualitative research methods, in order to gain a deeper understanding regarding consumers' adoption of R-strategies and the underlying motivations behind those behaviors. Additionally, the adoption of mixed-methods approaches could provide a more comprehensive view of this phenomenon, helping to bridge the *attitude-behavior gap*.

By conducting this review, we have noticed a literature gap related to SC management-related issues. Indeed, consumer behavior and the adoption of R-strategies in the SC are intertwined. The successful application of different R-strategies implies interrelationships among upstream and downstream actors in the SC, as well as the establishment of supportive structures by SC actors. Therefore, future studies could analyze the impact of practices put in place by some SC actors (suppliers, manufacturers, distributors, retailers) and their influence on circular practices among consumers and other SC players. Consumers can only return a product to a manufacturer or retailer if take-back programs or other circular initiatives (e.g., in-store repairs) have been set up and properly disseminated by those actors (Vadakkepatt et al., 2021). Even though the implementation of R-strategies is dependent on consumers' actions (e.g. disposal of end-of-life and consumption of circular products), it can only be made possible if the appropriate structures have been put in place to enable remanufacturing, refurbishing, repair and other R-strategies (Cole et al., 2019; Dominguez et al., 2021). So, when discussing the adoption of R-strategies, one needs to consider the role played by consumers, as well as the key role of all SC actors in a product's life cycle, from design to the post-consumption and disposal stage (Morseletto, 2020) that will ultimately influence consumer circular behavior.

Future studies could address how collaborative partnerships among stakeholders (e.g. co-creation) are developed to embark on new solutions, for instance by working with suppliers of recycled materials,

collaborating with recycling facilities to improve the availability and quality of R-based inputs and materials, or partnering with retailers to create dedicated sections for refurbished products. How consumer environmental needs affect the involvement of SC stakeholders in their quest for developing solutions to use R-based strategies to supply the demand could also be explored.

Ambidexterity proposes that organizations should simultaneously pursue exploration, which involves long-term-oriented objectives tuned to innovation and experimentation, and exploitation, which involves short-term-oriented objectives efficiency and optimization (Tushman and O'Reilly, 1996). This requires organizations to balance meeting and satisfying current consumer needs while also exploring future possibilities that address emerging other R-based consumer needs. Future studies should investigate how to set clear goals and metrics for introducing R-based products and embracing exploration strategies (e.g., developing new products and incorporating new materials) ensuring the proper resource allocation and defining new business models without jeopardizing operational efficiency.

Consumer behavior change also involves relationships that need further analysis. On the one hand, the exchange of knowledge and ideas with external partners (such as recycling facilities and sustainability organizations) to jointly develop innovative solutions and capture the future marketing needs of environmentally conscious consumers can be further analyzed. On the other hand, organizations need to explore how to integrate supply chain and marketing strategies around concepts like recycled materials, remanufacturing, refurbished and reused products. Ambidextrous organizations need a balancing act between exploration and exploitation to effectively incorporate R-based product strategies throughout the SC. This will allow them to successfully implement sustainable practices that cope with environmental market changes.

Finally, regarding public policies, future studies could address how they influence individuals' environmental consciousness in buying R-strategies-based circular products. Public policy and regulatory changes are mandatory to underpin a new demand for "circular" products, leading consumers to understand the importance of supporting environmental initiatives and comply with more stringent regulations of the CE. Imposing new regulations is only part of the solution; incentives for reusing, reducing, refurbishing, repurposing, remanufacturing or recovering materials and products are important to deploy all stakeholders throughout the SC to support consumers with credible solutions.

6. Conclusions

This paper aimed to analyze the role of consumers in the adoption of circular R-strategies by systematically examining the literature on the topic. In addition to providing a clear description of the current state of the literature, we thoroughly analyzed the distinct roles consumers play in the adoption of circular R-strategies and their main drivers and barriers.

However complex understanding consumer behavior is, the role of consumers in the adoption of circular-R strategies (RQ1) can be summarized in two aspects: (1) the correct disposal of products and components at the end of their cycle (or at the end of their "first" life); and (2) the willingness to consume products from circular processes and sources. These two roles, positioned at opposite moments in the product's life cycle, in addition to the role of companies and other stakeholders, are decisive for the viability of circular models.

Our in-depth analysis of the literature demonstrated that the role of consumers related to R-strategies is extremely complex and heterogeneous. As mentioned by van Weelden et al. (2016), the prevailing consumer response to circular-related products can be described by the sentence "Yes, but …". Although environmental awareness seems to grow in most audiences, with clear interference from cultural, generational and gender factors, the analyses show that this growth is often not reflected in consumption decisions. Moreover, the involvement of different players across the SC are clearly under-researched. Even so,

environmental beliefs are pointed out as one of the main drivers for the adoption of circular R-based strategies. The results of our analyses suggest that education/literacy, access to information and more effective public policies are among the factors that could increase environmental awareness and contribute to the adoption of the CE. On the other hand, the results indicate that financial aspects still play a critical role as a driver and a barrier to circularity.

The main contributions of this paper to the literature and theory are twofold. First, it helps to shed light on the preponderant and diversified role consumers play in fostering the adoption of circularity in SCs, which has been an under-researched topic. Secondly, it provides a comprehensive set of recommendations for future research on the topic. The article also adds to the practice by providing insights for managers looking to implement CSC practices in their quest to develop R-based strategies.

CRediT authorship contribution statement

Ricardo Zimmermann: Writing – review & editing, Writing – original draft, Visualization, Validation, Methodology, Investigation, Formal analysis, Conceptualization. **Ana Inês:** Writing – review & editing, Writing – original draft, Visualization, Validation, Methodology, Investigation, Formal analysis, Conceptualization. **Gustavo Dalmarco:** Writing – review & editing, Writing – original draft, Visualization, Validation, Methodology, Investigation, Formal analysis, Conceptualization. **António C. Moreira:** Writing – review & editing, Writing – original draft, Visualization, Validation, Methodology, Investigation, Formal analysis, Conceptualization.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

No data was used for the research described in the article.

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