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SUSTAINABILITY CHALLENGES IN OMNI-CHANNEL RETAILING: A SYSTEMATIC REVIEW

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ABSTRACT

The consideration of sustainability aspects in omni-channel retail research has increased in recent years. Nevertheless, the literature lacks structured reviews that provide a holistic view on the various challenges in this research field. The purpose of this systematic review was to identify and structure the current sustainability challenges in omni-channel retailing. This review was conducted in accordance with the PRISMA statement guidelines and examined publications from 2012 to 2022. The bibliographic databases ScienceDirect, Emerald Insight and Scopus were used for the review. The examination of 10 publications from 663 records revealed a diversity of sustainability challenges in omni-channel retailing covering all three dimensions of sustainability. However, the review indicated an uneven weighting in favour of economic challenges, followed by environmental, while social aspects were of minor interest. Along the value chain, challenges in transport and logistics were especially in the spotlight in omni-channel research. This review is the first to highlight sustainability challenges documented the academic literature on omni-channel retailing and attempts to offer a comprehensive, and structured overview as a starting point for future research or for development of managerial implications in business practice.
Keywords: retailing strategy, sustainable development, consumer behaviour, PRISMA, classification

INTRODUCTION

Background

Advances in digital technologies have transformed sales channels (V*erhoef et al.*, 2021). Omni-channel has become the new standard in retail (*Chen et al.*, 2018; *Cocco & De-Juan-Vigaray*, 2022; *Verhoef et al.*, 2015). This development has been further accelerated by the impact of the COVID-19 pandemic (*Timotius & Octavius*, 2021; *Verhoef*, 2021; *Zhang & Hänninen*, 2022). In omni-channel retailing, the individual sales and communication channels are merged with each other (*Cummins et al.*, 2016). This ensures a consistent, channel-overlapping customer approach (*Cai & Lo*, 2020; *Verhoef et al.*, 2015). The high degree of channel integration enhances the shopping

experience (*Lemon & Verhoef*, 2016). However, it is highly complex at different levels from the corporate perspective (*Dirsehan*, 2020). Major challenges for companies are channel integration and linkage, channel management, data analytics and understanding cross-channel customer behaviour (*Briel*, 2018; *Mirzabeiki & Saghiri*, 2020; *Simone & Sabbadin*, 2017; *Ye et al.*, 2018). Furthermore, sustainability aspects in the context of omni-channel retailing are of growing importance. The impact of climate change is not only one of the most urgent contemporary challenges for society and politics (*Werners et al.*, 2013), but also for companies (*Cai & Choi*, 2021). Retailers in the rising field of omni-channel are particularly affected by this development because the nature of the cross-channel business model includes a variety of sustainability-related aspects due to the different digital and physical touchpoints and processes (*Sousa et al.*, 2021). A wide range of corporate activities along the entire value chain is concerned (*Adivar et al.*, 2019). Examples of the spectrum of sustainability challenges in omni-channel retailing include e-commerce logistics, with its ecological footprint, returns management and the use of eco-friendly materials from a corporate perspective or the increasing environmental awareness of consumers (*Bălan*, 2021; *Sousa et al.*, 2021).

The concept of sustainability encompasses the careful of (natural) resources (*Barbier*, 1987). The use of the term in this article is based on the common assumption that sustainability can only be realised through the simultaneous consideration of economy, ecology and social aspects (*Barbier*, 1987; *Hansmann et al.*, 2012; *Kaklauskas & Kaklauskiene*, 2022; *Purvis et al.*, 2019). These three dimensions are known as the triple bottom line (*Kleindorfer et al.*, 2005). In the literature on sustainability challenges, there are common overlaps and blurred boundaries between the different dimensions. A dominant research focus on the ecological challenges in omni-channel retailing is the scientific examination of logistics (*Giuffrida et al.*, 2019a; *Melacini & Tappia*, 2018; *Muñoz-Villamizar et al.*, 2021). Although omni-channel retailing allows the customer to choose between different sales channels (e.g., web shop, in-store, click & collect or ship-from-store), the transport of goods, regardless of the delivery or collection option, is in all cases accompanied by CO2 emissions (*Buldeo Rai*, 2021). Studies conclude that direct delivery of goods in omni-channel retailing is usually more environmentally friendly than shop pick-up, but only if ambiguous factors such as excessive packaging waste or possible returns are not taken into account (*Bertram & Chi*, 2018; *Escursell et al.*, 2021). According to *Giuffrida et al.* (2019b), the most critical factor influencing sustainability, whether direct shipping or click & collect is more environmentally efficient, depends on the distance between the customer's home and the retail shop.

Omni-channel retailers, however, are not the only parties that affect environmental impact. The carbon footprint is also determined by consumer behaviour (*Buldeo Rai*, 2021). Studies indicate that customer awareness in terms of sustainability has grown, in particular with the advent of the COVID-19 pandemic (*Bălan*, 2021; *Koleva & Chankov*, 2022; *Švecová et al.*, 2020). For example, *Bălan* (2021) or *Koleva & Chankov* (2022) or *Švecová et al.*, (2020) demonstrate a strong scientific interest in understanding enhanced customer awareness and sustainability-related purchasing behaviour.

However, even if the above authors' studies represent an enlightening contribution to omni-channel research on sustainability challenges, only one partial aspect is taken into account (consumer behaviour). Approached from the corporate perspective, studies imply that the challenge of increasing consumer awareness towards greater sustainability can be addressed with more transparency and honest green marketing initiatives (no green washing) (*Harris et al.*, 2016; *Arora*, 2019; *Nguyen & Johnson*, 2020; *Young et al.*, 2009). However, such initiatives by retailers are only credible if the preconditions in terms of sustainability, e.g. through more sustainable products or business processes, are met (*Wiese et al.*, 2015). The term "challenge" as used in the context of this review is based on the economic definition of a difficult task, condition, situation or aspect, characterised by high demands.

Gap in knowledge and objectives of the review

The increasing number of scientific publications reflect a growing interest in omni-channel retailing from a sustainability point of view. However, structured summaries to provide an overall view on the various aspects of sustainability are lacking in this field of research. The extant literature addresses the different challenges (e.g., transport, customer behaviour). In attempting to fill this gap, this paper systematically reviews the relevant literature to identify the current sustainability challenges in omni-channel retailing. With the help of the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) checklist, this review provides a comprehensive overview of sustainability-related challenges in omni-channel retailing. Other objectives of this review are to categorise the individual challenges from a business perspective and to analyse and evaluate the screened studies, with the aim of informing future research areas and directions. In addition, the review establishes the most frequently discussed sustainability dimensions and their specific challenges, as well as the most challenging part of the supply chain.

Layout of the review

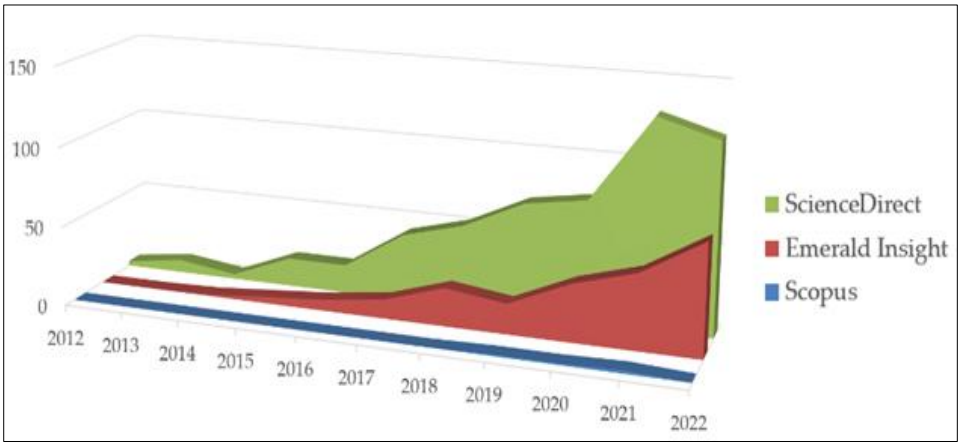
Following this introductory section, the subsequent sections give details of the method used in this review, the review process, results and discussion, limitations of the review, and finally conclusion and future directions.

METHOD

Databases Searched

This systematic review was conducted in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) (*Moher et al.*, 2009; *Page et al.*, 2021). *Scopus, ScienceDirect* and *Emerald Insight* databases were accessed to search for articles published in journals, primarily in the fields of retailing, e-commerce, distribution and transport. The search was conducted on 25th January, 2023. The search period was limited to the period from January 2012 to December 2022. The title, abstracts, names of authors and journals, and years of publication were exported to an *Microsoft Excel* spreadsheet (*Figure 1*).

Figure 1: Increasing numbers of publications in omni-channel retail with sustainability context on ScienceDirect, Scopus and Emerald Insight



Search string: TITLE-ABS- (sustainability AND omni-channel retailing OR omni-channel retail AND consumer)

Eligibility Criteria

To be included in the study, the published articles had to meet the pre-defined criteria. The selection criteria stated that the articles should be available in full length and published in English language (*Figure 2*). Moreover, only review articles, research articles and conference papers were to be selected. Thus, publications in books, book series and as chapters in books were excluded.

Figure 2: Eligibility criteria

Design

- Availability in full length
- Published in the English language
- Only review articles, research articles and conference proceedings
- No inclusion of books, book series and chapters in books

Search String

sustainability
AND
omni-channel retailing OR omni-channel retail
AND
consumer

REVIEW PROCESS

Information Sources

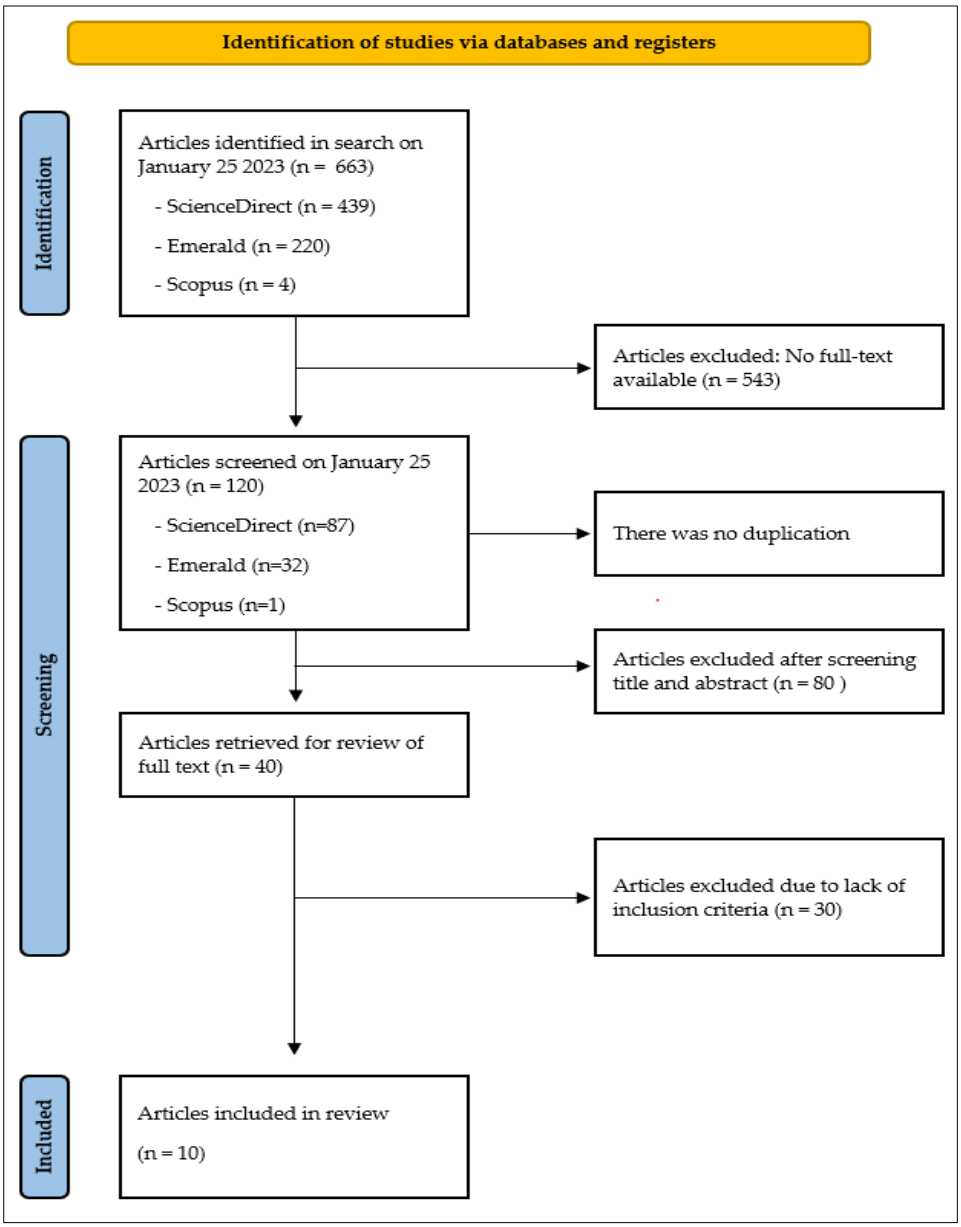
A comprehensive search was conducted on 25 January 2023 in three databases: *ScienceDirect*, *Emerald Insight* and *Scopus*. Using Boolean operators, the search string "sustainability AND omni-channel retailing OR omni-channel retail AND consumer" was produced. The title, abstract and keywords of the articles were considered in the search. Because the search was about "sustainability" in the context of "omni-channel retailing", both terms were included in the search string. In addition, the search term "consumer" was added to also cover the social and customer dimension in the search. Meanwhile, the search term "omni-channel retailing" has a more ecological-economical connotation. Hence, all three dimensions of sustainability were covered in the search string.

Study Selection

The selection of the identified studies was based on the PRISMA flow diagram (Page et al, 2021). First, the identified studies from the different databases were recorded in *CITAVI* and then exported cumulatively to an *Excel* spreadsheet. The dataset included basic information such as author(s) name, publication year, title or journal name. Subsequently, the articles were selected on the basis of the pre-defined eligibility criteria. If an article was initially screened successfully, the full text of the paper was evaluated and information about research-related topics, methods or the author(s) were recorded. Thereafter, the extracted articles were carefully read and recorded in an *Excel* spreadsheet containing, for instance, information on the author's name, year of publication, title of the article, journal name, digital object identifier (DOI), and main findings about challenges or databases (*Figure 3*).

Applying the search string, a total of 663 records were identified in the databases (*Figure 4*). The filter function for the study period of articles published from 2012 to 2022 and the classification of the article type had already been considered in the initial search. Despite unrestricted access to databases with the university library log-in data, only 120 articles were available in full-length. Therefore, 543 records had to be excluded. In a further screening process, the selection was made with the help of the four-phase flow diagram. Despite articles being drawn from different data sources, there were no duplicates. The remaining full-length articles were read thoroughly to determine their suitability. Because they were not related to the research question, 80 and later 30 additional articles were excluded. For example, in some articles no relation between the terms "omni-channel retail" and "sustainability" could be identified, but as keywords of the search string they were nevertheless in the text without any reference in the content. By the end of the screening, a total of 10 publications were included in this systematic literature review. Due to this low number of papers, further meta-analysis could not be applied.

Figure 3 Flow chart of study selection process



RESULTS AND DISCUSSION

Methods Employed and Characteristics of the Reviewed Studies

The main characteristics of the reviewed studies are summarised in *Table 2*. Although the survey included publications from January 2012 to December 2022, the final

records had only been published in the last five years with five publications appearing within the last two years. Research in the retail or sustainability or computer science journals, as well as management and business journals, was mainly conducted in Europe (5 of 10), but data sets were also analysed in an international context (4 of 10) and in South America (1 of 10). The methodology of the reviewed studies was primarily qualitative in its approach~~es~~, but these could be divided into three main groups.

The main group consisted of seven articles that employed qualitative methods. Literature reviews are useful to categorise literature and analyse research agendas (*Durach et al.*, 2021; *Rowley & Slack*, 2004) as well as to identify gaps – or challenges as in this study. A (qualitative) literature review is conducted in two publications (*Adivar et al.*, 2019; *Bijmolt et al.*, 2021). A qualitative approach also appeared in other articles that used (descriptive) case studies (*Bilińska-Reformat & Dewalska-Opitek*, 2021), including multi-case analyses (*Kembro & Norrman*, 2019; *Mkansi & Nsakanda*, 2021), for example in combination with an interview and the Delphi study (*Kayikci*, 2018). Two papers in the second group are based on quantitative methods. *Pan et al.* (2017) conducted a two-stage data-driven experimental study and *Muñoz-Villamizar et al.* (2021) employed a discrete-event simulation model. In one article, the researchers combined qualitative and quantitative methods to address the research question. Based on an interview on company characteristics, *Risberg & Jafari* (2022) developed a framework for a quantitative study.

Sustainability Dimensions Studied

It is noteworthy from how many different perspectives and research directions the sustainability challenges can be viewed. Nevertheless, the examined studies have in common a strong company-related perspective. Such a weighting towards corporate-centric considerations of challenges in omni-channel research is also confirmed in other literature reviews in this field (*Olsson et al.*, 2019). The economic-corporate view in this study is also reflected in the coverage of the different sustainability dimensions. Even if all three sustainability dimensions are addressed, the review of the articles indicates a slightly uneven weighting (see *Table 1* and *Table 2*) in favour of the economic dimension (17 of 32), followed by an environmental dimension (10 of 32), and lastly social dimension aspects (5 of 32) (*Figure 4*).

Figure 4: Weighting of the sustainability dimensions (number of mentions)

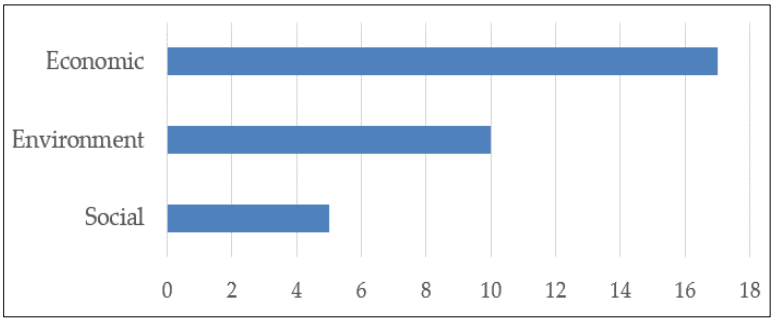


Table 1: Study characteristics and key findings

Study	Research field (of the journal)	Region	Challenges/Key Findings			Subject	Method
			Environment	Economic	Social		
Adivar et al. 2019	Retail, Distribution	internati-onal	Power consumption, packaging waste	Operational efficiency (e.g., eco-driving drivers, sustainable energy) Transport/logistics: using recycled or reused materials and packaging; distance between product origin, and destination, transport emissions, local supplier	-	Analysis of omni-channel retail supply chains based on the four performance indicators sustainability, efficiency, effectiveness and responsiveness	Literature Review
Bijmolt et al. 2021	Management and Business	internati-onal	Returns generate more waste and energy resources	Non-sustainable transports (i.e., last-mile) more cost-intensive	Last-mile key role for customer satisfaction (speed vs. sustainability)	Challenges for retailers that arise from external (consumer) as well as internal (operational) interdependencies.	Literature Review
Bilińska-Reformat & Dewalska-Opitek 2021	Computer Science	internati-onal	Environmental impact of the clothing industry	Reduction of the carbon footprint in fast fashion	Sustainability is only seen as a subordinate key factor for brand selection in fast fashion from the customer's point of view. But enhanced consumer awareness in relation to the social dimension (employment rights).	Challenges of the fast fashion industry during the Corona pandemic	Descriptive case study
Halldórsson & Wehner 2020	Transportation Business and Management	Sweden	High energy demand on the last mile of goods transport	Delivering goods collectively down in the supply chain as close as possible to the point of consumption	-	Challenge of high energy demand on the last mile of goods transport.	Explorative interview study
Kayikci 2018	Sustainability	Turkey	Resource efficiency, waste, pollution, land use impact	Costs, delivery time, delay, inventory, reliability	Health (disease caused by transport side effect like pollution or noise or accident rates)	Digitalisation of logis-tics processes makes it easier for companies to overcome sustaina-bility challenges	Case study (Interview, delphy study)

Kembro & Norrman 2019	Retail, Distribution	Sweden	Omni-channel retail executives still pay too little attention to sustainability aspects.	Decentralized omni-channel networks can help to improve sustainability when allocating the shipping location. Growing environmental awareness in management, nevertheless currently only of low relevance.	-	Challenges of logistics information systems from the perspective of Swedish omni-channel retailers.	Exploratory survey
Mkansi & Nsakanda 2021	Transport	United Kingdom	Food vans lead to more traffic congestion, noise pollution and increased space requirements	Due to several delivery and collection options, OCR has a better environmental performance than pure online providers or centralised retailers.	Eco-friendly delivery methods increase brand visibility and customer loyalty	Examining advantages for UK's leading food retailers in operating an e-grocery channel using the existing retail network.	Qualitative multi-case study
Muñoz-Villamizar et al. 2021	Sustainability	Mexico	-	Fast delivery, like same day, significantly impacts costs massively (up to 15% and 68%)	-	Environmental impact of Mexico's largest (omni-channel) retailer caused by fast shipping.	Simulation model
Pan et al. 2017	Management and Data	Ireland	-	Failed home deliveries of food purchased online are a challenge due to the perishable nature of the goods (from env. and eco. perspective)	-	Using customer-related data to determine the probability of customer absence due to failed home deliveries	Experiment al study
Risberg & Jafari 2022	Retail, Distribution	Sweden	-	OCR still pays too little attention to sustainability aspects in deliveries	High environmental awareness of customers in Sweden	Analyses the last-mile practices of omni-channel retailers.	Sequential, dual-phase approach

Table 2: Framework of challenges and key findings according to the three sustainability dimensions and (business) sectors

	Challenges/Key Findings			Count
	Environment	**Economic**	**Social**	
Logistics	Returns generate more waste and energy resources (*Bijmolt et al.*, 2021). High environmental impact caused by fast shipping (*Muñoz-Villamizar et al.*, 2021). Packaging waste (*Adivar et al.*, 2019)	Returns and non-sustainable transport are costly (*Bijmolt et al.*, 2021). Decentralized omni-channel networks to improve sustainability when allocating the shipping location(*Kembro & Norrman*, 2019). Failed home deliveries of food purchased online due to the perishable nature of the goods (*Pan et al.*, 2017).	Eco-friendly delivery methods increase brand visibility and customer loyalty (*Mkansi & Nsakanda*, 2021). Health (disease caused by transport side effects like pollution or noise or accident rates) (*Kayikci*, 2018).	
	3	3	2	**8**
Last-mile	Delivering goods collectively as close as possible to the point of consumption relieves the environment *[58]*. Omni-channel retail executives still pay too little attention to sustainability aspects (*Kembro & Norrman*, 2019; *Risberg & Jafari*, 2022). Food vans of OCR in the UK lead to more traffic congestion, noise pollution and increased space requirements (but better environmental performance than deliveries by pure online providers or centralised retailers) (*Mkansi & Nsakanda*, 2021).	High energy demand on the last mile (*Bijmolt et al.*, 2021; *Halldórsson & Wehner*, 2020; *Kembro & Norrman*, 2019; *Risberg & Jafari*, 2022). Last-mile most expensive delivery leg (*Bijmolt et al.*, 2021; *Halldórsson & Wehner*, 2020; *Kembro & Norrman*, 2019; *Risberg & Jafari*, 2022). Cooperations with logistics services providers to achieve fossil-free deliveries (*Risberg & Jafari*, 2022). Offering customers different/better prices for more sustainable-friendly delivery options (*Risberg & Jafari*, 2022).	Last-mile key role for customer satisfaction (speed vs. sustainability) (*Bijmolt et al.*, 2021).	
	3	10	1	**14**

Business Operations Information Technology	High environmental impact of the clothing industry (*Bilińska-Reformat & Dewalska-Opitek*, 2021). Resource efficiency (waste, pollution, land use impact (*Kayikci*, 2018) or power consumption) (*Adivar et al.*, 2019; *Bijmolt et al.*, 2021).	Reduction of the carbon footprint in fast fashion (*Bilińska-Reformat & Dewalska-Opitek*, 2021). Operational efficiency (e.g. eco-driving drivers, using recycled or reused materials and packaging; distance between product origin, and destination, transport emissions, local supplier) (*Adivar et al.*, 2019). Reducing waste, air pollution and greenhouse gas emissions are more likely to be met through the use of digital technologies (delivery time, delay, inventory, reliability) (*Kayikci*, 2018). Improving delivery distances (3–20%) and delivery rates (18–26%) with computer simulations (*Pan et al.*, 2017).	-	
	4	4	0	**8**
Costumer			Swedish customers are already more environmentally aware than retailers' executives (*Risberg & Jafari*, 2022). Enhanced consumer awareness for employment rights in the fast fashion industry (*Bilińska-Reformat & Dewalska-Opitek*, 2021).	
	0	0	2	**2**
Total	**10**	**17**	**5**	**32**

Challenges Related to Dimensions of Sustainability

Challenges in transport and logistics were mostly mentioned in the reviewed studies, the so-called "last mile" was especially emphasised or at least considered as a major challenge. These last-mile-related studies are examined in more detail in the following section. Afterwards, publications with a logistics focus are presented. Lastly, a publication with a further focus on sustainability challenges in the supply chain in omni-channel retailing is presented (*Pan et al.*, 2017).

All studies on the last mile stated the high energy demand and the non-sustainable character on this final delivery leg in good transports (*Bijmolt et al.,* 2021*; Özbük et al.*, 2020*; Halldórsson & Wehner*, 2020; *Mkansi & Nsakanda*, 2021; *Risberg & Jafari*, 2022). With regard to supply chain management, *Halldórsson & Wehner* (2020) viewed the delivery of goods collectively down in the supply chain as close as possible to the point of consumption as a solution to meet this last mile sustainability challenge. *Risberg & Jafari* (2022) proposed price differentiations or advantages at the purchase (online) checkout for customers choosing a more sustainable-friendly delivery option. They also suggested cooperations with logistics services provider to achieve fossil-free deliveries. Even if e-commerce executives state an increasing relevance according to their survey, they contend that omni-channel retailers still pay too little attention to sustainability aspects in deliveries. *Bijmolt et al.* (2021) address the challenges for retailers that arise from external (consumer) as well as internal (operational) interdependencies. The study of business processes and customer behaviour was intended to help companies find ways to increase their profitability in the future. The focus of the work was not primarily the investigation of sustainability aspects, but the authors identified non-sustainable transports and returns as more cost-intensive and therefore a challenge from a management perspective. The last mile is also considered from a social perspective, as it is directly related to customer satisfaction (speed vs. sustainability). *Mkansi & Nsakanda* (2021) uncovered a certain environmental challenge on the last-mile for omni-channel retailers in the grocery industry: Deliveries with food vans potentially lead to more traffic congestion, noise pollution and increased space requirements, even if the environmental performance is better than deliveries by pure online providers or centralised retailers who do not benefit from shorter distances through a retail network (*Mkansi & Nsakanda*, 2021). Overcoming this challenge by adopting more eco-friendly delivery methods can also help companies to increase brand visibility and customer loyalty.

In the second group with five articles, transport and logistic challenges were considered from different perspectives. This group included the study by *Bilińska-Reformat & Dewalska-Opitek* (2021) which addressed the challenges of the fast fashion industry during the coronavirus pandemic. They noted an accelerated change in business models, especially towards more e-commerce and omni-channel solutions. Sustainability challenges were not the focus of the study. Nevertheless, the authors identified sustainability-related challenges in the literature review. They indicated that consumers have increasingly become aware of and raised concerns about the environmental impact and working conditions in the textile industry. Despite these developments from the customer's point of view, sustainability is still only a subordinate key factor for brand selection in the fast fashion industry. A further study

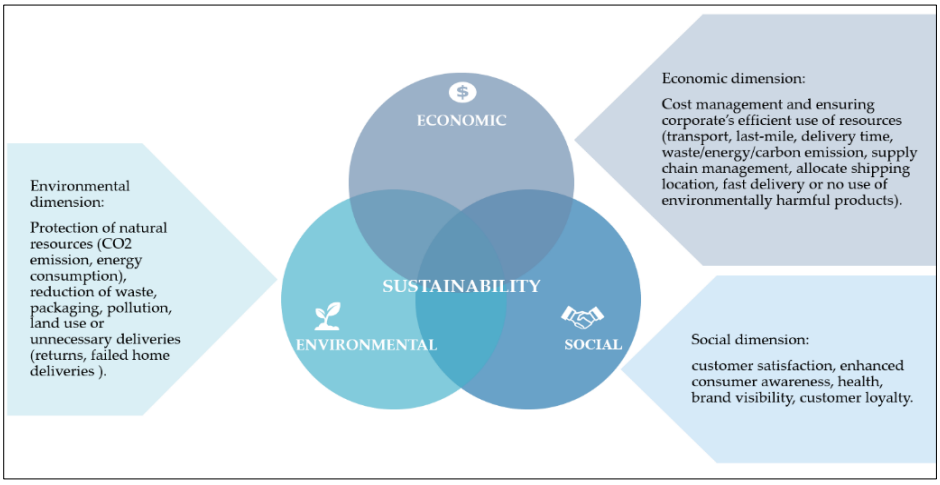
by *Kayikci* (2018) indicated that the digitalization of logistics processes makes overcoming sustainability challenges easier for companies. In particular, the challenges of reducing waste, air pollution and greenhouse gas emissions are more likely to be met through the use of digital technologies. Companies that trade in so-called Fast Moving Consumer Goods (FMCG) products were examined. It is therefore not possible to clearly verify how many of them are omni-channel retailers. *Kembro & Norrman* (2019) discussed challenges of logistics information systems from the perspective of Swedish omni-channel retailers. Operational aspects such as increasing complexity, data accuracy or frequency of synchronisation were cited as main challenges (*Kembro & Norrman*, 2019). Sustainability aspects were also not the main concern of the study. Nevertheless, the authors argued that decentralized omni-channel networks, like warehouses or outlets, can help to improve sustainability when allocating the shipping location of a good. In this context, a management survey reveals the challenge of minimising environmental impact is becoming more relevant, evidenced by an increase on the Likert scale (0–7) from 2.85 (today) to 4.70 (five years). *Pan et al.* (2017) identified failed home deliveries of food purchased online as a challenge due to the perishable nature of the goods. They propose a two-stage methodological approach that uses customer-related data to determine the probability of customer absence. Computer simulations indicate that this could reduce the delivery distance (3%-20%) and improve the delivery rate (18%-26%). The reduced environmental footprint would have a positive impact on sustainability (*Pan et al.*, 2017). *Muñoz-Villamizar et al.* (2021) analyse the transport-related environmental impact of Mexico's largest (omni-channel) retailer caused by fast shipping. With the help of a simulation model, they demonstrate that a fast delivery, such as same day delivery, significantly impacts carbon emissions and influences costs massively (up to 15% and 68%).

The last remaining study by *Adivar et al.* (2019) was an analysis of omni-channel retail supply chains based on the four performance indicators of sustainability, efficiency, effectiveness and responsiveness. Sustainability-related performance factors that successful omni-channel retailers should see as a challenge and pay attention to are operational efficiency (e.g., eco-driving drivers, sustainable energy), use of recycled or reused materials and packaging, the distance between product origin and destination, transport emissions and local supplier. In addition to the economic aspects, the ecological dimension was also considered (power consumption, packaging waste).

One of the most obvious outcomes of the current review concerns the wide range of different sustainability-related challenges and key findings in omni-channel retailing, covering all sustainability dimensions (*Figure 5*). Nevertheless, the focus of most studies is primarily on increasing efficiency on the company side (economic), less on uncovering the ecological (e.g., environmental pollution) or social dimension (e.g., consumer). Challenges in transport and logistics are commonly highlighted in the literature, in particular the last-mile. Concerning methodology, primarily qualitative approaches were used. With the exception of three studies (A*divar et al.*, 2019; *Kayikci*, 2018; *Pan et al.*, 2017), the research question did not explicitly aim to uncover sustainability challenges in omni-channel retailing. Rather, the different

sustainability challenges of omni-channel retailing have emerged in context and were revealed as a further result or finding of the analyses. The results indicate that there are still only a few studies that explicitly deal with sustainability challenges in omni-channel retail. The added value of this review therefore lies in summarising, classifying and structuring these challenges and thus offers a good starting point for further, even more detailed research on sustainability related challenges.

Figure 5: Interconnections of the three dimensions of sustainability challenges for omni-channel retailer



Source: Based on *Sikdar*, 2003

LIMITATIONS OF THE REVIEW

The current review has a number of limitations, for example, the diversity of information sources and selection of literature. Only review articles, research articles and conference papers from three databases were included. Therefore, relevant information from other sources may have been missed, including information from books or book chapters. However, it is noteworthy that IT and consulting companies also provide studies in the field of omni-channel retailing and/or address sustainability-related challenges for companies (*Lehmann & Teller*, 2022; Pierre *Mercier et al.*, 2014). Furthermore, this study focused only on literature written in the English language. The risk of bias due to limitations in the search process cannot be entirely negated, as the selected terms in the search string also have synonyms with similar meanings. For example, the term "sustainability" often appears in the context of words with similar meanings such as "environment", "ecology" or "green". An expansion of the search terms could be reconsidered in future reviews.

After the final screening in the method part, systematic literature reviews can be supplemented with additional systematic searches for further verification. For example, with an audit of primary sources, as recommended by *Greenhalgh & Peacock* (2005) using the "snowball" approach. This method can identify additional sources

that were not found via the systematic literature search in the databases. In addition to the search according to the PRISMA criteria, no further backward screening was performed in this study. Despite the stated limitations, the current systematic literature review offers a holistic, and structured view of the sustainability-related challenges in omni-channel retail and provides a starting point for further research, which is also necessary in this subject.

CONCLUSIONS

This systematic literature review attempted to point out the established knowledge on sustainability challenges behind the academic literature on omni-channel retailing. The aim was the development of a comprehensive, structured overview to serve as a starting point for future research or to develop managerial implications in business practice. The review revealed that the number of publications on the subject of omni-channel has increased, especially in the last few years. Even if the challenges in omni-channel retail are within the three sustainability dimensions, the review of the articles indicated a slightly uneven weighting in favour of the economic dimension with a strong corporate-centric view, followed by environmental and social aspects of sustainability. One more critical revelation is that there were no reviews separately focusing on the different sustainability dimension challenges. This review makes recommendations on this gap. While few studies have included a dual perspective on omni-channel retail and sustainability challenges (*Adivar et al.*, 2019; *Kayikci*, 2018) in most articles the two components are not strongly linked.

It would be in the interests of the research field, that future studies pay even more attention in considering these two perspectives in an integrated way. The strength of this review lies in combining these two aspects. Evidently, no systematic analysis has adequately focused on the current challenges in omni-channel retailing from a sustainability point of view. However, a comprehensive study with systematic approach to identify the challenges in omni-channel retailing can be used as a starting point to stimulate future research in the scientific debate and to support integrating sustainability management into the retail business operations. The current review provides some orientation in this regard.

FUTURE DIRECTIONS

This systematic literature review contributes to omni-channel retail research by summarising the literature on sustainability challenges. Furthermore, it also identifies potential areas for future research. First, most recent studies are only focused on a specific topic. Broader-based investigations provide a coherent overview and can help marketers and researchers to understand and explore how different sustainability challenges along the entire value chain are interrelated and connected. This review identifies a need for further reviews in this complex field of research. Secondly, although this study provides a holistic overview, solutions to overcome the different sustainability-related challenges are not provided. The research landscape would therefore be enriched by more investigations, such as that by *Pan et al.* (2017),

with concrete solution and approaches to addressing certain environmental, economic or social obstacles in omni-channel retail. Thirdly, the review reveals that qualitative methods, such as interviews or literature analyses, were most frequently applied in the studies. Therefore, increased use of quantitative research and data driven methods could provide an even stronger empirical evidence in future research.

If the trend of increasing publications in omni-channel retail continues as rapidly as it has in the last three years, the research field will remain relevant and provide a fertile ground for further research on sustainability challenges in omni-channel retailing.

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