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Consumer Logistics: a systematic literature review

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Consumer Logistics: a Systematic Literature Review

Abstract

The research field of Consumer Logistics (CL), initiated by Granzin and Bahn (1989), deals with consumer logistics participation in product handling, from the point of acquisition to destruction. Research into CL stems from the premise that consumers' logistics activities resemble those of businesses closely. With consumers' increasingly active logistics role in acquiring goods or services, transporting, and storing goods, but also disposing or getting rid of them, this field is receiving growing attention. However, there is no general view or synthesis of this fragmented field, located at the interface of different disciplines. With the objective of investigating current knowledge, we conducted a systematic literature review that analyzes 155 articles on CL spanning the last 32 years (1990-2022). Based on an analysis of the research themes, the article summarizes and maps CL research, highlighting five areas of interest: 1) consumers' choice of physical channel, 2) consumer transportation, 3) consumer storage, 4) systemic consumer logistics and 5) consumer outbound logistics. The article provides the first interdisciplinary synthesis of the fragmented CL literature and concludes with some suggestions to stimulate more systemic and sustainable CL research in the future.

Introduction

First developed in the army, the concept of logistics was imported into the business world in the 1960s (Smykay *et al.*, 1961), and is now used in a wide range of organizational contexts (state logistics, urban logistics, humanitarian logistics, etc.). Given the widening application of logistics, it was inevitable that the concept would be applied to consumers. The first to do so were Granzin and Bahn (1989), in a seminal article published in the *Journal of the Academy of Marketing Science*. This work laid the conceptual foundations for a new research stream lying at the interface between logistics and marketing: “Consumer Logistics” (CL). Granzin and Bahn suggest that consumers have to manage logistics activities during consumption, which can be divided into sub-systems: location, inventory, transportation, handling and storage, and communication. Similarly, Boyd and McConocha (1996) point out that consumers participate in concrete material activities during consumption, which can be characterized as “logistics”.

These two articles launched a research stream that recognizes the long-neglected reality of consumers’ logistics activities. Indeed, it was only in the 1970s that economists began to study the role of consumer storage in supply/demand adjustment mechanisms (Reinhardt, 1973) and that marketers started to investigate how consumers transport their purchases (Hubbard, 1978). This research stream has recently received more attention, and several researchers are calling for a reassessment of the logistics role of the consumer. Lusch (2011) suggests expanding the boundaries of supply chain management (SCM) to include consumers as co-creators. Similarly, while SCM still considers consumers “passive”, Ta *et al.* (2015) suggest viewing them as “value co-creators”. To achieve this objective, it is necessary to better understand the logistics role consumers play by analyzing the current knowledge about this topic.

However, no synthesis of CL literature mapping out current knowledge actually exists. Given that the role of logistics in the consumption process has dramatically increased since the publication of those seminal articles 30 years ago, it is surely important to conduct such a

synthesis. With the trend towards ‘putting consumers to work’ (Ritzer and Jurgenson, 2010), more logistics tasks are entrusted to consumers, either by firms (e.g. collecting purchases at the store) or the authorities (e.g. sorting waste). Consumers now have to organize their daily logistics tasks, despite increasing demands on their time (Southerton and Tomlinson, 2005), and can order by internet or mobile and acquire goods from multiple channels and touchpoints (stores, warehouse stores, drive-through stores, collection points, or home delivery). Providing such a synthesis seems all the more necessary given CL’s position at the interface between marketing and logistics/SCM, and given that CL research is published in different disciplines and journals. Consequently, there is a risk that researchers may fail to communicate and that knowledge might not be properly exploited. Therefore, our article aims to provide the first interdisciplinary synthesis of current knowledge in the field of CL and to answer to the following research question: *What do we know about consumers’ logistics activities?*

Methodology: a Systematic Literature Review

To answer this question, we conducted a Systematic Literature Review (SLR). Systematic reviews adopt “a replicable, scientific and transparent process” (Tranfield *et al.*, 2003, p. 209) to highlight key scientific contributions to a field. We conducted the six steps that are generally associated with such reviews in logistics and SCM (Durach *et al.*, 2017).

Step 1: define the research question

The first step of the SLR consists of defining a research question and theoretical framework to mark out the scope of the literature review. To develop an initial CL framework and answer our research question, we started with the two seminal frameworks of Granzin and Bahn (1989) and Boyd and McConocha (1996). Based on a model introduced by Bowersox (1978; 1989) for business logistics, Granzin and Bahn pointed out that CL comprises five sub-systems: location, inventory, transportation, handling and storage, and communication. They also introduced a descriptive process model of CL decisions that comprises 10 steps: setting, pre-trip information

gathering, pre-trip stock assessment, trip planning, outbound travel, in-store selection, inbound travel, post-trip stock management, disposal, and post-trip communication. Boyd and McConocha introduced the Inventory Ownership Cycle model, which includes five sub-systems: pre-acquisition, acquisition, physical possession (a sub-system consisting of both usage and storage), disposal, and transportation. These seminal frameworks differ from each other and do not define CL in the same way. These divergences raise the question of which consumer activities should be included within the scope of CL. Moreover, the CL context has evolved since these theorizations were proposed. In Granzin and Bahn's time, CL was centered around brick-and-mortar stores. Now, consumers have multiple logistics channels through which to obtain supplies. In addition, the outbound logistics flows from consumers' homes include not only objects to be disposed of, as stated by Boyd and McConocha, but also second-hand items that are resold through a new sharing economy.

In view of these elements, we made the two following assumptions in framing the SLR. First, we chose to define CL as comprising the two activities present in the two models, i.e. transportation and storage. Second, as these models highlight, we consider that CL refers to two flows, i.e. inbound and outbound. On the one hand, consumers bring home products they acquire from different distribution channels (including stores, as in Granzin and Bahn's model, and several alternatives, such as home delivery, delivery-box, pick-up point, etc.). On the other, they send items from their home to collection points (disposal, waste, etc.). As Figure 1 highlights, CL is defined here as encompassing all logistics activities of transportation and storage that individuals must coordinate during consumption to move products from different distribution channels into their home (inbound consumer logistics) and out of their homes to different collection points (outbound consumer logistics).

< Insert Figure 1 >

Step 2: determine the criteria for selecting studies

We then defined the criteria for including or excluding studies. In line with our definition of CL, we first determined that we would include only articles whose units of analysis involved at least one logistical activity (e.g. transportation and storage) of the consumer (e.g. an article dealing with delivery to the consumer's home from a retailer's perspective would be excluded). In terms of publication type, in line with other SLRs conducted in logistics and SCM (e.g. Seuring and Gold, 2012; Kamal and Irani, 2014), we chose to include in our selection only articles published in peer-reviewed academic journals. However, as suggested by Briner *et al.* (2009), we decided not to restrict our analysis to well-ranked journals, as the rankings may be controversial (McKinnon, 2013). Nor did we limit our analysis to marketing and/or logistics and SCM journals; the interdisciplinary nature of CL studies justifies a very open approach, as Pawson recommended (2006). We chose two databases often used in SLR (e.g. Wilding *et al.*, 2012; Durach *et al.*, 2015): Business Source Complete and Econlit, as they cover not only all management disciplines, but also leading journals in other social sciences (economics, sociology, health), in accordance with our objective of an interdisciplinary perspective.

Step 3: gather a sample of potentially relevant literature

The third step comprised a search in these databases to identify relevant articles. In order to identify the relevant keywords, we followed Tranfield *et al.*'s (2003, p. 245) recommendation and built our list "from the scoping study, the literature and discussions within the review team". In practice, we searched not only for the combination of the keywords "consumer" and "logistics", but also synonyms for these terms. For "consumer", we included "shopper" and "household" as some papers talk about "shopper logistics" (e.g. Teller *et al.*, 2012; Flint *et al.*, 2014) and "household logistics" (e.g. Monnot *et al.*, 2014; Halldórsson *et al.*, 2019). For "logistics", we obviously used "supply chain", but also – in accordance with our definition of CL (see Step 1) – several keywords related to the two activities at the core of CL: transportation (transportation, transport, trip, travel, delivery, last mile) and storage (storage, inventory,

stockpiling, handling). Altogether, we conducted searches for 36 combinations: the three keywords related to consumers (consumer, shopper, household) combined with the 12 related to logistics (logistics, supply chain, transport, transportation, trip, travel, delivery, last mile, storage, inventory, stockpiling, handling). We searched for these combinations in both titles and abstracts. Our initial search identified 565 academic articles (duplicates included).

Step 4: select relevant literature (synthetic sample)

The fourth step identified the relevant literature within this vast corpus to create our SLR database. We first entered descriptive information for each article in a spreadsheet: title, year of publication, journal, publication reference, authors, abstract. During this step, duplicates were identified and removed, and our corpus decreased to 343 articles. Each article was then assigned to two of the three members of the research team, who separately determined which articles should be included in or excluded from the SLR (see Steps 1 and 2). Once this task was complete, the research team met to finalize the selection. First, we withdrew 179 articles that both researchers had considered outside the scope of the study, as their unit of analysis did not integrate a consumer logistics activity (e.g. articles dealing with household travel independently of consumption activities; articles dealing with delivery from a retailer's perspective). Then, all members discussed the few articles that only one researcher had rejected. At this stage, we agreed, for example, not to retain articles identified by the keywords "consumer" and "storage" covering the storage of electronic data, and we reduced our selection to 155 articles.

Step 5: synthesize the literature

During this fifth step, each member of the research team read a selection of the 155 articles in detail and noted the type and nature of methodology used, the type of supply chain studied, the aim and topic of the article, and the field covered by the journal. Based on the theoretical framework we had defined, we then classified the papers in sub-themes according to their aim and topic. We determined that 143 of the 155 articles dealt with inbound flows (from channels

to consumers' homes) and 12 articles dealt with outbound flows. The 143 articles dealing with inbound flows were then classified according to the logistics activity analyzed in the article: 53 articles focused on "storage activities" and 42 on "transport activities". In the course of our analysis, it appeared that 29 articles dealt with an activity not initially included in the core of CL: the question of a consumer's choice of physical channel from which to acquire products. This activity was mentioned in Boyd and McConocha's model, which spoke of the "acquisition" phase, but was only implicitly present in Granzin and Bahn's model. Following abductive logic (Dubois and Gadde, 2014; Ketokivi and Choi, 2014), we decided to enrich our initial theoretical framework to include a third activity called "physical channel selection" concerning the way consumers choose among different physical channels (store, home delivery, etc.). Finally, 19 articles that did not focus on any one activity as their unit of analysis, but adopted a global perspective on inbound CL, were assigned to a global category named "systemic consumer logistics", which refers to an integrated analysis of inbound CL. A PRISMA diagram summarizes our search process and articles selection (Figure 2).

< Insert Figure 2 >

Step 6: present the literature

The final step is to present the results of our synthesis. As recommended by Tranfield *et al.* (2003, p. 218), we provide two major types of results: a descriptive analysis and a thematic analysis of the studies, which is an "outline of the knowledge derived from the study synthesis" (Durach *et al.*, 2017, p. 76), presented in the subsequent sections. The descriptive analysis is summarized in Figure 3 and demonstrates: 1) an increase in publications over the years; 2) the cross-disciplinary nature of CL research, evident in many different journals; 3) the dominance of quantitative approaches. The next five sections present our thematic analysis. Following our CL framework, we first present articles that deal with inbound logistics flows, starting with articles on "physical channel selection" (theme 1), then those on "transportation during

shopping trips” (theme 2), “storage of finished products at home” (theme 3), ending with the articles that propose a “systemic analysis of inbound logistics” (theme 4). Finally, the last theme summarizes the articles on “consumer outbound flows” (theme 5). For each theme, we provide a synthesis of the main results. Notably, the purpose of these sections is not to provide an exhaustive synthesis of the 155 articles – which would have been impossible in this article – but to highlight their main results. Accordingly, although some articles sometimes contributed to two themes, we presented an article only within the theme to which it contributed the most.

< **Insert Figure 3** >

Theme 1: physical channel selection

One set of articles (N=29) focuses on the logistical aspects behind consumers’ choices regarding physical distribution channels. Although brick-and-mortar stores were historically the dominant channel, the development of the Internet led to a multiplication of options for the consumer: home delivery, delivery-box, drive-through, etc. The literature identifies several determinants of physical channel selection and analyzes how it affects the consumer and the environment.

The selection of physical channels based on their logistics utility

The literature finds that the choice of a channel depends first on utilitarian logistics variables, notably time, cost, distance, and convenience (Reimers and Chao, 2014; Wang *et al.*, 2019). Several shopping behavior models identify how consumers optimize these variables (Rovsek and Beskovnik, 2017; Bawa and Gosh, 1999). However, the literature highlights the difficulties of consumers in evaluating these logistical aspects. Hsiao (2009) showed that consumers are not always able to evaluate time properly when they face a choice between shopping at a physical store or online. Also, perceptions of time spent waiting during logistics activities vary between consumers (Lin *et al.*, 2014). In a study of home delivery, Teller *et al.* (2006) showed that consumers are unable to convert their time and distance logistics efforts into costs. In the

same vein, consumers appear to be unaware of environmental aspects when they choose logistics providers for their purchases (Gruchman *et al.*, 2019).

The importance of designing “experiential” physical channels

The literature also points out that this choice depends on experiential variables. Wang *et al.* (2019) showed that enjoyment (i.e. “the degree to which the self-collection process is interesting and enjoyable”) is decisive. Thus, the challenge for businesses is to design logistics channels that are “fun to explore”. In a case study of a farm where consumers pick their own fruit and vegetables, Rouquet and Paché (2017) showed that consumers’ logistics participation can be driven by experiential motives. They later described how smartphones can make consumer participation more experiential, by turning the visit to the store into a “treasure hunt” (Rouquet and Paché, 2020). Teller *et al.* (2008) showed the proportion of hedonic consumers is greater in shopping streets than in shopping malls.

The influence of household capacities (equipment, type of shopping, and age)

Several contextual and individual variables also influence physical channel choice. Shi *et al.* (2019) showed that internet experience, car ownership, and location factors (partially) affect consumers’ e-shopping and travel shopping behaviors. According to Kim and Park (1997), “routine” shoppers have high opportunity costs so they try to simplify their shopping problems: they may prefer smaller stores and/or everyday low-price stores. Searching for the best price, “random” shoppers may prefer high-low stores and shop in larger stores, which provide various buying opportunities, since they have time to shop around (Kim and Park, 1997). Active people are more likely to shop at big-box stores because of their family status and the tendency to seek low-prices, whereas young people and the elderly prefer traditional shopping centers as they offer entertainment activities (Gjin *et al.*, 2006).

The impact of a channel’s logistics utility on customer satisfaction

According to the literature, the logistics utility of a channel influences consumer satisfaction. Teller *et al.* (2013) observed that accessibility, in-store maneuverability, and shelf management influence satisfaction. For Reimers and Chao (2014), the time-saving and distance-minimizing properties of a shopping trip determine satisfaction. Lloyd *et al.* (2014) proposed a conceptual model delineating the relationships between service convenience, shopping trip value, customer satisfaction, and three retail outcomes: repatronage intention, word of mouth, and desire to stay. For shoppers who place high economic value on time, service convenience affects hedonic value more significantly, but for those who place low economic value on time, service convenience affects utilitarian value more.

The respective weight of each physical channel

The literature also assesses how the multiplication of physical options affects the relative weight of each channel and, in particular, whether the e-commerce boom has led to a reduction in the use of physical stores. Rotem-Mindali and Salomon (2007) and Hoogendoorn-Lanser *et al.* (2019) noted that e-shopping replaces very few shopping trips. Similarly, Calderwood and Freathy (2014) showed that the boom in e-shopping has had only a minor effect on physical shopping. However, they pointed out that it has led consumers to reconfigure their shopping trips. On the other hand, Zhou and Wang (2014), show that online shopping encourages shopping trips, while shopping trips tend to discourage online shopping. Recently, Shah *et al.* (2021) showed that the way consumers combine shopping and e-shopping depends on both sociodemographic characteristics and stages of life and identifies four profiles: time-pressured shoppers, dual-channel shoppers, traditional shoppers, and infrequent shoppers and travelers.

Physical channels generate different levels of CO₂

Finally, the choice of channel leads to the implementation of different types of logistics flows with varying impact on the environment. Edwards *et al.* (2012) found that home delivery generates less CO₂ than typical shopping trips and that shopping by bus is comparable to home

delivery with regard to emissions. Gee *et al.* (2019) compared the energy necessary for a food supply chain delivering meal-kits to consumers with that required for a traditional food supply chain. While meal-kits save energy by supplying only the ingredients necessary for a recipe, they have negative effects in terms of packaging and their transport requirements are greater. Carlsson *et al.* (2016) studied the conditions under which home delivery becomes more environmentally friendly than when individual households transport the products themselves. They showed that a minimum amount of adoption of such delivery services is necessary for the overall carbon footprint of the region to decrease. Halldorsson and Wehner (2020) introduced a framework to compare the energy efficiency of six distinct options in last-mile fulfilment. Their results stress that energy can be saved in last-mile fulfilment when goods are carried as far as possible collectively down in the supply chain to collection points close to the Point Of Consumption (POC) in commercial vehicles with high fill rates.

Theme 2: consumer transportation during shopping trips

A second series of articles (N=42) investigates consumer transportation. The literature identifies several variables that affect the choice of transport mode during a shopping trip (e.g. car, public transport, walking, etc.) and how consumers schedule their transport on a weekly basis (e.g. single trip, multi-shopping trip, weekly timing of trip). The literature also points out that how consumers organize their transport impacts the environment.

A question of proximity for the individual

First, some articles study the effects of contextual variables. A key determinant of transportation is place of residence (Guy, 2009; Hagberg and Holmberg, 2017), as is retail agglomeration in general, the location and size of shopping centers in particular (Brooks *et al.*, 2004; Arentze *et al.*, 2005), and store opening hours (Baker, 2002). Susilo *et al.* (2011) showed that proximity to home is the variable that most encourages customers to visit a store. Some authors examined

whether the cost of travel affects travel behavior, showing that trip frequencies are not cost sensitive (Lundevaller, 2009).

The role of the weekly scheduling of transportation to optimize and pool shopping trips

Some articles studied the effects of situational variables such as the impact of day of the week (Bijwaard, 2010), shopping trip schedule (Chiang *et al.*, 2001), departure time (Bhat, 1998), trip purpose, trip length (Bhat and Steed, 2002; Gjin *et al.*, 2006), and multi-stop trips (Brooks *et al.*, 2004; Brooks *et al.*, 2008; Dellaert *et al.*, 1998). Regular and non-shopping days are important features to include in models for purchase-timing behavior (Bijwaard, 2010). Morning shopping trips are mostly home-based, and grocery-shopping trips take place less often in the middle of the day than non-grocery shopping trips (Bhat and Steed, 2002). Consumers tend to optimize their shopping trips by combining consecutive visits to different locations on a single trip. Consumers may visit multiple stores to take advantage of their complementarity (Gijsbrechts *et al.*, 2008).

The influence of individual physical ability and household equipment

Some papers studied the effects of individual variables such as gender, age (Schmöcker *et al.*, 2008), professional occupation, or type of household or income (Kim and Park, 1997; Gjin *et al.*, 2006). They showed, for example, that age and disability influence public transport use and that the preference for taxis increases with age when there is a disability (Schmöcker *et al.*, 2008). The age distribution of children also has an impact (Bhat and Steed, 2002): households with young children are less likely to go shopping at midday, as the children require care at that time. Some articles also considered variables relating to household equipment: car ownership or possession of a driving license, for instance (Gjin *et al.*, 2006; Widener *et al.*, 2015; Meena *et al.*, 2019). When vehicle ownership decreases, shoppers access supermarkets increasingly via public transit (Widener *et al.*, 2015).

The complexity for consumers to optimize and pool transportation

More broadly, several articles stressed the complexity of optimizing transportation activities. Brooks *et al.* (2004) modeled trip-chained store choice and showed that consumers seek to minimize perceived travel costs and maximize perceived savings in travel distance. Some papers modeled the spatial distribution of retail stores and individual travel choices (Claycombe, 1991; Veenstra *et al.*, 2010), and found that consumers combine shopping trips with a commute to work, making the shopping trip spatially costless (Claycombe, 1991; Widener *et al.*, 2015). Dellaert *et al.* (2008) analyzed how consumers mentally represent decisions about complex shopping trips and found that they integrate several utilitarian attributes, e.g. simplicity of route, crowdedness in stores, or combining shopping and work. The literature also points out that evaluating all aspects of transport is difficult for consumers. Kang *et al.* (2003) showed that consumers may have better and more accessible knowledge of trip time than distance. As a result, they tend to substitute time and distance information in their judgments when making their shopping trip decisions.

The different carbon impact of shopping trips

Finally, numerous papers examined the environmental impact of trips to shopping centers (whatever the transport mode) and their CO₂ emissions (Carling *et al.*, 2013; Chen, 2018; Jia *et al.*, 2013; Li *et al.*, 2016). Carling *et al.* (2013) showed that out-of-town shopping trips generate 60% more CO₂ emissions than downtown and edge-of-town shopping trips. Wiese *et al.* (2015) showed that negative perceptions of public transport and the perceived mobility necessity of different life cycles may hinder environmentally friendly behavior. In addition, some research has studied the effects of urban tolls to reduce traffic congestion and thus CO₂ emissions (Hu and Saleh, 2005; Schmöcker *et al.*, 2008). Nevertheless, as Guy (2009, p. 656) mentioned, exhortations to shop on foot or by bike have limited impact as “the car is ideally suited to ‘trolley shopping’ trips involving bulk purchase of frequently required food and household goods”.

Theme 3: consumer storage of finished products at home

A third series of articles (N=53) investigated consumer storage of finished products at home. In these papers, storage refers to the quantities stored (level of stock) and the quality of storage (quality of product preservation). Such papers identified a set of variables that impact storage (quantities and quality of storage) and those variables impacted by storage.

Consumer stockpiling according to price fluctuations and type of product

Numerous papers analyzed the role of contextual variables and showed that price fluctuations have an effect on consumer propensity to stockpile products for future consumption (e.g. Pofahl, 2009; Hendel and Nevo, 2003). They buy more when there is a price reduction and time their purchases to exploit price fluctuations (Meyer and Assunção, 1990; Mela *et al.* 1998). In addition, consumers stock more when the probabilities of shortages are high. Stockpiling behavior occurs when consumers attempt to mitigate the negative impact of a retailer supply shortage (Yoon *et al.*, 2018; Dong and Klaiber, 2019). The impact of these variables depends on the type of product and its availability/accessibility. The literature points out that storage varies among product categories, e.g. dangerous products (Grossman *et al.*, 2012; Pearson *et al.*, 2017); fresh (Yang *et al.*, 2006) and grocery products (Ailawadi and Neslin, 1998). Finally, Pozzi (2013) found that the emergence of e-commerce has led consumers to store more products and to make bulk purchases because home-delivery services remove the inconvenience of having to transport heavy and unwieldy shopping baskets.

The influence of consumer characteristics, equipment, and resources

Storage is also influenced by individual variables: sensitivity to gains or losses (Krishnamurthi and Mazumdar, 1992); price sensitivity (Gangwar *et al.*, 2014); purchase frequency (Su, 2010); consumer cyclical purchase behavior (Park and Gupta, 2011); consumer desire to reduce transaction costs (Garrod *et al.*, 2019); “consumer stock aversion” (difficulty accurately estimating the stocks they have at home) (Chandon and Wansink, 2006); and lack of consumer

knowledge about refrigeration (Yang *et al.*, 2006). Lifestyles are also explicative variables. Patterson *et al.* (1997) pointed out that household eating habits have an impact on storage habits. Consumers' resources and equipment (i.e. "storage capacity") also impact the level of storage. Bell and Hilber (2006) showed that consumers who have less storage space available go shopping more often and buy smaller quantities on each trip.

Consumer storage that generates costs for companies and affects marketing strategies

The literature shows that consumer stockpiling generates additional costs for firms: it leads to more intense promotional competition, a reduction in profits (Bell *et al.*, 2002; Sigué and Karray, 2007; Guo and Villas-Boas, 2007), and lower margins (Ailawadi *et al.*, 2007). Consumer storage behaviors thus lead companies to adjust the frequency and depth of promotions. Tellis and Zufryden (1995) and Osborne (2018) proposed models to optimize time lapses and the frequency and depth of promotions. However, stockpiling may have a positive impact for firms. For instance, Glöser-Chahoud *et al.* (2019) argued that the large inventory of unused consumer electronic goods kept at home increases demand for new products. The literature also analyzes the link between the level of stock and consumer purchasing behavior. Kano (2018) showed that daily consumption depends on inventory. For Neslin and Stone (1996), household stocks did not play a particularly important role in later purchase decisions, but Guadagni and Little (1998) showed the opposite.

Consumer stockpiling in response to crisis

More recently, following the COVID-19 crisis, a stream of literature developed to understand consumer stockpiling in response to a crisis. The research focuses on food (Dammeyer, 2020) and products sold in pharmacies (Cameron *et al.*, 2021). This stream emphasizes that individual variables play a role in the propensity to stockpile in response to crises. Dammeyer (2020) showed that stockpiling was associated with high scores on Extraversion and Neuroticism, and low scores on Conscientiousness and Openness to Experience. Amaral *et al.* (2020) suggested

that the Locus of control (LOC), the extent to which a person believes the environment is controllable and responsive, is associated with the stockpiling decision. Precisely, consumers with internal LOC are less likely to stockpile than those with external LOC. In a comparative study conducted on 31 countries, Ahmadi et al (2022) concluded that fear and expectations of a supply shortage lead to stockpiling, but that the relative prevalence of these motives has evolved over the progression of the disaster. Beyond the COVID-19 crisis, some authors have also become interested in other forms of crisis such as hurricanes (Pan *et al.*, 2020).

Consumer storage that may affect consumers' health

Finally, some research has analyzed household food storage and the effect of these practices on health risks, particularly on infectious diseases (e.g. salmonella, legionellosis) and mortality. For example, these studies examined the question of household storage of fresh products such as eggs (Junqueira *et al.*, 2022), tomatoes (Wang *et al.*, 2017), pork (De Cesare *et al.*, 2017; Gurman *et al.*, 2018), fresh milk (Crotta *et al.*, 2016), or even water (Uddin *et al.*, 2014). Such articles point to consumers' lack of knowledge about refrigeration, and thus their unsatisfactory storage of fresh products (Yang *et al.*, 2006).

Theme 4: systemic consumer logistics (integrated analysis of inbound CL)

Rather than examining a single sub-logistics activity (e.g. channel choice, transport, or storage) as their unit of analysis, some articles (N=19) adopt an integrated and systemic view of inbound CL. Some of them try to conceptualize consumers' logistics roles in retail supply chains; others propose taxonomies of CL participation in retail supply chains; finally, a few articles assess the impact of (inbound) CL on the environment and product quality.

Several conceptualizations of the logistics roles of consumers in retail supply chains

Stolze *et al.* (2016) developed a shopper service ecosystem framework, bringing together the Service-Dominant Logic from marketing and the service ecosystem perspective from SCM. In a conceptual paper, Esper and Peinkofer (2017) pointed out that several SCM processes, as well

as decision effectiveness and efficiency, are directly based on or influenced by end-consumers. Accordingly, they propose the concept of “consumer-based SCM performance”. Rouquet *et al.* (2017) studied how firms and consumers transfer logistics activities to each other (insourcing or outsourcing) and introduced a theoretical model inspired by the services literature, which demonstrates that supply chains are co-produced by retailers and consumers. Some authors (Canu and Cochoy, 2012; Cochoy *et al.*, 2015; Hagberg and Normark, 2015) explored “pedestrian logistics” and how the everyday activity of carrying goods from store to home has evolved over time. Such logistics highlight the role of the types of container (personal objects and branded bags) or equipment used, as in strollers or trolleys (Lalanne *et al.*, 2016), and introduce the concept of “vehicle agency”, which refers to a “hybrid and moving entity comprising a person and her things” (Calvignac and Cochoy, 2016, p. 133).

A variety of taxonomies of CL participation in supply chains

Another series of articles has tried to classify consumers’ logistics participation in supply chains. First, some authors propose categorizations of logistics functions that consumers may participate in. Bahn *et al.* (2015) identified 10 logistics functions: inventory needs assessment and planning; transportation management; interdependent transportation; contingent transportation; materials handling; storage management; location of acquisition; intra-household communications; information search; and intra-store communication. Hüseyinoğlu *et al.* (2020) only found six functions, which they combined into three macro-functions: storage management and inventory needs/assessment; transportation management and materials handling; and contingent inventory operations and product acquisition. A second series of articles proposed typologies of CL participation. Granzin *et al.* (1997; 2005) identified six shopper segments classified by type of logistics contribution, sociodemographic characteristics, and purchasing behavior: searchers, carriers, outsourcers, communicators, sovereigns, and uninvolved. Adopting another perspective, Goudarzi and Rouquet (2013) highlighted four

possible roles for customers in retail supply chains, depending on whether they are actively involved in transport and/or storage activities: logistician, transporter, handler, and served. In a research in the omni-channel context, Wang et al. (2022) identified four structuring dimensions of shoppers' logistics activities: information gathering, integrated shopping experience, intellectual activities for delivery, and physical activities for delivery.

The impact of CL on the environment and on product quality

Finally, two papers studied the impact of CL on the environment and on consumer health. Rosa *et al.* (2017) analyzed the overall lifecycle of the chestnut, considering three consumer activities: consumer transport, consumer storage, and chestnut boiling. To decrease the environmental impacts of chestnut supply chains, it is important “to reduce energy use in storage and cooking” at the consumer level (Rosa et al., 2017, p742). Godwin and Coppins (2005) conducted a transversal analysis of how consumers buy, transport, store, and handle foodstuffs and how this influences the quality of a product. They argued that both the handling of chilled foodstuffs and household refrigeration (use of an icebox for transport a thermometer in the refrigerator) are particularly critical. According to them, there is a need to “disseminate current food-safety and home-refrigeration information as consumer lifestyles adapt to the changing global economy” (Godwin and Coppins, 2005, p. 55).

Theme 5: outbound consumer logistics

While the previous articles (N=143) dealt with inbound CL (from physical distribution channel selection to home storage), some rare articles (N=12) studied outbound CL (from home to outside) and consumer participation in other types of supply chains. First, some articles studied CL involvement in reverse supply chains. Second, some studies analyzed involvement in the sharing supply chain, enabling its expansion.

Consumers' pivotal logistical role in reverse supply chains

Several papers analyzed consumers' active role in reverse supply chains. Monnot *et al.* (2014) showed that consumers who sort their garbage use three types of logistics – consolidation, just-in-time, and pooling – depending on how they coordinate the three logistics activities of separating, storing, and shipping the waste. Jalil *et al.* (2016) showed that households occupy a pivot point as a first-tier supplier in a reverse logistics system and that there is a symbiosis effect between household waste recycling systems and household recycling behavior. Bing *et al.* (2014) studied plastic recycling in the Netherlands, comparing several scenarios that integrated CL: a recycling strategy in which consumers sort the plastic at source is more efficient than a strategy in which sorting occurs after waste collection. Halldorsson *et al.* (2019) stressed that households are co-producers of logistical services, providing important inputs in the form of sorting and moving waste and raw materials into new cycles of goods circulating in the logistics system.

CL behind the expansion of sharing economy supply chains

Recently, some articles investigated CL participation in the expansion of sharing economy supply chains. Although the majority of the sharing economy literature focuses on the key role of digital platforms, some articles pointed out that this new economy also relies on physical platforms and consumers' logistics activities (Carbone *et al.*, 2018). Carbone *et al.* (2017) showed that consumers possess different logistics resources and competences, which help to develop four types of “crowd-logistics” services: storage, local delivery, freight forwarding, and freight transport. Rouquet *et al.* (2018) explained that consumers can set up consumer-to-consumer supply chains to facilitate the exchange of second-hand products among consumers (e.g. eBay, etc.). These chains have four features: their perpendicular orientation relative to traditional supply chains, the amateur status of their actors, their social embeddedness and their direct structure. Finally, Le Goff (2022) showed that consumers do not appreciate taking over these consumer-to-consumer logistics, and that it is relatively inefficient.

Discussion: the challenge of stimulating systemic and sustainable CL research

The objective of this article was to review the current state of research on CL. The first lesson of our SLR is that CL remains little explored and is the subject of very fragmented research, in the sense that logistics activities are often studied independently of each other. In the future, the challenge is to develop more systemic approaches that consider all logistics activities and the links between them. The second lesson of our SLR is the crucial role of CL in sustainability. The challenge for the Sustainable SCM (SSCM) literature is to better integrate CL (Table 1).

Stimulating more systemic CL research

At the end of our analysis of 155 articles published on CL over more than 30 years, we conclude firstly that this field remains little explored and fragmented. This conclusion is all the more obvious, given that among these 155 articles, many works do not refer to CL explicitly, and limit their analysis to one consumer's logistics activity in isolation. This fragmentation is also evidenced by the extreme diversity of journals publishing work related to CL, and by the fact that since the founding works, no global framework has been proposed. However, if we follow the literature on logistics and SCM, it is crucial to develop an integrated and systemic approach to physical flow (e.g. Mentzer et al., 2001; Christopher, 2005). From this point of view, three aspects should be investigated in future in order to better understand CL globally.

One aspect is to better explore consumers' logistical processes. While most of the literature mobilizes quantitative approaches to analyze a logistical sub-activity, researchers should use more qualitative approaches to understand how consumers articulate the various activities of CL. An interesting avenue would be to adopt more comprehensive approaches, drawing perhaps on methods used in the "Consumer Culture Theory" area of marketing (Arnould and Thomson, 2005): home observation, photography, and videos. Understanding these processes better is all the more key because consumers act very differently from firms, collecting objects (Belk, 1995; Gao *et al.*, 2014) and sometimes tending to keep everything (Guillard and Pinson, 2012).

A second aspect for investigation is how logistics coordination is organized between members of the same household system. To a large extent, the literature tends – almost exclusively – to analyze CL from an individual perspective. However, household logistics is shared between members and requires communication and coordination among members of the household system. How do households organise themselves to coordinate their logistics flows? How do they divide up the different logistics tasks? What micro-practices do households set up to manage their everyday logistics tasks? Sociologists have approached such domestic issues from many angles, such as gender equality, stressing the domination of men (Bourdieu 1998). The challenge is not to explain the historical reasons for this division but to propose a logistical analysis of coordination between members of the same household system.

Finally, the literature reveals many variables that influence each of the CL activities (e.g. transport, storage, channel choice), but no integrated model exists to understand how consumers make decisions about CL. Researchers could study how consumers integrate (or not) these interdependent decisions. They should also try to provide a systemic view of the factors that determine CL decisions and the consequences that CL can generate. Precisely, research could seek to develop an integrative behavioral model of CL, which would identify the logistical, experiential, contextual, situational, and individual determinants of CL and its effects on the consumer, and on business and the environment. Based on the studies synthesized in this SLR, Figure 4 summarizes the variables that influence CL and those that CL influences in turn.

< Insert Figure 4 >

Stimulating sustainable CL research

The other conclusion that emerges from this SLR is that CL refers to issues of sustainability. In general, these issues, less prominent in the 1990s than today, hardly figured in the theoretical frameworks of Granzin and Bahn and Boyd and McConocha, which only emphasized the existence of disposal-related flows. However, our SLR highlights that several sustainable topics

such reusable packaging, (food) waste, CO₂ reduction, food deserts, or disadvantaged shoppers, are closely related to CL. This impact of CL on sustainability is all the more important to emphasize since the literature on SSCM neglects consumers, and focuses mostly on supply chain companies (e.g. Carter *et al.*, 2018; Khan *et al.*, 2021). The challenge for work in SSCM is to recognize that consumers are stakeholders in supply chains and to see how they can contribute to the development of SSCM. In this context, three points are worth exploring.

The first is measuring CL's carbon footprint. The impact of CL is not included in global estimates of logistics' carbon footprint, which only consider warehousing activities and freight transport (McKinnon, 2018). However, to reduce the carbon footprint of supply chains, all emissions must be integrated, otherwise counterproductive decisions may be made. The challenge is to better assess the carbon footprint of CL, and to deepen existing research that has sought mainly to assess the impact of consumers' freight transport and to compare the carbon impact of different physical channels (e.g. Edwards *et al.*, 2012; Carling *et al.*, 2013). The key question is to identify which supply chain configurations are the least carbon-intensive globally. This is a major issue, as the latest IPCC report underlines the urgency to act as soon as possible in the hope of containing the consequences of global warming within reasonable limits.

The second point is the logistics capabilities of consumers. Consumers are not all equal, and their capability, as Sen (1999) conceptualized it, to take on logistics is unevenly distributed. First, some logistics tasks require effort and generate fatigue, requesting physical capabilities from the outset (Monnot *et al.*, 2014). If they depend on age (Teller *et al.*, 2013), they are also linked to the disability discussed in disability studies (Albrecht *et al.*, 2001). In addition, financial capacity plays a key role, as illustrated by the weight in logistical decisions of a factor such as car ownership. Finally, the role of the household home is crucial, in the sense that it determines the storage capacities of households, as well as the product distribution services that are accessible. The challenge here is to help increase the logistical capacities of consumers, in

order to promote their inclusion in consumption systems. This is especially important because the way in which individuals handle logistics can affect the preservation and quality of products and thus, ultimately, their health and integrity.

The third point is the role of CL in driving the shift towards a more circular economy (Geissefoerfer et al., 2017). The emergence of such an economy depends on consumers putting their used products and waste back into circulation. However, as our SLR has shown, only a tiny part of the literature (12 articles out of 155) focused on these outbound flows. More research should focus on CL associated with waste recycling (e.g. Monnot et al., 2014; Halldorsson et al., 2019) in particular by studying types of waste other than food (e.g. electronic waste). Researchers should also keep studying the circulation of second-hand products, which underpins the sharing economy (e.g. Rouquet et al., 2018) and is currently booming.

< Insert Table 1 >

Managerial and societal implications of CL research

Developing future research on CL is all the more important as it raises managerial and societal issues. At the managerial level, CL decisions have multiple effects on companies, influencing their promotional strategies, the weight of each distribution channel they set up, and the volume and type of products that consumers purchase. On a societal level, they affect the planet in terms of carbon impact and resources consumption; they also influence consumers' health.

Managerial implications of CL

A better understanding of CL will have important managerial implications, particularly for retailers. First, as shown in Figure 4, CL influences many strategic variables for retailers, particularly that of satisfaction. Second, any retail strategy induces a certain distribution of logistics activities between retailers and consumers. By rethinking the way the logistics tasks are organized with consumers, retailers can innovate and design new formats (as they did with drive-through stores) or concepts as part of existing formats (as they did with self-scanning).

Finally, as retail formats multiply, it is not relevant for a retailer to propose to its consumers all the existing formats (store, drive, click and collect, home delivery, etc.). The challenge is to identify a mix of retail formats that logistically suits the customer segments they target.

The managerial stakes of CL for retailers seem all the more key as many new entrants are currently trying to take advantage of the digital boom to develop new logistic services and build relationships with consumers. This is particularly the case for several firms in the sharing economy (e.g. Postmates, Instacart), members of GAFAM (e.g. Google Home and HomePod), but also for some Logistics Services Providers (LSP). That may, in the long term, damage retailers' privileged relationship with consumers. In addition, in a context where everything needs to be immediately obtainable, consumers expect a great deal from retailers in terms of logistics services. Amazon has understood this perfectly with its service 'Prime Now', which delivers what people want, when people want. New services, such as individual parcel delivery services, are also being developed in urban areas as part of the collaborative consumption trend.

Societal implications of consumer logistics

A better understanding of CL also has societal implications. The first of these is environmental, as logistics activities affect the environment substantially (fuel consumption, greenhouse gas emissions, etc.). Through their choices of transport modes, consumers are responsible for some of the ecological impact of logistics. They are also the principal suppliers of reverse and sharing supply chains that make product recycling or reuse possible. It is thus important to help them reduce the environmental impact of their logistics. For example, the authorities could take inspiration from the integrated eco-logistics processes implemented by firms. The challenge would be to promote a circular economy connecting traditional and reverse supply chains.

In addition to these environmental challenges, a second societal challenge lies in the promotion of a form of fair logistics between consumers. As stressed above, consumers are not all equal in terms of logistics capabilities. Depending on their physical capacities, their socio-economic

status, the location of their home, and their personal logistics resources, consumers will find it more or less difficult to organize their logistics. To reduce these disparities and favor inclusion, the State and local authorities could implement logistics policies to enable everyone to consume without being penalized by the complexity of the logistics issues they face. Ultimately, the challenge would be to go beyond the question of access to transport or shops, which are usually kept apart, and to take an overall, sustainable perspective. Finally, consumer logistics choices are not neutral in terms of product conservation, and it is important to both accompany and train households in this area in order to avoid the disastrous effects of potentially bad practices on consumers' health and well-being.

Conclusion

The contribution of this article is to provide the first interdisciplinary synthesis of existing knowledge in the field of CL. While it constitutes the first attempt to map existing knowledge in this area, this article is not free from methodological limitations.

The main limitation of this work relates to the CL definition with which we framed our SLR. On the basis of seminal articles on the subject, we opted for a definition that could be completed or modified in future work. Despite our attempt to build an exhaustive database of articles for our SLR (use of the synonyms “consumer”, “household”, and “shopper”, for example), we may have left out important keywords that might extend the database. We focused on the use of these keywords in titles and abstracts, thus we may have missed some articles on CL. Moreover, the topic of CL is hidden in many areas related to services, retail, or economic geography that might have not been taken into account because of the choice of keywords. Finally, our SLR did not include any books, although some do deal with CL (e.g. Rimmer and Kam, 2018). Because of these limitations, it may be useful to replicate this research, extending the SLR to include other relevant keywords or other types of content.

To conclude, it is clear that future research on CL will require close collaboration between researchers from marketing and logistics/SCM. It is noteworthy that two marketers, Granzin and Bahn (1989), published their seminal article on CL in a special issue of a marketing journal that was dedicated to logistics/marketing interfaces coordinated by one of the founding fathers of logistics and SCM, the late Donald Bowersox. This leads us to reiterate Granzin and Bahn's (1989) call for cross-disciplinary research to develop a more in-depth and global view of consumer behavior. This could be done through special issues on the subject that could be hosted in logistics/SCM or marketing journals, through collaboration between researchers from the two disciplines, and mobilization of the methods and concepts used in the two disciplines.

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Figures

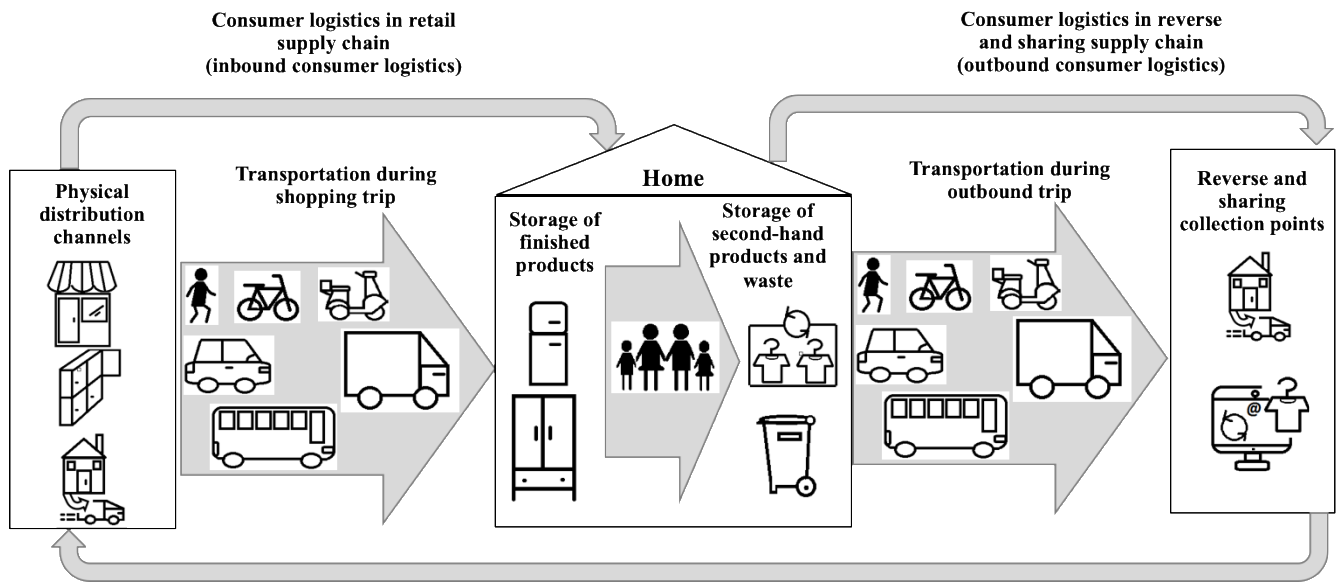


Figure 1. Framework of consumer logistics

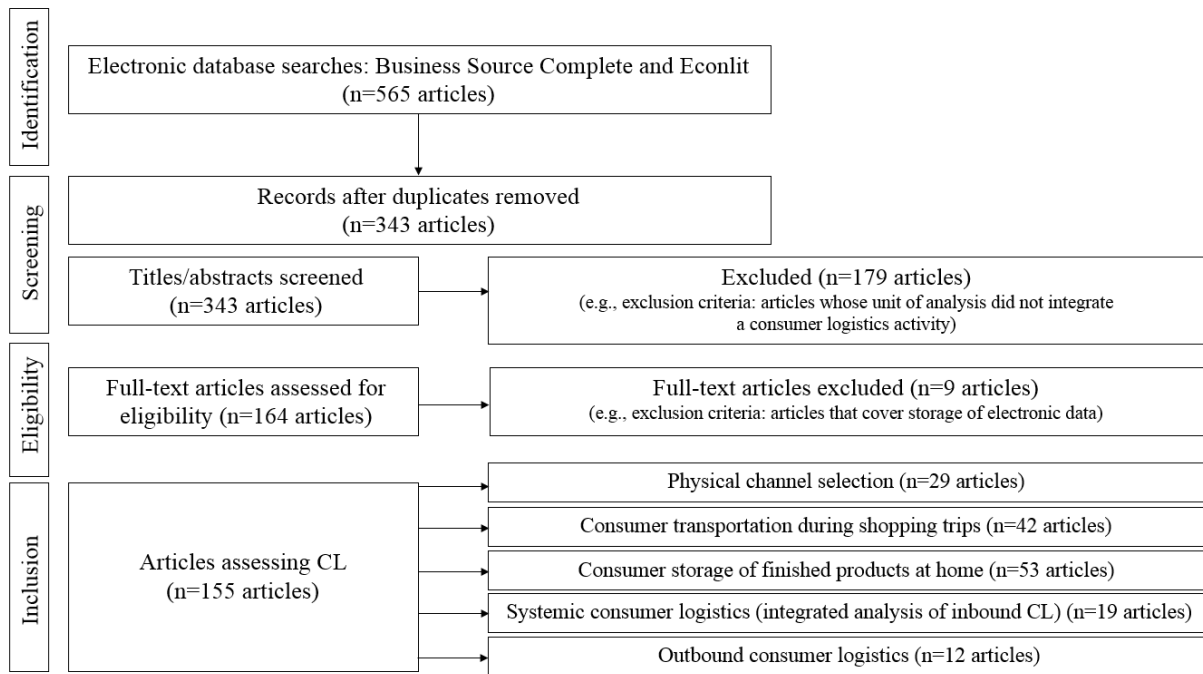
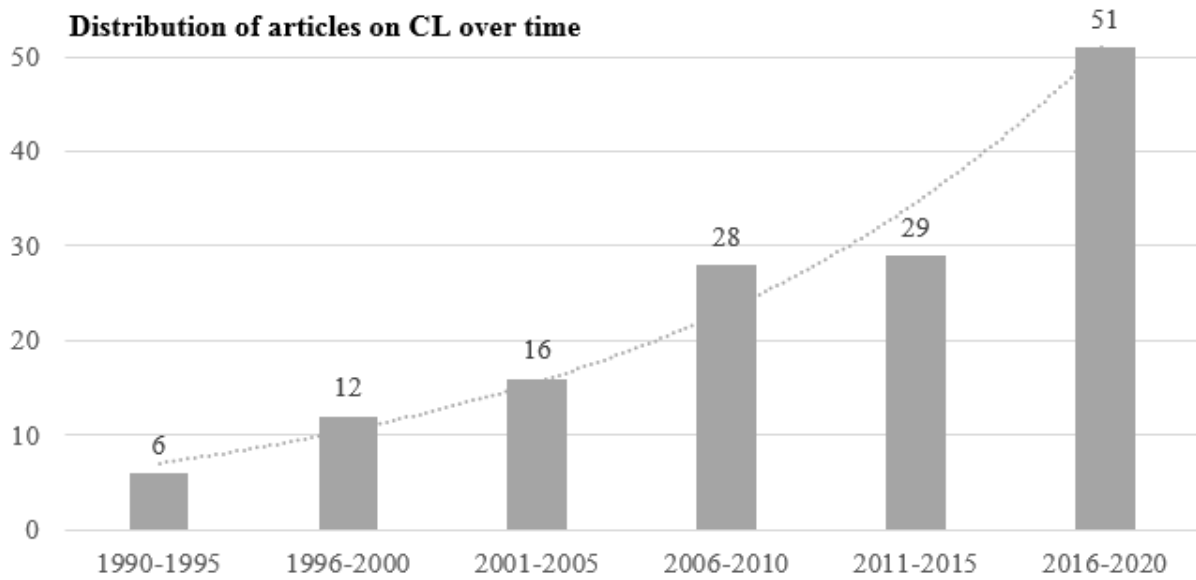


Figure 2. The PRISMA flow diagram of the SLR approach



Journal discipline	Total
Management	79
Marketing	53
Logistics and SCM	17
General	3
Operations	4
Services	1
Information systems	1
Other disciplines	56
Transport	22
Economics	15
Food	6
Human Health	5
Operations Research	3
Environment	2
Urban	1
Psychology	1
Anthropology	1
Interdisciplinary	20
Total	155

Methodology	Number of articles
Quantitative	119
Model	75
Survey	38
Experiment	6
Qualitative	22
Case studies	12
Interviews	3
Archeology	2
Ethnography	2
Focus Group	2
Fiction	1
Conceptual	8
Mixed design	6
Total	155

Figure 3. Description of the articles in the SLR

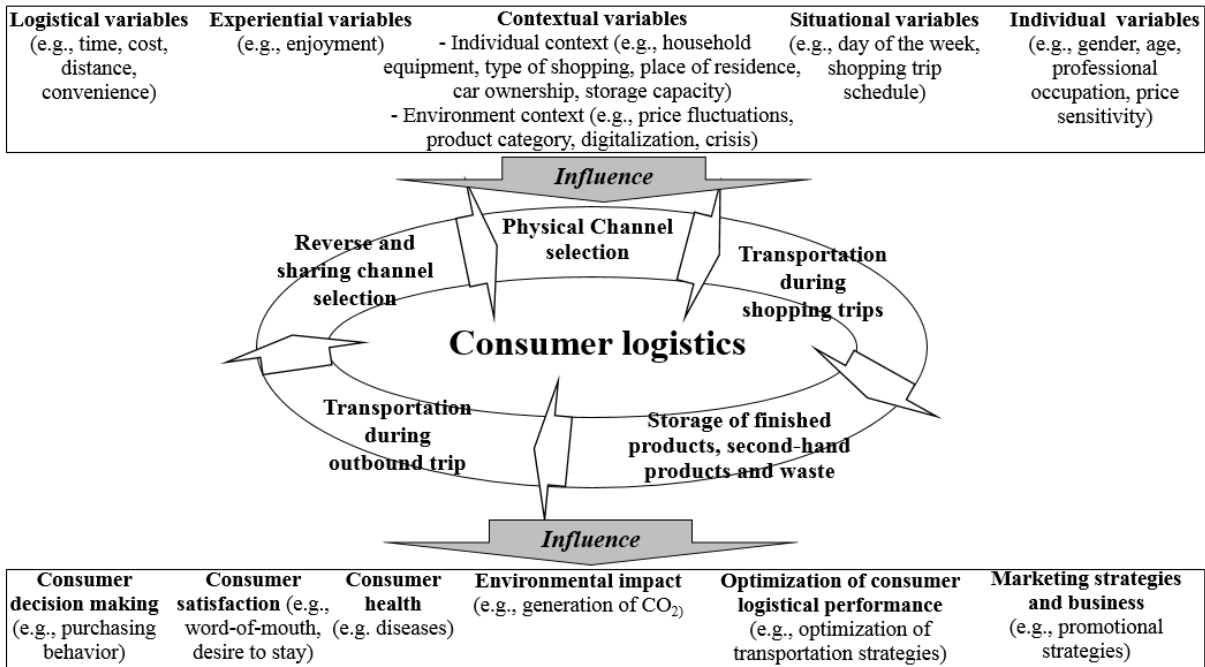


Figure 4. Model of CL decisio

Tables

Thematic	Sub-themes	Questions	Methodologies
Systemic CL	CL processes	How do consumers combine the different activities of CL? What are the interdependencies between consumer storage practices, transport, and physical channel selection? What are the different types of CL processes implemented by consumers?	<u>Qualitative studies.</u> In-depth longitudinal case studies of a sample of households with the use of multiple data collection techniques (observations, interviews, consumptions data, etc.). Semi-structured interviews with households from different sociodemographic backgrounds on their channel selection, storage practices, and shopping trips
	CL coordination	How does a household organize itself collectively to coordinate logistics flows? How are logistics tasks divided up between members of the household or those of other households? How do households communicate about consumer logistics activities?	<u>Qualitative studies.</u> Group interviews with the members of a household on flow coordination. Observations in the kitchen during meal preparation and in stores during shopping trips. Filmed observations to analyze everyday family logistics depending on type of consumption (market, supermarkets)
	CL decisions	How to develop an integrative model of CL decisions? Which determinants explain CL decisions? What impact do CL decisions have on consumers, companies, and the environment?	<u>Quantitative studies.</u> Development of an integrative model of CL behavior by conducting a survey. Test of the influence of: 1) the different individual, contextual, and situational determinants on CL decisions; 2) CL decisions on several variables linked to consumers, companies, and the environment
Sustainable CL	CL carbon footprint	What is the carbon footprint of CL? What differences exist among consumers? Are consumers aware of the carbon impact of their logistics? How do consumers decrease their carbon impact?	<u>Qualitative and quantitative studies.</u> Assessing the carbon footprint of consumer logistics activities using available methodologies, for different types of consumers (urban vs. countryside, rich vs. poor, single vs. family). Semi-structured interviews on their perceptions of the carbon impact of CL.
	CL capabilities	What are the logistics competencies and resources of consumers? Can we establish consumer logistician capabilities profiles? Who are the disadvantaged shoppers? How does being over- or underequipped logistically influence consumption choices?	<u>Mixed studies: qualitative then quantitative</u> Observation and semi-structured interviews of consumers in their homes to identify their logistics resources and competences. Joint analysis to identify consumer profiles. Design and test of a scale to measure CL capabilities.
	CL in the circular economy	How do consumers organize the reuse of second-hand products and waste? What are the techniques used by consumers to decrease their level of waste? What factors can explain consumer participation and engagement in outbound CL?	<u>Qualitative and quantitative studies.</u> Case studies of consumer-to-consumer supply chains (second-hand items, bartering). Semi-structured interviews on the techniques used by consumers to limit their level of waste. Survey to test the influence of logistics factors on consumer participation in outbound CL.

Table 1. Stimulating systemic and sustainable CL research