E-commerce Delivery: Which Links with the Consumer?

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***Abstract*— In recent years, the topics of urban logistics and consumer behaviour have attracted considerable interest from researchers and practitioners. As cities rapidly urbanize and customer service expectations increase, the corpus of research on these topics has become fragmented. This article is interested to describe the impact of consumption patterns on urban goods transport, we have also taken the opportunity to detail the different situations of e-commerce delivery. Our paper outlines perspectives in relation to the evolution of consumption. It studies how e-commerce is profoundly changing the way cities are distributed and proposes solutions that can organize the transport generated by this mode of consumption. Our theoretical article contributes to theory and practice in several ways. (1): This article allows researchers and urban logistics professionals with a comprehensive and holistic view of e-commerce delivery; (2): This article can help practitioners to analyse consumer behaviour in the future research in order to identify the most decisive and significant factors.**

***Keywords*—** *Urban Logistics, transportation, Last Mile, Consumer Behaviour, E-commerce*

1. Introduction

Urban logistics is first and foremost the mobility of people, pollution peaks, green neighbourhoods, sustainable mobility, car sharing, bicycle travel, tramways – all these ideas and concepts testify to a profound change in cities and the role of transport in people's daily lives. The mobility of goods within a city is an essential component of collective life. Located in a crossroads of urban planning, transport, commerce and ecology, urban logistics has a complex perimeter. Each of these four components has its share of truth in an equation that needs to be invented.

More than a simple construction site, urban logistics, to be recognized, must be implicated in the problems of each of these components. It is necessary that any local plan or urban planning program takes urban logistics into account. In the same way, the creation or reorganization of an urban transport network must involve the "goods" issue. The action of dynamizing commerce in the city, whether it be shopping centers, markets or shopping districts, has necessarily a component of urban logistics. As for ecology, it is of course impacted by urban logistics measures that go in this direction. The development of e-commerce, the evolution of our consumption habits and the famous last mile problem force us to rethink and reorganize parcel distribution. A look at some aspects of the history of urban goods transport, which is marked by major changes in consumption and distribution patterns, enables us to understand the road we have travelled, but also the changes caused by our lifestyle (consumer behaviour). In order to understand the problem of urban logistics and more specifically, last mile logistics in e-commerce, it is necessary to start from the customer. It is the final customer who chooses to buy on the internet. He must choose how he wants to receive his parcel and if he is willing to pay.

Our research problematic is based on the following questions:

(1) How are new consumption patterns changing the logistical pattern of cities?

(2) How does e-commerce delivery relate to the final customer?

To answer these questions, we provide a literature review for e-commerce delivery. Next, we outline the methodology followed, and finally, we will describe the impact of consumption patterns on urban freight transport and detail the different e-commerce delivery situations.

2. Literature Review

Research on urban logistics and e-commerce can be characterized as inconsistent and diverse, both in terms of definitions, data, theoretical approaches, methodologies and findings. It is still difficult to establish an obvious general direction. Furthermore, the existing studies are insufficient to draw a definitive conclusion on the relationship between urban logistics and e-commerce. It is generally assumed that e-commerce is a developing aspect of an increasingly digital age, and that it continues to grow and expand into new markets and industries. According to [1], reduced number of physical stores, consumption pattern changes and increased use of smart phones are all factors that can drive the growth of e-commerce.

A growing body of research has focused on the effect of e-commerce on urban logistics. This research addresses issues related to failed delivery and returns [17], [25], [39], [60], consolidation and cooperation [54], [69], time windows [01] [34], the prevalence of home delivery transportation in urban areas [33], [59] and the changing nature of urban supply and value chains [22], [23] ,[26], [60], [66].

However, the predominant body of research examines the impact of e-commerce on consumer mobility and explores a range of implications and influences. Through an evaluation of the life cycle of electronic commerce and in-store shopping, [27] concluded that there is no required environmental benefit of e-commerce, as the environmental effect of electronic commerce depends on consumer behaviour and travel mode choices. Current researchers have not achieved to understand the way that e-commerce influences the consumer travel patterns. While several papers indicate that electronic commerce can replace consumer trips towards physical stores, other publications suggest a small or non-existent impact on travel behaviour.

E-commerce can change consumer mobility through modification, neutrality, substitution or generation [38]. Several research studies have shown that e-commerce can make personal travel more sustainable as it replaces trips towards physical stores [18], [44], [51], [53], 55], [64]. However, this impact may be overestimated due to the fact that surveys do not consider chained trips [46]. Furthermore, other studies show no effect on consumer mobility [06], [28], [63], [68]. On the contrary, most studies indicate a complementary or neutral effect [09]. Replacing physical travel by e-commerce is a real challenge, as shopping represents one of the valued leisure activities [45].

Researchers whose have investigated a similar topic to this research have examined several factors that influence the correlations between e-commerce and travel behaviour. The impact of electronic commerce on consumer mobility depends largely on characteristics of the consumer, the household and localities [19], [68]. According to [16], the environmental impact of shopping depends on the consumer's willingness to use less polluting travel modes. Simultaneously, [49], [57] reported that climate impacts are determined by the mileage distance between the consumer's home and the physical shopping location [07], [44]. In addition, the impact of e-commerce on urban logistics depends on the increased use of relay points in rural and suburban areas, as well as the way deliveries are made [39]. Impacts could also result from the degree to which consumers adopt new technologies and practices (innovation hypothesis) or their lack of access to physical stores (efficiency hypothesis) [33].

3. Research Methodology

Our documentary research that focuses on urban logistics and e-commerce is mainly based on bibliographic sources, which will allow us to approach the subject in its entirety while broadening our field of reflection. The objective of our paper is not only to determine the theories put forward in the fields of last mile delivery and e-commerce, but also to identify the researchers who have done work and studies on a topic similar to that of our research.

This purely theoretical approach calls upon various readings necessary to enrich our knowledge in terms of notions such as: urban transport of goods, urban delivery, last mile, e-commerce, consumer behaviour, relay points, home delivery, hybrid and electric vehicles...

3.1 Formulation of the research questions

In formulating the research questions, we focused on studies that deal with last-mile delivery and e-commerce. These questions were formulated through discussions and dialogues between the authors, as well as by reading scientific articles. Based on this process, our paper aims to answer the following questions:
(1) How are new consumption patterns changing the logistical pattern of cities?
(2) How does e-commerce delivery relate to the final customer?

3.2 Definition of the research strategy

During this phase, we selected the best search engines, namely Scopus, Cairn, Emerald and Ebsco, which allowed us to identify the maximum of articles published between 2000 and 2021 that deal with our theme. The reading of titles, abstracts and/or conclusions enabled us to identify several pertinent articles. However, certain criteria were used to filter these articles: (1) the article must be written in English or in French; (2) the article must be published between 2000 and 2021; (3) it must be a journal article or a peer-reviewed review.

4. Results & Discussion

4.1 How are new consumption patterns changing the logistical pattern of cities?

Since the 21st century, every period of history has been marked by important developments in consumption patterns and distribution. From department stores to mail order, consumption, distribution of goods and transport have evolved. But we have probably never in history experienced a similar upheaval in consumption patterns as in the last twenty years. E-commerce, the use of mobile phones and tablets, and the drive, have significantly changed the way we buy, our habits, our demands, and the way goods are distributed [31]. The internet brings us a choice never imagined before, the possibility to buy from all over the world, the possibility to see, to inquire, to compare prices, to order without moving, to receive without moving, to return, if necessary, to exchange, to sell … [32]. The act of buying has become simpler and access to an infinite number of data changes our behaviour. However, the final part of the logistics organization: the transport of the last mile, has changed little.

4.1.1 E-commerce is transforming expeditions

The double-digit growth of e-commerce and the slight decrease in the average shopping basket, which is possibly due to the economic situation, have resulted in a steady increase in the number of parcels, these parcels which essentially relate to B-to-C orders, corresponding to an increase in individual deliveries of goods that were previously purchased in shops, and therefore delivered in a massified manner in pallets [05]. The growth of C2C commerce, with eBay or Leboncoin, also contributes to this phenomenon. For the last mile, the main effect of e-commerce has been to increase the number of parcels and therefore deliveries. Shipment in individual packages rather than pallets generates cartons or plastic envelopes, cushioning materials and volume. A pallet shipment necessarily takes up less space and requires less packaging, for the same total volume transformed into individual packages.

E-commerce is also changing the actors in the transport chain. Traditionally, the B-to-C and C-to-C delivery operators in most countries are the postal operators. The other operators have for a number of them, a historical positioning on B to B [50], [61]. They are naturally seeking to gain a presence in this growing market for delivery. However, they do not have the same organization as the Post Office for access to buildings and for managing pending parcels. The public postal operators all have an extensive network of post offices throughout the country. The relay point companies also have a non-negligible market share [12].

4.1.2 The city is a producer of flows

E-commerce has another special feature: returns. For many products, such as clothing or shoes which presents a very important segment of e-commerce, the high rate of returns makes the city a producer of flows. Worldwide, the footwear sector is logically the one that generates the highest percentage of returns. Some countries, such as Great Britain and Germany, have even higher return rates, the habit being to order several sizes in order to try them on

at home and return those that do not fit [41]. The rate of returns for the clothing sector, even if it does not reach that of footwear, is also very high. The principle of returns is not new, but the levels reached and their progression challenge us. Returns have a strong impact on the logistics chain by causing reverse flows. These flows must be dropped off, collected and then routed to a central processing point so that the bulk of these products put back into the logistical circuit, before customer reimbursement. This is therefore a trend that substantially changes the logistics flows of a city [04].

4.1.3 The Drive-Phenomenon

The principle of the drive is to order groceries on the Internet and to collect them with one's vehicle in a peri-urban space provided for this purpose [47]. The advantages of the drive are to combines the collection of groceries with other journeys such as the home-work journey, but also to save time. Three models of drives exist. In the click and drive model, the customer collects their shopping in a dedicated area equipped with parking lanes. In this case, they can remain in their car. The click and drive model is available as a "solo" drive, i.e. independent and combined with a warehouse for preparing orders, and as a drive attached to the store, which is in this case a simple withdrawal point in addition to a supermarket. There are also drive-through services, which are collection points at the shop reception. The customer must then get out of their car and go to the store [10]. The drive is in some ways a relay point, dedicated to a brand and adapted to the purchase of everyday food and household products. The absence of regulations and the commercial aggressiveness of chains offering prices identical to those of hypermarkets have contributed to the development of the drive-through in most large towns. From a logistical point of view, it can be considered that the drive competes with traditional mass retailing, hypermarkets and supermarkets, even if the actors all come from this sector. It is also changing consumer purchasing behaviour, with the average basket being half that of a hypermarket [08]. It is likely to reach the convenience store by providing a very low-cost solution.

4.2 How does e-commerce delivery relate to the final customer?

B-to-C e-commerce distribution is a considerable source of opportunities for virtuous practices [40]. Even if these opportunities arrive much later than the development of this form of commerce, we are remarking real evolutions and concrete achievements. To understand the problem of the last mile in e-commerce, it is necessary to start from the customer. It is the final customer who chooses to buy on the Internet. They must choose how they wish to receive their parcel. The free transport offered by many sites is a commercial choice of which we can see the limits. It is not applied in all countries. This commercial choice means a frantic race for the cheapest, least efficient and least profitable transport for the service provider and for the various stages of the delivery chain.

4.2.1 Home delivery

Recent studies show that a very large proportion of Internet users want their order to be delivered to their home. However, this is not the case in all countries. When the choice is made to deliver to an individual's home, it makes sense to be certain that he is present [20]. This principle may seem simple, but it is much less so in its implementation. Transport organizations are industrial organizations. They are used to delivering according to their own constraints, with the exception of some sectors such as retail, which has long imposed appointments. Agreeing on an appointment with the customer means organizing delivery rounds according not only to the carrier's constraints for optimizing the route, but also to the customer's wishes [03], [35]. The algorithm is then complex. It requires contact with the customer and, consequently, heavy administrative management, even if current technologies make it possible to simplify this connection. It is also the way of checking all the access constraints to the building. An appointment time should not be a 24-hour or even half-day slot, as this requires the individual to be present for too long. It should be a time agreed with the individual, as short as possible. This is the choice that made by Colizen, a subsidiary of Chronopost. This company, whose clients are the main e-commerce leaders, offers to deliver to Internet users by appointment and 2-hour time slot,

from Monday to Saturday and on Sunday morning. In order to deliver to Internet users when they want, it adapts its delivery slots until 10 pm. Of course, delivering by appointment at 10 pm represents a cost, but it is a service and a virtuous practice [21], [56]. Transport companies specializing in home deliveries also deliver exclusively in time slots, with very few delivery failures. Heavy and bulky goods, often transported by specialized networks, also operate mainly by appointment, but sometimes with very wide delivery slots [52]. Consumers are accepting of having to set aside half a day for the delivery of a refrigerator than for the delivery of a small parcel. Delivery by appointment corresponds to the most qualitative level of service and constitutes the 'top of the range' segment of last mile delivery. Its price is necessarily quite high, particularly because of the delivery times and days, which are the same for most Internet users. Some companies have implemented differentiated delivery prices according to time slots, which allows them to better balance the charge [31]. A variant of home delivery - which is developing very rapidly even if some companies are reluctant - is the delivery of packages to the workplace. This has the advantage of reducing delivery failure and potentially a certain level of consolidation on large tertiary complexes [61]. Delivery to the workplace, which is practiced in many companies, especially small ones, necessitates however the participation of an additional actor: the company.

4.2.2 Leaving the last mile to the internet user

The second set of solutions consists of entrusting the last mile to the Internet user, i.e., to deliver the parcels to a consolidated point, as close as possible to the Internet user's home, workplace or at passing points. This centralized method of delivery and return of parcels at the level of a neighbourhood, which has existed since the 1980s, constituted the traditional solution for the delivery of parcels outside the home for mail-order companies [29]. It has developed significantly as a result of e-commerce. Relay points are not specific to certain cities. The United States, with its convenience stores, and Japan, with its Konbini, have long since adopted this form of multiservice point or PuDo (Pick up, drop off) with the possibility of parcel collection. The low profitability of the shops makes the relay point more suitable for a rural or peri-urban model than for town centers. The relay point is subject to opening hours and closing days. It constitutes a solution to last-mile delivery, but one that remains imperfect for dense urban centers [36] [65].

A second solution that lets the Internet user carry out the last link in the delivery chain is click and collect [01]. This solution consists of delivering orders to a store of the website's brand. Retailers in all areas have gradually developed internet sales and therefore cross-channel [62]. Delivery to the retailer's shop, which is generally free for the Internet user, has many advantages and is very successful. This allows the retail group to consolidate flows and therefore minimize delivery costs. The cost of the relay point, even if modest, it is integrated into the operation of the shops. The main advantage for the retailer is to get the Internet user to come to the shop. in other hand, we can say that the Click and collect is also used for returns [37]. A variant of the relay point, directly derived from historical solutions, is the town office. Commercial premises dedicated to the collection and delivery of parcels, the town office finds new opportunities with e-commerce. In this concept, rather than being an ancillary solution to a business, the parcel management activity becomes the main activity. Some experiments, such as the Pickup Store set up by Pickup Services, make it possible to broaden the activity by creating a multiservice point concept in which parcel management is the central business [67]. This business can offer a concierge service, food sales departments, and a fast-track service, for example. Various similar experiments are being carried out in Great Britain by Network Rail with the Doddle concept, which is developing a network of shops specializing in receiving, returning and sending parcels. Another model being tested in the UK is the mobile relay point solution. This involves positioning a relay truck at a strategic location, for example a railway station [31].

In addition to the collection of parcels, the consigns also include several significant advantages. They allow parcels to be sent and returns to be deposited. Thus, a network of lockers spread over a territory can allow C to C parcels to be sent directly from locker to locker, without even having the name and address of the recipient. All that is required is a mobile phone number. This

number is used to send an SMS to the recipient to inform him/her of the receipt of a parcel in a given locker, which will have been chosen by mutual agreement between the sender and the recipient. We can imagine that physical relay point networks will also develop automatic relay points, especially for cities, in order to improve their service and the network of urban centers [13]. We can also foresee that some transport groups specializing in B-to-C delivery seek to invest in networks or acquire rights to use locker networks [02]. The cost of investing in a network of lockers will necessarily be a brake on the multiplication of networks and will encourage operators, even competitors, to pool their resources. It is possible that certain e-retailers, such as Amazon, will invest in their own deposit boxes [43]. The second issue concerns the location. The location of a locker must be adapted to the needs of the customers. Let's not forget that it is the customer who chooses to be delivered to a given point. The locker must therefore be located in a place that is suitable for collection, not too far from the user's home or in a place where people pass through [11]. In peri-urban areas, we can assume that some of the withdrawals are made by car. Shopping centers, petrol stations or office buildings are undoubtedly suitable locations. In dense urban areas, withdrawals are usually made on foot. Post offices, railway stations or public transport stations are suitable locations. It is also possible to imagine installing lockers in street furniture, directly on the road, even though security issues might require adaptation. Relay points, whether manual or automatic, are undoubtedly a relevant solution for collecting parcels. They allow parcels to be massed at points set aside for this purpose and avoid delivery failure. Their success is linked to the density of the network, particularly of cities, but also to their ease of access and opening hours [30].

4.2.3 Can we shorten the last mile?

There is another aspect of e-commerce delivery that allows the Internet user to collect his package by himself, while reducing the distance. Delivery to the workplace is an option that goes in this direction. Another example, widely used in all countries, is the courier. Delivery is made at home; the cost of this capillary delivery is gradually leading postal companies to question this principle in favor of community boxes [48]. That is, grouped together in specific locations. This is, for example, the direction chosen by Canada Post. This method of mail delivery in post office boxes is already very present in many countries. In dense urban areas, the habitat is most often made up of buildings, which have their own mailbox premises, or possibly a caretaker [24]. One idea to reduce the last mile distance while maintaining some consolidation of flows is the placement of parcel boxes in buildings. Few buildings have enough space to accommodate one box per flat. The idea is to install connected and shared parcel boxes in buildings. The Spanish post office, Correos, is experimenting with 1 m² units, containing about 5 different sized lockers, for dropping off and returning parcels. Some manufacturers, such as Decayeux, are working on this subject as well as on the creation of parcel lockers for individual housing. Placing the parcel locker at the entrance of a building or a house (like a mailbox) has certain advantages [14], [15]. First of all, the delivery failure is eliminated. The Internet user finds there an ideal service, since he can collect his parcel without difficulty. Distribution remains capillary, but more efficient. Indeed, a delivery person who places a parcel in a box provided for this purpose will carry out this operation much more quickly than during direct contact with a physical person. Finally, a point often evoked in defense of capillary delivery is the service provided to categories of people with reduced mobility or elderly people.

5. Conclusion and Future Research

This article is interested to describe the impact of consumption patterns on urban goods transport, we have also taken the opportunity to detail the different situations of e-commerce delivery. Our article outlines perspectives in relation to the evolution of consumption. It studies how e-commerce is profoundly changing the way cities are distributed and proposes solutions that can organize the transport generated by this mode of consumption. Giving a digital image to the city, by facilitating digital mobility and e-commerce, is a necessity. It is always better to accompany development than to undergo it. In this context, it is necessary to allow local shops access to e-commerce, almost all customers appreciate the ease, choice, access to products, price and service. However, we must set the rules of the game so that we do not experience a second wave of disappearance of shops after the one caused by the development of large-scale distribution. Access for

local shops to marketplaces is a major issue for the attractiveness of cities. Similarly, e-commerce deliveries must be organized. The delivery of parcels must be structured with one objective: to reduce the externalities caused by this mode of consumption. Here too, rules must be defined. It is not up to the legislator to decide on the commercial policy of an e-retailer, but it is up to him to define what he accepts or not in terms of deliveries. It is up to local authorities to organize, as has been the case with the mobility of persons. We must also measure the virtuous approaches and change our habits in order to guarantee efficient and sustainable urban distribution.

Our theoretical article contributes to theory and practice in several ways. (1): This article allows researchers and urban logistics professionals with a comprehensive and holistic view of e-commerce delivery; (2): This article can help practitioners to analyse consumer preferences and behaviours (in terms of e-commerce delivery) in the future research in order to identify the most decisive and significant factors that influence shopping and travel behaviour.

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