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The Collection-And-Delivery Points Implementation Process from the Courier, Express and Parcel Operator's Perspective

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Abstract: Collection-and-Delivery Points (CDP) have become increasingly important for couriers operating in the e-commerce sector. Through this way of delivery, it is possible to mitigate many issues related to the traditional home delivery (e.g. missing delivery, complex routing planning, and traffic delays). Despite this, there are still obstacles that prevent the CDP to become a dominant mode of parcel delivery. Through semi-structured interviews to companies working in the courier, express and parcel sector, this work aims to understand the enablers and barriers to the spread of the CDP mode of delivery, with a focus on the Italian market.

Keywords: parcel lockers, e-commerce, urban logistics, micro-consolidation, semi-structured interviews

1. INTRODUCTION

Last mile transportation of goods is one of the most expensive activities within the overall delivery process, accounting for approximately 28% of its total cost (Pronello et al., 2017).

This could become an issue for companies that have their core business in door-to-door deliveries, such as the Couriers, Express, and Parcel (CEP) delivery companies. In particular, Business-to-Consumer (B2C) e-commerce deliveries are the most expensive, which makes CEP companies operating in this market segment very interested in reducing the cost of last mile distribution.

In fact, B2C deliveries suffer from strains inherent with their own structure, which is characterized by fragmented deliveries in size, location and time (i.e. smaller, disperse and, frequent) and by the so-called "first-attempt failure" that increases the total number of trips (Xu et al., 2008).

To address these issues, one of the most promising load consolidation solutions from a CEP sector's perspective seems to be the use of Collection-and-Delivery Points (CDP) where the customer can collect and return online purchases (Weltevreden, 2008). The most adopted among these delivery solutions are pickup points (CDP in commercial activities) and automated locker boxes (called *parcel lockers*). Parcel lockers are a type of unattended CDP installed in public and private areas, where parcels are retained for a limited amount of time until the customer is able to retrieve them by using the order reference code.

Despite the increasing importance of these two forms of delivery in terms of investments and operations planning (Augereau and Dablanc, 2008), in the literature, there is still a lack of insights on the diffusion potential of Collection-and-Delivery Points. On the one hand, quantitative simulation studies (Wang and Zhou., 2015; Gonzalez-Feliu et al., 2012) foresee promising results in terms of reduced operative costs and emissions, but those do not consider the peculiarities of the implementation process, such as the placement and sizing of the lockers. On the other hand, surveys and case studies highlight high cost as a potential barrier to parcel lockers diffusion (Ducret, 2014). Therefore, even some developed countries (e.g. Italy) are still lagging behind schedule in their diffusion.

In this context, the objective of this work is to provide an updated state of the art of the deployment of Collection-and-Delivery Points in Italy by investigating the barriers and success factors that might hinder or support the diffusion of such schemes from the perspective of the Courier, Express and Parcel (CEP) sector.

To this end, the paper is organized as follows: section 2 provides some background information to frame the context, the customers' role, and the best practices in this field. Next, section 3 describes the methodology used in our research to extract information from interviews. Then, main findings of our research are illustrated in section 4. Finally, some conclusions and further development are provided.

2. COURIER, EXPRESS AND PARCEL SECTOR'S CONTEXT

2.1. Market trends in the CEP sector

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The CEP market has undergone significant changes in the last decades, following market pressures of the online retail market and the development of innovative green technologies.
First, B2B provides constant and steady revenues for CEP companies, as well as high margins (Sugie and Park, 2013; Accenture, 2015), but it is a stagnant market that is not expected to grow significantly in the future. On the contrary, the B2C online retail sales have consistently increased over the last years, showing a compounded annual growth rate of 17% from 2007 to 2012 (ATKearney, 2013). However, to deliver goods to the final customers, CEP players have to face all the above challenges (e.g. missed deliveries and multiple stops for each vehicle trip). Moreover, to attract B2C consumers and compete for market share, companies have to offer very competitive and flexible delivery prices (Izzah et al., 2016), quicker deliveries and better customer service. All these factors generate higher cost and lower revenue for B2C deliveries, thus reducing the margin contribution and profitability of the CEP industry.
The above-mentioned market trends, coupled with huge investments required to compete in the industry, have also resulted in a convergence and co-evolution of business models among the biggest players of the sector (Ducret, 2014). This pattern of evolution has emerged alongside with a broader redefinition of the urban parcel delivery sector, which saw the entrance of other logistics service provider such as green delivery services, parcel lockers, and pickup point networks operators. Their presence in the urban parcel delivery sector is growing but still limited, as these new players account for 12% of the market (Ducret, 2014). However, CEP players are outsourcing part of their deliveries to these players as a mean to overcome some barriers of the urban area, such as the limited traffic zones for some categories of freight vehicles.

2.2. Customer behaviour

Users' behaviour can influence strategic decisions of CEP companies. With regard to the delivery phase of the B2C E-commerce process in Europe, significant trends emerge. For example, 47% of consumers choose the parcels withdrawal in a place other than home, whereas 73% consider free delivery a major factor: customers are willing to make a larger order or to wait much longer for delivery to benefit from free delivery. Further, 58% say that the free shipping of returns is crucial to purchase online products (UPS, 2015).
Customer behaviours drive the introduction of new delivery services, including Collection-and-Delivery points. In fact, such services have been found to be solving the previously mentioned delivery requirements in the mind of customers (Ghajargar et al., 2016). In the following paragraph, the trends for the CDP are underlined.

2.3. State of the art of Collection-and-Delivery points

As mentioned in the previous section, only about halves of consumers choose an alternate location to their homes for their delivery address. Consequently, the increase of e-commerce and delivery activities have raised concerns over the number of failed first-time delivery: rates of failed first-time deliveries are between 12% and 60% of the total number of deliveries (Song et al., 2009).
Failed delivery turns out to be one of the main operational problems for couriers. In order to solve this problem, one of the most successful solutions implemented by CEP companies are the CPDs, in which parcels are not delivered directly to the customer's home but are carried to another address chosen by the client among those available. The most common methods of CDP are pickup points and parcel lockers.
Pickup points are located at local small businesses (i.e. shops, bars, petrol stations, post offices) carefully selected by couriers. This solution is advantageous for both carriers and local businesses benefiting from this partnership in terms of advertising and the potential increase in the number of customers (Morganti et al., 2014b). The only limitation of the service for customers and distributors are shops opening hours. New players are constantly emerging and new partnerships are being set up, such as the Kiala network by UPS in February 2012 and the Pickup Services network taken over by La Poste (Morganti et al., 2014a).
Parcel lockers are instead automated dispensing machines that allow the delivery and collection of goods 24 hours on 24, 7 days out of 7, 365 days a year. They are installed in easily accessible places, controlled and close to places with a high frequency of shipments (service stations, shopping malls, squares) (Janjevic et al., 2013). Although a newer concept than the pickup point, the parcel lockers have experienced rapid development in recent years. In Germany, DHL offers the parcel lockers service since 2001 and since then the network has exceeded 2,500 units. Most of the stations are located in urban areas, mainly in strategic nodes for mobility (railway stations, subways, supermarkets) (DHL, 2011). However, the maximum diffusion of a parcel lockers' network in Europe took place in Poland, thanks to InPost. InPost is one of the largest private postal operators in Poland managing letters, parcels and express services in 300 Polish cities to a network of 1,000 offices (Iwan et al., 2016).

3. METHODOLOGY

A qualitative study is proposed here to understand the major diffusion factors for collection and delivery points. The data and information used in this paper have been collected using semi-structured interviews. The choice of semi-structured interviews as a research approach is motivated by the possibility to overcome the limitations of traditional interviews, where interviewees are influenced by the interview situation (Diefenbach, 2009), and to have a certain flexibility of responses that structured interviews do not allow (Longhurst, 2003). The sampling for the interviews was made among the CEP companies operating at the national level that had already implemented a

network of CDP services. Sales & Marketing and Operations business functions of two major CEP companies have been interviewed, in order to have a full perspective on the parcel lockers system implemented (Table 1).

Table 1 Interviewees

Company	Interviewee	Duration
Company A	*Business Development Manager* *Marketing development coordinator* *Operations business development*	*2 h*
Company B	*Marketing development coordinator* *Operations business development*	*2 h*

The interviews were digitally recorded, transcribed and analysed, following the standard procedures from Corbin and Strauss (2008). First, the "open coding" process performed independently by the authors to organize the data into higher-level concepts. After a consensus on the coding was reached, the higher-level concepts were then organized into categories by means of an axial coding procedure. The objective of the axial coding process was to generate purposeful results from the interview and create links among the categories. As the purpose of this work is not to generate theory from qualitative data, the coding process ended at the axial coding phase. As Corbin and Strauss (2008) stated, this is permissible if the researcher is only interested in thematic analysis or concept development.

4. MAIN FINDINGS

This section highlights some interesting aspects of CDP, such as the evolution and impact on deliveries operations, with a particular focus on the advantages of these new delivery solutions with regard to traditional home delivery.

4.1. Characteristics of CDP

As previously mentioned, B2B deliveries are more secure since there is no risk of a missed delivery, as opposed to the B2C deliveries. One major problem, for example, is that customers sometimes state the wrong address so that drivers lose time looking for the right address. This increases uncertainty of the time of delivery, and thus drivers cannot state precisely when they are going to deliver to a specific place. In turn, customers are forced to wait at home for the delivery, and might even suffer delays in the delivery. Moreover, these factors represent some of the major barriers for online purchases.

Implementing a CDP network will actually solve the problem of missed delivery since with this solution the address is always correct. Delivering to CDP is beneficial not only for customers but also for drivers since it is cheaper because it reduces the number of customer zones to deliver to, and is also faster, safer and more secure because there is no risk of delivery failure. From an operational point of view, CDP services could optimize the vehicle routing problem and reduce the total delivery time.

Given the operational advantages of CDP services, companies are adopting a system of discounts to steer customers in choosing these delivery solutions. In fact, Company A offers 5% and 10% discount for deliveries to pick up points and locker box respectively.

However, there are other advantages of introducing CDP services besides the operational ones. In fact, it is confirmed that pickup points were established to give the chance to customers of shipping items close to their homes rather than to solve issues with last mile delivery in congested cities.

CDP have generally attracted final customers because it is more convenient for them on many levels. First, as Company A put it, it is more convenient for Logistics Service Provider (LSP) and customer to meet at a CDP, especially when the customer lives in smaller cities where delivery takes more time and he/she commutes daily. Second, CDPs make return option and the return delivery management easier. Moreover, the shift to a CDP is seemingly straightforward from the customer's side, as nothing changes in the pickup point delivery process with respect to traditional delivery. Similarly, Company A argued that using locker box is a very intuitive procedure for the customer. However, a certain resistance by some of their major business customers in using locker boxes has been noted. Some retailers, in fact, do not want to lose a point of contact with their customers, and a specific company prefers to exploit only the pickup points network because locker boxes are against their communication strategy.

The acceptance of CDP by the retailers implies that these companies introduce the new delivery option on their websites. To do this, the ICT business function of one company is writing the necessary lines of code to be inserted on the customer company's website. However, bigger B2C companies have to develop their own lines of code to match their web interface, and they may encounter some issues concerning the internal procedures for the implementation. Moreover, B2C customers have to print a specific label for the locker box delivery and to develop an interface with the locker box station owner, which is introduced in the next paragraphs.

Few major retailers have an additional problem related to the fact that they outsource their deliveries to multiple CEP companies. Given the fact that each CEP company manages its own pickup point network, these retailers would have to make a decision of whether to choose only one express courier to offer the CDP option or else outsource to more couriers and don't offer the CDP solution at all.

Overall, the implementation of CDP is an important factor for the success of B2C deliveries. In fact, company B stated that online purchase appears to increase with the pickup points and it may happen that a specific customer chooses to go back to using their services for exploiting the CDP network.

The success of the deployment of a network of CDP depends to a great extent on the success of a partnership

among the CEP company on one side and the parcel locker owner and pickup point owners on the other side. First of all, it has to be noted that in the case of the companies interviewed the locker box are owned by InPost, the Polish post operator, and the companies grant a pay per use fee for using the locker box station. The partnership works for the advantage not only of the CEP company but also for InPost, which has issues with large-scale implementation of this solution and partners with local companies to overcome bureaucratic barriers. Partnership with the CEP company is advantageous for pick up point owners as well, who chooses to become part of the network to increase visibility and potentially increase the number of customer in the store. Very often, the pickup points are part of a network, that is, a larger organization, which selects and manages the pickup points and acts as a single reference point for the CEP company. Company A stated that 40 percent of his pickup points have been acquired through an agreement with two large national-wide organizations.

4.2. Differences between Pickup Points and Parcel Lockers

Deliveries using pickup points and parcel lockers are very different. There are differences in various aspects, summarised in Table 2 and explained in this section: the operational aspect, the ICT technology, the relationship with drivers and customers.

Table 2. Main differences between pickup points and parcel lockers deliveries

	Pickup point	**Parcel Lockers**
Service Hours	opening hours	h24
Queues for customers	Probable	Not probable
Queues for drivers	Probable	Not probable
Limitation on parcel dimensions	No	Yes
Limitation on parcel number	No	Only 1 parcel per box
Limitation on ICT	No	Yes
Number of packages per delivery	No limits	1
Limitation on withdrawal time	5-7 days	3 days
Costs	Less expensive	More convenient for economies of scale
Paper Documents	Many	Few
Human Contact	Yes	No
Drivers training	No	Some needed

From an operational point of view, the delivery through parcel lockers apparently seems more simple and immediate. Parcel lockers are available for both delivery and pickup around the clock, every day of the week; in such a way, drivers can make deliveries even when they would hardly perform home or pickup point deliveries (e.g. lunchtime, after several missing deliveries, early in the morning or late in the evening), and hence they do not have to adjust their route for delivering to the parcel lockers. According to our interviews, the majority of deliveries to parcel lockers are made at lunchtime. Otherwise, pickup points are only open during the opening hours of the shops, and they are often closed during lunchtime, during the weekend or in the holiday periods; consequently, drivers have to take into account these working hours' limitations when they plan their route. Moreover, it is very difficult to experience queues for delivery and collection of parcels at a parcel locker. Instead, in a pickup point, both customers and drivers have to wait for their turn together with other regular customers of the store creating some additional burden.

However, parcel lockers have several limitations on parcels. First, for an ICT constraint depending on the technical characteristics of the order management software that companies use, there is a limitation of one parcel per delivery and the parcel cannot exceed the dimensions of the locker. This could be a problem because usually, the average number of parcel per delivery is roughly three. The procedure for preparing a delivery to a locker box is also more complex. In fact, two checks need to be performed on the package volume and weight to verify that they fit within a limited range. If the package size goes beyond the allowed size, it is blocked and the locker box delivery option is cancelled.

Another important difference found in interviews is the users' approach to these two different modes of delivery. Even if there are fewer documents for the parcel lockers delivery and it could be faster, many customers prefer to go to the pickup point with printed documents and having human contact. If customers think that the parcel lockers are complex to use and it is necessary to increase their awareness, for drivers it is necessary to carry out training courses so that the operations at the parcel lockers can be any carried out quickly and smoothly.

In terms of location, parcel lockers need to be installed in places that are accessible and convenient for customers, and that are monitored via video cameras to avoid the risk of vandalism and thefts. The security issue is considered one of the most relevant factors. Many city councils have regulation on visual disfigurement of the city centres, and there are other bureaucratic barriers with local administration concerning permits for occupying public soil. Consequently, there are some limitations to the availability of location to install a locker box station. Because of these limitations, companies tend to install parcel lockers in private spaces, such as shopping malls, where the population is dense, such as in big cities and their suburbs.

Setting a pickup point network does not include these bureaucratic barriers and requirements (e.g. accessibility, security etc.), and therefore is much less complex. Nonetheless, the selection on the location of a pickup point is also accurate: as one company pointed out, a preliminary analysis based on a GIS algorithm and 15 selection criteria is performed for selecting an appropriate location.

Finally, there are also considerable differences in costs. The pickup points are less expensive, have much lower activation costs than parcel lockers, and only require the signature of a partnership with the stores. However, they hide other indirect costs (e.g., delays, queues, closing days). It can take up to one year for customers to fully implement the locker box, and the implementation costs (e.g. for notifying delivery status update) are borne by customers as well.

The parcel lockers have higher activation cost (i.e. cost of the structure, installation commissioning, for land tax, ICT maintenance system) but are convenient in the case of break-even volume of deliveries that guarantee economies of scale. However, costs are not only limited to the activation phase. In fact, beyond implementation phase, additional setup phases take place that company A called "development and adjustment phases". Here, various problems and issues occur, and new costs are sustained depending on the seriousness of the problem. Moreover, a dedicated team is devoted to the task of training the drivers in the use of the locker box, as the drivers' interface is not that intuitive. It is clear then that the implementation cost for a locker box network is deemed a considerable barrier to its diffusion by the companies interviewed.

Taking into account the characteristics of the CDP system and the main differences that exist between parcel lockers and pick up points, the main advantages and barriers to both the LSPs internal operations and their customers are identified in table 3.

Table 3. Major advantages and barriers of the two CDP systems for LSP and their customers

		LSP	Customers
Advantages	*Parcel lockers*	No missed delivery problem Reduction in customer zones More efficient routing (parcel lockers)	No missed delivery problem Service extensiveness Easier returns Longer pickup window (parcel lockers)
	Pickup points		
Disadvantages	*Parcel lockers*	Bureaucratic/legal issues Setup of new procedures (e.g. drivers' training) Installation costs	Internal procedures for integrating the CDP system Loss of personal contact Size constraints
	Pickup points	Waiting time at the shop	Internal procedures for integrating the CDP system

5. CONCLUSION

The implementation process of CDP has been relatively successful. The two interviewed companies have extended access points networks, and one company aims at focusing on CDP because of they more secure and advantageous for their drivers.

In particular, CDP services are aimed at B2C deliveries, as a way to respond to the operational challenges posed by these deliveries, to the extent that they can provide better vehicle routing and decrease the delivery cost. These advantages reflect also on drivers, who do not suffer the problems of missed delivery and wrong addresses and therefore can work faster and better. Nevertheless, these types of services were introduced in order to expand the network of access points and reach more customers, and this aspect of CDP has become even more significant in the light of the increase in B2C market size and the customer's requirements of flexible and cheap deliveries.

Customers have generally accepted the CDP. However, this consideration does not hold completely for parcel lockers. A large part of customers prefers to maintain a human contact and dislike to retire parcel from a machine. In addition, some retailer preferred not to use this delivery option because it did not fit with their image and strategy. Furthermore, introducing parcel lockers is a long and expensive process of implementation of a network where costs are shared among the CEP company, the retailer, and the owner of the locker box.

In fact, the success of the implementation of CDP depend largely on the success of a partnership, and that is why pickup points owner are chosen accurately based on different selection parameters and GIS location algorithm. Location is a very important factor for parcel lockers as well. The installation of parcel lockers on the public soil, in fact, suffers from legal constraints and the necessity for different permits. CEP companies, therefore, chose mainly to install them in private places such as shipping malls, where customers can easily access it and can combine different purposes for one trip. Finally, from the interviews emerged that for the Italian market in recent years there was a major expansion of deliveries in CDP, although with a significant predominance of pickup points. This is due to implementation costs (parcel lockers are much expensive in an initial phase even if we have no data about the total cost of the implementation of both parcel lockers and pick up points and this could be a limitation of this study), bureaucracy barriers related to Italian regulations (i.e. permissions for the land use, security), and the peculiarity of the Italian B2C market, which sees a widespread use of paying the delivery in cash directly to the driver. This peculiarity might affect the behaviour of the Italian customers to not endorse the use of parcel lockers. Certainly, having interviewed only two CEP companies in Italy is a limitation of our work, but it is only a preliminary survey of the industry.

Future research is directed towards understanding how the obstacles highlighted in the interviews could be bypassed by couriers in practice, in particular with regard to parcel lockers implementation. To this end, interesting insights, as well as further validation of the results presented in this paper, may come from extended interviews with companies operating in other European countries to better understand if enabling factors and barriers are proper of the Italian market or could be extended to the entire European CEP sector.

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