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Why do some sustainable urban logistics innovations fail? The case of collection and delivery points

Ceren Altuntaş Vural [a,*], Çağlar Aktepe [b]

[a] Chalmers University of Technology, Technology Management and Economics, Division: Service Management and Logistics, Gothenburg, Sweden
[b] Dokuz Eylul University, International Trade, Izmir, Turkey

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ABSTRACT

Combined with current trends in e-commerce, demand for urban logistic services are putting significant pressure on the environment. While some European examples show that collection-and-delivery points (CDPs) offer a sustainable solution, this is not always the case. This paper explores the mechanisms that support CDPs as sustainable urban logistics innovations while providing viable market offerings. To do so, it analyses a failure case using multiple data sources, such as a consumer survey, interviews and secondary data. Using diffusion of innovations (DoI) theory, the study explains how CDP failed in a developing market setting. Sustainable logistics innovations fail due to both supply chain-related and market-related factors. Significant factors on the supply chain side include network structures, IT integration and diverse value propositions while the market side includes consumer market characteristics, regulations, security issues and convenience of existing alternatives. Important factors for success include looking for horizontal collaboration opportunities, building strong network partnerships with customers and distribution channel actors. CDPs should be positioned as sustainable solutions and complemented with other urban logistics services to diversify the value proposition.

1. Introduction

Global retail e-commerce sales amounted to 3.5 trillion dollars in, 2019 and are expected to grow to 22% of all retail sales by 2023 (Statista, 2020). Although this new economy stimulates growth, increased e-commerce transactions combined with rapid urbanization are harming the environment. Specifically, e-commerce increases the number of freight vehicles travelling in urban areas, mostly with unutilized capacity (Song, Cherrett, & Guan, 2011), which significantly increases congestion and emissions (Liu, Wang, & Susilo, 2019). Therefore, great effort is being made to find solutions and innovations for making urban freight transport more sustainable (Muñuzuri, Larrañeta, Onieva, & Cortés, 2005; Patier & Browne, 2010).

One solution to solve the failed home-delivery problem, is collection-and-delivery points (CDPs), or pick-up points (McKinnon, Wang, Potter, & Edwards, 2015). CDPs are automated or manned locations where consumers can pick up or return their packages. They are mostly sited in convenience stores, retailers or other regularly-visited shops (Weltevreden, 2008). For operators, CDPs increase drop densities (Edwards, McKinnon, & Cullinane, 2010) and decrease the distance and time travelled for final delivery (Lachapelle, Burke, Brotherton, & Leung, 2018). Previous research has indicated that locating CDPs close to residential areas can significantly reduce delivery vehicle mileage (Liu et al., 2019; McLeod, Cherrett, & Song, 2006; Song et al., 2011) and hence emissions. According to Fernie, Sparks, and McKinnon (2010), by balancing consumer convenience, delivery efficiency and security, CDPs are one of the most viable solutions to last-mile deliveries. Evidence from many European countries, such as Germany, France (Morganti, Seidel, Blanquart, Dablanc, & Lenz, 2014), the Netherlands (Weltevreden, 2008), the UK (Song, Cherrett, McLeod, & Guan, 2009) and Sweden (Liu et al., 2019) suggests that CDPs will continue to grow across Europe (EC, 2012). However, this is not always the case in all settings.

The first CDP initiative which was launched in 2014 in Istanbul, Turkey, stopped its operations in June 2017 due to market conditions. This initiative could have provided a sustainable urban logistics solution to deliveries in a megacity of 16 million people, that suffers from heavy, 24-h traffic congestion. The reasons for the CDP's closure reflect several market and supply-side struggles.

Recent research emphasizes the lack of scholarly attention given to understanding sustainable logistics innovations (Björklund & Forslund, 2018), such as CDPs that are introduced to solve the urban delivery problem. Extant research has focused on successful and expanding CDP

* Corresponding author.
E-mail addresses: ceren.altuntasvural@chalmers.se (C. Altuntaş Vural), caglar.aktepe@deu.edu.tr (Ç. Aktepe).

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applications (e.g. Morganti, Seidel, et al., 2014; Weltevreden, 2008), understanding customer preferences from these examples or other pilot projects (Kedia, Kusumastuti, & Nicholson, 2017; Wang, Yuen, Wong, & Teo, 2018a; Yuen, Wang, Wendy Ng, & Wong, 2018). In contrast, there has been little discussion about why some CDPs fail, although studying such cases could help to understand why some sustainable urban logistics innovations do not diffuse. Such an effort could match the need for reflection and learning from sustainable logistics innovation processes, which is a managerial challenge according to Björklund and Forslund (2018). Investigating cases that have failed can provide deeper insights into why some sustainable business models for urban logistics fail (Björklund, Abrahamsson, & Johansson, 2017).

Furthermore, research into CDPs has also largely focused on customer perspectives. However, it is important to understand the dynamics between sustainable urban logistics solutions and their related supply chains or networks (Allen, Browne, & Holguin-Veras, 2015; Morana, Gonzalez-Feliu, & Semet, 2014). Lim, Jin, and Srai (2018), for example, emphasize the over-reliance of last-mile logistics research on design prescriptions and a lack of focus on operational challenges. Studying a failure case can thus enhance the understanding of the operational challenges faced by sustainable urban logistics innovations. Similarly, Björklund et al. (2017) point out that investigating failure cases can provide deeper insights into the reasons for failing.

Accordingly, the purpose of this study is to explore the mechanisms that support CDPs as sustainable urban logistics innovations while making viable market offerings. We selected diffusion of innovations (DoI) theory as the theoretical lens in combination with the logistics innovation literature and a failed CDP example to complement existing knowledge on successful cases. Furthermore, we adopted a dual approach where both provider and consumer perspectives are explored to understand the supply chain dynamics behind the failure. The purpose is operationalised through two research questions:

RQ1. . What caused the selected CDP service to fail from both consumer and service provider perspectives?

RQ2. . How can these reasons help to understand the market and supply chain contingencies that enable CDP initiatives to sustain?

The rest of the paper is organized as follows. To develop the study's theoretical framework, the next section discusses CDP as a sustainable urban logistics solution, together with DoI theory and the logistics innovation literature. The methods section describes the context and selected case, together with the data collection methods. The results are then presented with a discussion based on the frame of reference. The paper concludes with implications for urban logistics practitioners and recommendations for future research.

2. Literature review

2.1. CDPs as sustainable urban logistics solutions

Besides many others like off-peak hour deliveries or cargo bikes, Allen et al. (2015) list CDPs among many other initiatives to address the sustainability challenge in urban logistics. According to Triantafyllou, Cherrett, and Browne (2014), CDPs are a form of urban consolidation centres (UCCs) as they function as a consolidation point between retailers and consumers, who can use them to both collect and return their online orders. In many European countries, CDPs provide an alternative to home delivery service and a solution to home delivery failures (Iwan, Kijewska, & Lemke, 2016; Morganti, Seidel, et al., 2014); in some countries like Sweden, they are even the main urban delivery solution (Liu et al., 2019). Following this European expansion, pilot CDP initiatives are being introduced in many countries around the world (de Oliveira, Morganti, Dablanc, & de Oliveira, 2017; Kedia et al., 2017; Xiao, Wang, Lenzer, & Sun, 2017).

There are three main streams of CDP research. The first consists of modelling studies focusing on transportation impacts (McLeod et al., 2006; Song et al., 2009; Song et al., 2011) and environmental impacts of CDPs (Liu et al., 2019; Song et al., 2011). This stream assumes various conditions whereby CDPs offer significant benefits in terms of lower logistics costs, reduced transportation activity and reduced environmental externalities. The second stream clusters around urban planning and policy studies concentrating on CDP networks in particular cities, their geographical span and potential for future development (Arnold, Cardenas, Sörensen, & Dewulf, 2018; Cardenas & Beckers, 2018; Lachapelle et al., 2018; Morganti, Dablanc, & Fortin, 2014; Morganti, Seidel, et al., 2014). The third stream focuses on market acceptance and consumer preferences regarding CDPs (de Oliveira et al., 2017; Kedia et al., 2017; Moroz & Polkowski, 2016; Wang et al., 2018a; Wang, Yuen, Wong, & Teo, 2018b; Weltevreden, 2008; Yuen et al., 2018; Yuen, Wang, Ma, & Wong, 2019). Some of these studies acknowledge the technological innovation component in these urban logistics solutions and focus on the acceptance of automated parcel systems (Wang et al., 2018a, 2018b; Yuen et al., 2018; Yuen et al., 2019) and smart lockers (Rai, Verlinde, & Macharis, 2019).

While CDPs take many different forms, they are generally classified as either unattended or attended delivery points (Weltevreden, 2008). Unattended delivery solutions, also called locker points (Lemke, Iwan, & Korczak, 2016), provide automated delivery or return services with extended service hour advantages. Attended delivery points, also called service points (Weltevreden, 2008), are either self-operated locations by logistics service providers (LSPs) or shared spaces at convenience stores and other small shops (Morganti, Seidel, et al., 2014). Such CDPs provide a variety of benefits, such as higher security, flexible storage space, flexible payment options and opportunities to combine pick-up trips with other shopping activities (Weltevreden, 2008). Attended CDPs also offer benefits to the distribution network that hosts the collection points by attracting customers and generating additional revenue streams (McKinnon & Tallam, 2003).

If located close to residential areas, CDPs can increase environmental sustainability by minimizing personal travel with fewer car trips for picking up a failed delivery (McLeod et al., 2006) and reduced carbon emissions from carrier and customer trips (Song et al., 2011). A highly dense CDP network can even encourage consumers to collect their packages on foot or by bicycle (Collins, 2015). CDPs in regular shopping zones or on commuting routes enable customers to combine package collection with other regular trips (de Oliveira et al., 2017). Thus, while balancing customer convenience needs with the efficiency goals of logistics service providers (Fernie et al., 2010), CDPs can significantly enhance the environmental sustainability of urban deliveries.

2.2. Theoretical framework for CDP success

2.2.1. DoI model and logistics innovation

According to Rogers (2003), innovation is an idea, practice or object that is perceived as new by individuals or units of adoption. DoI theory explains how these new ideas, practices or objects become accepted and widespread among social groups at different scales, based on four main elements: (1) the innovation itself; (2) the communication channels used for spreading the innovation; (3) the time taken for an innovation to be adopted by individuals or organizations; and (4) the social system comprising individuals, groups or organizations (Rogers, 2003). Each innovation has five attributes that help to understand differences in the rate of adoption across innovations (Rogers, 2003). The first is relative advantage, which is the extent to which an innovation has advantages over the idea it supersedes. The second is compatibility, which refers to the innovation's consistency with the social norms, beliefs, values, past experiences and needs of potential adopters. The third, complexity, is the degree to which an innovation is difficult to understand and use. The fourth, trialability, is the availability of opportunities to experience the innovation. Finally, observability refers to the visibility of the innovation to others.

During the 2000s, logistics research largely neglected innovation (Flint, Larsson, Gammelgaard, & Mentzer, 2005) despite wide discussions around new technological tools and their impacts on supply chains (Grawe, 2009). Flint et al. (2005) define a logistics innovation as any logistics-related service that is perceived as new and helpful, whether by an internal audience (the organization itself) or an external audience (customers). This can be a radical service innovation (Johnson, Menor, Roth, & Chase, 2000; Menor, Tatikonda, & Sampson, 2002), such as the intermodal container, or an incremental service innovation (Johnson et al., 2000; Menor et al., 2002), such as an improvement in packaging design. In the present study, CDPs are viewed as logistics innovations that introduce a new way of providing last-mile delivery service to internal actors by changing the operational structure and to external actors by actively involving them in the delivery process. For internal actors, CDP is an innovation because it changes the operator's delivery process from "operator-to-consumer" to "operator-to-service/locker point" while improving operational efficiency. For external actors, CDP is an innovation because it changes how they receive packages and helps to solve problems associated with home delivery.

Based on an extensive literature review, Grawe (2009) proposes a model to explain how a logistics innovation can generate a competitive advantage that in turn enables its diffusion because competing firms in the market will adopt or imitate it to gain the same advantage. Hazen, Cegielski, and Hanna (2011) use this model to study environmentally sustainable logistics practices and provide empirical proof that a lack of competitive advantage may hinder their diffusion. Russell and Hoag (2004) use the diffusion model to suggest that innovation attributes, organizational factors, communication channels and leadership factors are significant predictors of innovation adoption rates in supply chains.

The logistics innovation literature mainly focuses on the adoption of technological innovations, particularly information technology (IT) tools (Hazen et al., 2011). While digitalization is one of the main trends affecting logistics, the industry is also strongly influenced by sustainability transformations at the supply chain and policy levels. This has given rise to many sustainable service development efforts by LSPs (Isaksson & Huge-Brodin, 2013). However, research has yet to explore sustainable logistics innovations (Björklund & Forslund, 2018). Studying CDPs as a form of sustainable urban logistics innovation from a DoI perspective can provide important insights to address this gap in the literature.

2.2.2. Theoretical framework

Based on the above discussion, one can conclude that competitive advantage is a prerequisite for sustainable logistics innovations to diffuse. This theoretical framework links two contingencies that affect the innovation attributes of CDPs and that might prevent them from providing a competitive advantage. These contingencies are twofold.

First, there are supply chain contingencies related to the service supply chains that CDPs operate within. CDP organizations need to structure and manage a supply chain that is composed of distribution network members that provide space and services for their offering. These contingencies mainly concern location selection, IT system alignment with the service network, network performance monitoring and expansion of operation management strategies (Morganti, Dablanc, & Fortin, 2014). Weltevreden (2008) argues that providers need to have sufficient resources to establish and maintain large CDP networks to succeed in the market. Depending on how the customer networks are structured, these service networks can take many different forms, such as retailer-operated CDPs, LSP-operated CDPs, selective distribution networks or diverse authorized points (Xiao et al., 2017). CDP customers may be online retailers or traditional cargo operators.

On the other hand, CDPs can provide an alternative urban delivery service only if they offer an advantage over conventional home delivery (Wang et al., 2018a; Yuen et al., 2018), such as reduced delivery costs (Kedia et al., 2017). One of the most crucial preference criteria for CDP customers is proximity (e.g. Weltevreden, 2008) in addition to commuting routes and public transportation hubs. These indicate an environmentally sustainable consumption habit for service points (Lemke et al., 2016). The success or failure of CDP services is also influenced by consumer characteristics and CDP preferences in each context, other available services and consumer responses to those, and the macro-environmental conditions that shape the markets.

Supply chain contingencies, which refer to the contextual mechanisms that emerge within these supplier and customer structures, also impact the competitive advantage of the CDP service. Market contingencies refer to consumer market characteristics and environmental forces that shape the conditions determining the competitive advantage of a CDP service. Understanding contingencies is important as it enables decision makers to implement appropriate strategies in specific situations (Wilhelm, Blome, Wieck, & Xiao, 2016) to gain a competitive advantage. Competitive advantage is defined by the five determinants described in DoI theory and contingencies impact competitive advantage through these determinants.

3. Methodology

In line with the exploratory nature of the study, case study methodology was adopted. The unit of analysis was a particular CDP service in Istanbul, Turkey, that failed to diffuse. However, the nature of data differs slightly from the usual case study data. To capture multiple perspectives that can help explain the components within the framework, this study combined multiple data sources, namely a consumer survey, semi-structured interviews with the case company and other last-mile service providers, online blogs, newspaper reports, podcasts, and consumer complaint portals. These data collection methods are explained in detail below after elaborating on the context of the case.

3.1. Context and case company

Turkey's e-commerce volume increased by 42% in 2018 and 39% in 2019 to reach $11.6 billion while the proportion of online transactions in the total Turkish retail market, currently 14.9%, is expected to grow steadily (TUBISAD, 2020). Trends and statistics indicate that e-commerce growth will accelerate, and the Turkish market has idle capacity to take advantage of. However, there are significant problems regarding the logistics services that e-commerce markets depend on.

According to the Turkish Cargo and Courier Operators Association, logistics companies in Turkey visit 7 million addresses and travel 5 million kilometres every day (Kut, 2017). The majority of these shipments are small-sized packages delivered across a wide area, which poses significant difficulties in operation and planning of deliveries with a high service level. Due to problems in capacity utilization and fleet management, the industry is expected to become unable to satisfy demand in the long term.

Prior to the main study, a pre-study was conducted to investigate the nature of complaints regarding e-commerce deliveries through a content analysis of Turkey's largest online complaint platform. This showed that the most popular online shopping brands receive most complaints under the logistics category. Indeed, e-commerce consumers in Turkey face many problems during cargo delivery, such as late deliveries, missing or damaged packages, poor returns, lack of communication and order tracking problems (Atmaca & Turgut, 2015; Boruhan, Ersoy, & Yumurtacı, 2015; Büyükkeklik, Özoğlu, & Bülbül, 2014; Deniz & Gödekmerdan, 2011; Duran, 2017; Kayabaşı, 2010; Ünal & Yücel, 2014).

The CDP service was introduced to this environment as a potential solution to these problems. It started as a pilot in Istanbul, one of the world's largest cities, which has 16 million inhabitants, covers 5461 km^2 and accounts for 52% of Turkey's commercial activity. It is ranked first in Europe and fifth in the world with its traffic congestion rate of 51% (TomTom Traffic Index, 2020). Its inhabitants face long commutes, primarily by car or service buses, because business districts are

concentrated in certain areas while residential areas are widely dispersed.

During the 1990s, Istanbul's pollution grew to critical levels. In 2015, the city's total greenhouse gas emissions were 47 million tons, of which 13 million tons were caused by transport activity (IBB, 2015). Despite some improvement following precautionary measures, a 2017 report released by the Chamber of Environmental Engineers concluded that Istanbul's pollution has become a significant threat to human health. These conditions highlight the need for sustainable urban logistics solutions in Istanbul and the importance of studying why such innovations may fail to diffuse.

The CDP initiative started operations in 2014 and was closed in 2017. The service was designed similarly to many European counterparts, but the CDP company's distribution network comprised individual convenience stores and independent trial locker points in a few busy urban transportation stations. By 2015, there were approximately 500 service points while the company was signing contracts with e-commerce companies and offering its services on their online stores as an alternative to conventional home delivery. The company collected orders from the e-commerce companies' own distribution centres and delivered them to its service points with its own vehicle fleet. It also provided information technology infrastructure and managed information flows. While it did not run any warehouse operations, all transportation operations were run in-house using its own assets. Thus, the company simultaneously sold its services to e-commerce companies within the B2B market while directly serving their customers in the B2C market. The company positioned itself as providing an alternative service to home delivery rather than a complementary service to failed home delivery. Furthermore, from a marketing perspective, it did not position itself as a sustainable urban logistics solution. Although one of the company's aims was to reduce redundant freight trips for failed home deliveries and hence reduce emissions, this was not the main positioning strategy for the service offering.

When the CDP service was introduced, the market was dominated by three large conventional cargo operators and some other smaller players. Turkey's conventional operators run their operations through their urban distribution centres sited outside cities. These receive consolidated cargoes for further distribution to each operator's network of urban depots. These urban depots, which are called branches by the cargo operators, are smaller consolidation centres that deliver to a specific district or a large neighbourhood in the city. Every operator has their own network of branches/depots and when a home delivery fails, they take the cargo back to this depot. Consumers can then either collect their packages from the depot or ask for a second or third home delivery. These depots are less widespread than the new CDPs and only operate during working hours whereas convenience stores are open for long hours.

3.2. Consumer survey: sampling, data collection and data analysis

First, we developed a survey tool to understand how consumer perceive CDPs. The first part of the survey recorded the respondents' demographic characteristics while the second part asked about their online shopping behaviour and cargo delivery issues with online shopping. The questions were generated from the preliminary study and previous research with a similar focus, specifically Kedia et al. (2017) and Weltevreden (2008) regarding the delivery method for the participants' last three purchases. The final section of the survey provided a definition of CDPs followed by questions about the respondents' awareness and usage preferences. Questions about CDP service points, advantages, and user concerns were based on Weltevreden (2008), who studied other European cities, while questions about the mobility preferences for using CDPs were based on McLeod et al. (2006). These questions helped to capture consumer perceptions regarding CDP services and to identify any gaps between them and the failed case.

Sampling targeted active internet users who are also e-commerce consumers. We used a form of convenience sampling, specifically online snowball sampling, which is considered a useful tool for exploratory and qualitative research (Baltar & Brunet, 2012). Initial seeds started the sampling process by posting the online survey link on the social media pages of various public groups. The population was approximately 2000 based on the membership to these pages. A total of 351 responses were received between April and May 2017, representing an 18% response rate, which was similar to web-based surveys in logistics research (Grant, Teller, & Teller, 2005) and considered an adequate rate (Krejcie & Morgan, 1970). The demographic characteristics of the sample presented in Table 1 were in line with recent results from an online shopper profile survey by the Turkish Ministry of Trade (2018).

The respondents' cargo delivery preferences and perceptions about CDPs were analysed after removing nine respondents who stated that they do not shop online and one respondent who stated that they only shop for football match tickets online (Tables 4 and 5). The descriptive analysis identified response frequencies for the different survey sections while a cross-analysis with responses to the latter parts of the survey profiled the potential CDP user. For example, we compared the preferences of respondents with specific complaints about traditional cargo services regarding their CDP usage or the perceived advantages of CDP services.

3.3. Semi-structured interviews and secondary sources: sampling, data collection and data analysis

In parallel, we collected in-depth data from semi-structured interviews and online secondary sources. The interviews started with the case company, although not many respondents were accessible because the company was already closed. Therefore, given that the main unit of analysis was the CDP service that failed to diffuse, the interview sample was expanded to include similar service providers and traditional cargo carriers. This also helped in understanding the "supply chain contingencies" part of the framework as these respondents represented alternative service supply chains providing last-mile services for online purchases. They also had expert knowledge about contextual dynamics and represented traditional home delivery services that CDPs usually complement.

Table 2 summarizes the details about the 10 semi-structured interviews, conducted with 12 people from 9 service providers, of which two were conducted via online communication interface while the rest were face to face. The service providers were categorized into four

Table 1
Demographic characteristics of the sample.

	Frequency	%		Frequency	%
Gender			Monthly income		
Male	160	45.58	<1300 TL	37	10.54
Female	191	54.42	1301–2000 TL	24	6.80
Age			2001–4000 TL	113	32.19
18–23	19	5.41	4001–6000 TL	85	24.22
24–29	90	25.64	>6000 TL	92	26.21
30–35	85	24.22	Employment status		
36–41	52	14.81	Employed	262	74.64
>42	105	29.91	Unemployed	89	25.36
Highest educational qualification			Online purchasing frequency		
Primary School	5	0.01	Every day	11	3.13
High School	14	3.99	Once in a week	31	8.83
Undergraduate	200	56.98	Once in two weeks	51	14.53
MA	81	23.08	Once in a month	110	31.34
PhD	51	14.53	Rarely	139	39.60
			Never	9	2.56

Table 2
Semi-structured interviews.

Type of company	Number of interviewee(s)	Position of interviewee(s)	Date(s)	Duration
CDP service provider	1	General manager	25.07.2017 31.10.2019	50 min 50 min
New solution provider	1	Founder and general manager	08.05.2019	30 min
Traditional cargo operator 1	1	Operations executive	16.09.2019	35 min
Traditional cargo operator 2	2	Operations responsible	13.09.2019	50 min
Traditional cargo operator 3	1	Regional director	16.09.2019	30 min
Traditional cargo operator 4	1	Regional director	27.09.2019	20 min
International cargo operator 1	3	Operations responsible	27.09.2019	20 min
International cargo operator 2	1	Regional sales executive	28.10.2019	20 min
Urban logistics service provider	1	Business development manager	27.09.2019	20 min

different groups based on their service characteristics. The CDP service provider was the main case company in the study. The new solution provider was a recent start up that combines multiple urban logistics solutions, such as home delivery, car delivery, delivery to other locations or CDP. Traditional cargo operators were home delivery operators, operating either domestically or internationally. The urban logistics service provider was a company with a broader logistics service focus, running a UCC and operating in both the B2B and B2C markets. None of these service providers had any business relationship with the case company. Although they were direct competitors, none provided exactly the same service. As mentioned earlier, CDP was a new, innovative service in this setting.

Because the case company had ended its operations, direct users of its CDP service could not be contacted conventionally. Instead, the survey data could only be collected from a general consumer sample of last-mile delivery services. However, such consumers leave online traces in blogs or forums through their daily activities (Hewson & Stewart, 2016), which can provide data about the companies, products and services they use (Stokes and Minds of Quirk, 2013). Furthermore, the internet also contains many expert opinions, discussions by business analysts in online spaces like industry forums, media blogs and news portals. Based on this approach, we collected secondary data from online sources, such as news portals and blogs on e-commerce, the technology and e-commerce sections of newspapers, customer complaint platforms and technology podcasts. According to Ellram and Tate (2015), using secondary data in supply chain management research increases the validity of the findings and complements the primary data.

The web-based search was conducted systematically. First, the following list of keywords and key phrases for the search was generated: “failure”, “Why did X fail?”, “failing online commerce initiatives”, “complaints”, “user complaints”, “user comments” and “user evaluations”. This list was based on the pre-study and was extended in line with the purpose of the main study. Then, a web-based search was conducted by combining the name of the failed CDP service with these words and phrases. The initial search produced 170 customer complaints and 60 web sites, many of which referred to the same sources. Due to data saturation, 27 were selected as the secondary database for further analysis.

To analyse the qualitative data, we adopted an iterative process for comparing data with theory (Miles & Huberman, 1994; Strauss & Corbin, 1998). First, open codes were formed from the raw data to understand what the sources were saying (Fawcett et al., 2014). The common patterns among these open codes were then investigated for axial coding, particularly in terms of the relationships between them (Ellram & Tate, 2015). Next, the refined axial codes were matched with the theoretical categories of supply chain and market contingencies. Each researcher did this simultaneously using separate coding tables, which were then compared and refined. Power and proof quotes (Pratt, 2008) were selected to present the results and demonstrate the chain of evidence. Table 3 illustrates this process with some example codes and quotes.

3.4. Research quality

Given that this was an exploratory study, we adopted a qualitative research design and analysis despite using structured consumer survey data. Accordingly, we used qualitative research quality indicators to evaluate it (Ellram, 1996; Halldórsson & Aastrup, 2003). Construct validity was assured by using multiple data sources and establishing a chain of evidence through the data analysis process. Credibility was assured through coding, data analysis, power quotes and discussing their relationship with DoI theory. It was also strengthened by conducting a follow-up interview with a representative from the case company to validate the findings. Dependability was assured by providing a detailed description of the research process and illustrating how the interplay of data and theory was handled. Finally, transferability was assured by using thick descriptive data within an extended framework that can help in applying findings to other similar settings.

4. Findings

Based on the qualitative analysis of the interviews and secondary data, we expanded the theoretical framework, as shown in Fig. 1, which illustrates how the sub-categories of the contingencies influenced the diffusion of the CDP service. The following sections explain in more depth the findings concerning these contingencies and their sub-categories. Data from multiple resources were combined under relevant sub-categories. For example, survey data contributed more to the market contingencies section as it provided information about consumer market characteristics, although some survey data is also used to discuss the findings in the section on supply chain contingencies. Table 2 refers to primary data sources by their labels and secondary data sources by their respective types, such as a web blog or newspaper column.

4.1. Supply chain contingencies

4.1.1. Customer network

This sub-category emerged based on the discussions about the business customers that the case company served. Both the primary and secondary resources related this closure decision to the closure of one of

Table 3
Data coding process example.

Proof quotes	Open codes	Refined axial code	Theoretical category
“There needs to be more online retailers to serve.”	B2B contracts Supply chain partnerships	Customer network	Supply chain contingencies
“E-retailer X is opening its own distribution firm now.”	Customer-provider collaborations		
“The inability to develop agreements with e-retailer X, Y or Z provokes some thoughts about the closure.”	Diffusion Integration B2B market sizes		

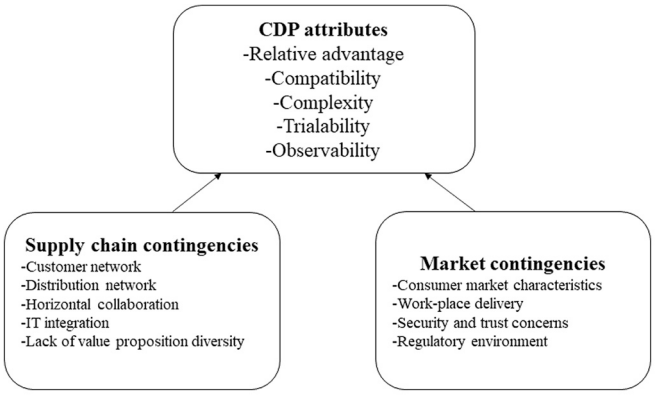

Fig. 1. Factors influencing CDP diffusion.

Turkey's largest online retailers. "*It's not difficult to guess that closure of e-retailer X and other online private shopping brands have a role in the CDP's closure.*" (e-commerce expert opinion in a web blog). Having started as a pure-click set-up, this e-retailer had begun opening physical stores shortly before the closure. They had collaborated with the CDP service while the CDP provider used the e-retailer's network to increase the trialability of its services.

Other sources also confirmed this by mentioning that several large e-retail businesses had started their own distribution firms while the CDP provider had been unable to attract other large e-retailers. "*There were no CDP integrations with the largest e-commerce companies in the country*" (sector analyst in a newspaper column). According to the CDP service provider, however, there were few high-volume e-retailers in the market for a business that needs to collect many packages from a few points for efficiency. Not only did some e-retail partners lack sufficient volume; e-retail partners also lacked a centralized distribution centre structure. "*E-commerce firms are trying to centralize their internal structure. Using a shared distribution centre with competitors I believe could only be possible in the distant future. Even then, it might not be possible because these distribution centres for e-retailers are what factories are for manufacturing companies*" (CDP service provider) The CDP provider also claimed that financial survival was impossible if such CDP initiatives rely on only small volumes like C2C cargo.

The traditional cargo operators agreed about this problem and also mentioned that e-commerce deliveries are financially unsustainable for them as well. They think that increasing volumes will not solve the problem but even complicate it because it means increasing the number of delivery points. However, they rely on their other customer networks for B2B package delivery services. These services have different operational requirements, such as consolidated pick-ups and deliveries from and to fewer points. Such diversification of customer networks compensates for lower volumes or profitability of their online commerce deliveries.

According to a recent analysis of 6500 online stores and 4,482,650 e-commerce orders, 47.55% of all online commerce in Turkey takes place in Istanbul (Ideasoft, 2018) and it is expected to increase. Thus, there is a large volume to be handled. Our analysis of online complaint portals indicated the need for improvements in last-mile delivery services. Two of Turkey's largest e-commerce companies have started their own distribution services to control final deliveries. If the failed CDP service had diversified its customer base by establishing multiple partnerships with these strong players in the e-commerce market, it could have become a mainstream alternative to existing last-mile delivery services. This finding was also supported by the survey, which showed that despite all the complaints about final delivery services, an e-retailer does not lose customers if it has a strong market presence and large consumer base (Table 4). Therefore, it is important to maintain strong partnerships with the largest e-retailers in the market to enable at least the trial and potentially diffusion of sustainable urban logistics innovations like CDPs. While this is a prerequisite for achieving scale and efficient logistics operations, having a diversified portfolio of large e-retailers is not be enough to provide a popular service. Rather, the service design, service delivery and supporting service components need to be in place to become a preferable option in the market.

Table 4
Last-mile delivery preferences.

	Frequency	%
Cargo delivery preference		
Delivery to workplace	169	49.56
Home delivery	148	43.40
Personal collection from cargo office	14	4.11
Delivery to another address	7	2.05
Online purchasing and offline collection	3	0.88
Cargo company effects on e-purchasing		
None	164	48.09
If there are no options other than that e-tailer, I buy from them although I do not like the cargo company	130	38.12
I never buy from that e-tailer if they work with a cargo company that I do not like	47	13.78
Needing to go to a cargo office for a personal cargo		
Rarely	108	31.67
Sometimes	94	27.57
Frequently	79	23.17
Never	51	14.96
Always	9	2.64

4.1.2. Distribution network

All the sources had concerns about the downstream supply chain partners of the CDP service provider. The traditional cargo operators manage the last mile delivery in house by controlling their distribution fleets, warehouses, agencies and employees. However, in an additional actor was introduced to the distribution network in the CDP case: the service or locker point. The service points included convenience stores like buffets, markets, flower shops, and stationers. Introducing an external partner into the final leg that is normally not a logistics actor, created trust issues regarding the service: "*because many of the CDP locations were small stores around me, I did not want to use the service to avoid a problem with the product I buy. They may throw the packages around carelessly or even sit on them*" (consumer opinion from a web blog). Thus, 59% of respondents in the consumer surveys who preferred to use CDPs expressed doubts about the security of their orders when they used this service. Traditional cargo operators similarly stated that local convenience stores would create a lot of security issues regarding fake identities, wrong deliveries or even theft. The CDP provider was also aware of these concerns but found them difficult to understand: "*We would immediately cover the costs for a damaged or lost cargo if such a thing happened, but that local store would lose many customers because of such behaviour. The local stores were the most committed component of this distribution chain. They provided a customer experience that none of the traditional employees could because their main motivation was not to deliver cargo but to sell extra cheese!*" (CDP service provider).

Another concern about the distribution network was the capacity of these stores. One traditional cargo operator asked, "*Can a local convenience store provide the space for large packages, or the peak days such as Black Friday or Mother's Day? What happens when the volume increases? Will the store employ an additional person for taking care of online packages*?" The majority of the convenience stores in the CDP distribution network were small shops with limited space and only one person, who is both the owner and only worker. In a business model that relies on volume for achieving economies of scale, such supply chain partners limit handling this potential scale. In contrast, because traditional cargo operators have their own distribution networks, branches and agencies, they can easily increase their package handling capacity by shifting resources between zones: "*When the daily average of 1,000 packages that are to be stored and distributed by branch X increases to 5,000 due to a*

demand peak, we can meet that demand by either shifting extra vans and drivers or by outsourcing to a business partner. But for the CDP service provider's local convenience store, this means packages covering their whole space and long queues of consumers during rush hour" (Traditional cargo operator 2). "*We are equipped to store and carry everything between an envelope and a sofa. But the case company was not. Therefore, they needed to select the cargo to carry*" (Traditional cargo operator 1).

Finally, Istanbul covers over 5000 km^2, with multiple business and population centres that are significantly distanced. After its establishment in 2014, the case company was already managing 480 service points by 2015 with a goal of 2500 by 2020 and 20,000 in the longer term to achieve their motto of "*Having a service point around the corner in every neighbourhood*" (CDP service provider). However, managing distribution operations across these geographically dispersed points and managing the information and communication flows within this complex network was very difficult and costly. This indicated that horizontal collaboration in the supply chain could be a solution.

4.1.3. Horizontal collaboration

Like many other business failures, the main reason behind this closure was inadequate profitability "*despite a good business model*" (e-commerce expert opinion from web blog). Many of the factors mentioned above led to this result, such as the inability to achieve economies of scale. However, competition was a key factor as this CDP service was competing against conventional cargo delivery services offering the most convenient way of receiving goods, which is getting them to wherever the customer is, whether at home or work. The survey results indicated that majority of the consumers were only willing to use a CDP service if home delivery failed (Table 5). However, the company did not position the service complementary to failed home delivery in Istanbul. In addition, the company ran deliveries to CDP service points and locker points in house, which increased costs significantly.

Service design is a critical element for such innovations. Successful CDP service providers in Europe have either been established by or bought by large, well-known urban logistics service providers (e.g. Kiala bought by UPS or DHL managing its CDP network in Germany). It is easier for such initiatives to complement home delivery service with CDP: "*In such markets (*meaning the case context*), a CDP service can only be a complementary service to existing cargo delivery services. It does not have the business volume and market size to become a standalone service*" (e-commerce expert opinion from a web portal). Both the CDP service provider and all traditional cargo operators shared similar opinions: "*CDPs in Europe made contracts with traditional cargo operators that enabled them to use their network for failed home deliveries. This helped their business to scale up and avoid distribution costs*" (CDP service provider). On the other hand, traditional cargo operators expressed concerns about the structure of a potential collaboration. "*In case we collaborate with such a CDP service and deliver failed packages to their distribution network members, we have to be sure about the capacity, skills and dependability of those partners*" (Traditional cargo operator 3). All of them also stated that they would still want to control the final leg.

Table 5
CDP preferences.

	Frequency	%
CDP awareness		
Yes	135	39.59
No	206	60.41
Would you like to use a CDP if one is opened close to you?		
Yes	287	84.16
No	54	15.84
Which one would you prefer the most among home deliveries?		
Delivery to the closest CDP	44	12.90
Home delivery (If failed, delivery to the nearest cargo office)	85	24.93
Home delivery (If failed, delivery to the nearest CDP)	212	62.17
For which operation would you like to use a CDP?		
Collection	84	24.63
Returns	57	16.72
Both	181	53.08
None	19	5.57
Under which condition would you prefer a CDP the most?		
If close to home	179	52.49
In all conditions	64	18.77
If close to work/school	59	17.30
If on the way to work/school	39	11.44
How would you travel to this most preferred CDP?		
On foot	217	63.64
By car	101	29.62
By urban transportation	13	3.81
By bike	9	2.64
By motorbike	1	0.29

4.1.4. IT Integration

Another dimension that emerged from the secondary data is the integration of software across supply chain partners, such as e-retailers, the CDP provider and the CDP provider's distribution network. "*The main reason behind this closure was the lack of software integration*" (e-commerce expert opinion from news portal). The sources emphasized that a similar integration of IT infrastructures like that available between conventional cargo carriers and e-retailers are critical for a smoothly functioning CDP service. Furthermore, such integration should also make the IT system easy to use. Instead, the cargo picking process from the collection point for the failed CDP company was described as long and troublesome because "*giving name, citizenship number, tracking number etc. takes such a long time. And when the owner of a convenience store is somewhat unskilled in technology, it takes the person too long to enter all these into the app. When the delivery code is a very complicated one with a mix of many numbers and letters it is even worse.*" (consumer opinion from a web blog). In contrast, the CDP service provider claimed that the integration process took longer because of the long IT adaptation processes of large e-retail businesses. These introduce complexity for potential consumers of a CDP service. Furthermore, establishing a strong IT infrastructure with individual stores is both time-consuming and costly for a new actor in the urban logistics market compared with traditional cargo operators that already have a strong IT infrastructure within their networks.

4.1.5. Lack of value proposition diversity

Our evidence showed that the CDP service was not viable as a standalone service but needed to be complemented with traditional cargo delivery. However, even if it were complemented, the lack of trust in new distribution network members would remain an obstacle. Yet, Turkey's growing e-commerce points that traditional solutions can no longer solve urban logistics problems. A recent report concluded that e-commerce companies and cargo operators need to work together to develop new delivery models for consumers e in large cities who are not at home most of the time (Deloitte Digital and TUSIAD, 2019). This suggests that the case company could have survived by diversifying its value proposition and providing different services to e-commerce consumers. As the CDP service provider representative put it, "*the customer value proposition was higher in returns, but such channels could not be utilized as much for returns*". While there are also various market-related reasons for this situation, which will be explained in the forthcoming sections, the CDP service provider also needed to establish other supply chain networks with, for example, electronic product sellers, and their maintenance and repair networks for a strong positioning of its return service. These supply chains are different to the e-commerce supply chains that the CDP service provider operated with.

Recent developments indicate the need for delivery service diversity. The interviewee from the recently established solution provider mentioned that they function like a "logistics service box" as they are based in large shopping malls, providing various delivery solutions to e-retailers, brick-and-mortar retailers and even individual consumers,

such as changing rooms for customers to try on their online purchases immediately and return if they want, or same or next-day home delivery services for physical purchases from the shopping malls where they are located. These all provide opportunities to reduce unnecessary journeys and combine individual trips to consolidate deliveries. One of the traditional cargo operators stated that they are piloting a new service in collaboration with shopping malls, university hospitals and large factories, and establishing locker points for their employees.

4.2. Market contingencies

4.2.1. Consumer market characteristics

Consumer surveys show the heavy reliance on various kinds of conventional delivery services to the buyer (Table 4). Most of the last three online purchases of survey respondents had been delivered to the respondent at work or home or delivered to a third party like a neighbour or security officers at home or at work. Only a minority of respondents had personally picked up their delivery from the carrier's depot or the nearest offline store.

Consumers were also asked about their CDP awareness and preferences regarding such a service. Table 5 summarizes the results. Their lack of awareness clearly indicates a failure in diffusion, which could be related to a lack of adequate communication. Secondary evidence also supported this finding in the lack of advertisements, the inadequacy of public relations and the inability of existing communication efforts to emphasize the real benefits of this service. Considering that the CDP service was only operating as a pilot, this is somewhat understandable. On the other hand, the respondents' willingness shows that CDPs have market potential, which is unsurprising given the many problems with the conventional cargo services of online retailers.

The respondents perceived the CDP service as complementary to existing home delivery solutions. A majority were only willing to use CDPs when a home delivery failed, for both deliveries and returns, if the CDP is close to their home and accessible on foot, which has a sustainability implication. Responses to the open-ended questions showed that consumers prefer CDPs mostly for textiles and shoes, electronics and accessories or giftware purchases. Locker points were the most preferred type of CDPs, which customers access through pins or barcodes received via their mobile phones. The next most popular type was service points at local grocery stores, supermarkets, flower shops, drug stores and pet shops, closely followed by nearby shopping malls and gas stations.

Further analysis to compare respondents' problems with traditional cargo and their CDP preferences showed that 90.65% of those who had problems with returns, 91.45% of those who had communication problems with conventional cargo firms, 89.40% of those who had problems with not being at home when the cargo arrived and 88.46% of those who had to go to a cargo carrier depot to pick up a failed delivery were more likely to use CDP services. These findings provide important insights for defining the relative advantage of a CDP service over conventional cargo deliveries.

However, the interviews produced contradictory findings. "*The biggest challenge was convincing the customer to try it. They became regular customers after trying it once. The Turkish market is not an 'early-adopter' paradise. Technology orientation is low*" (CDP service provider). Almost all interviewees described the average Turkish e-commerce consumer living in a large city as a "*white-collar worker*" who has "*too little time*" and "*no willingness to provide his/her services to go and pick a package*". Traditional cargo operators claimed that consumers do not tell the truth in surveys. Otherwise, people would not want the same failed package to come to their home address for a second, third or even fourth time. Secondary sources also supported this finding: "*Paying for a CDP after online shopping and the CDP location concept that you have to go and pick your package later became a kind of burden for people and drove them away from the concept of the 'order coming to me'*" (e-commerce expert opinion from web blog). One of the international cargo operators thought that they would not introduce the CDP service that they already provide in other European countries in Turkey because of the intense competition among both e-retailers and cargo operators, which increases consumer expectations even more. Although consumers state that they would like to use a CDP if it is close to where they live, the availability of a repetitive home or work-place delivery service hinders the potential usage of CDPs. Thus, to make consumers favour CDPs, they need to be positioned as the only alternative for failed home deliveries.

4.2.2. Work-place delivery

An interesting finding was that work-place delivery was an alternative to home delivery, which was also mentioned in one of the semi-structured interviews as the main rival of CDP services. Istanbul is a large city where the majority of white-collar labour works in plazas. These plazas and business centres accept personal cargo deliveries to work-places, which creates a lot of security and workload issues at reception. *"4 years ago, plazas in Istanbul started to avoid accepting employees' personal cargo deliveries. There were regulations against this habit but nothing significant has changed since then … Consumers order their packages to their work-places and carry them on their service buses at the end of the working day"* (CDP service provider).

Service buses are a commuting mode that is specific to the research context. Almost all large workplaces in Turkey take responsibility for their employees' commute, whether internally or by outsourcing. They are included in employee benefits. In Istanbul, employees strongly prefer service buses due to severe traffic congestion, inadequate public transportation, long distances between residential areas and business zones and the inaccessibility of some workplaces. Consumers who are not at home during the day, order packages to their workplaces; once they are delivered, they can easily carry them home on the service buses.

Although this creates a lot of problems for workplaces, they cannot ban this practice due to long working hours and the lack of alternative solutions for e-commerce deliveries. Some workplaces try to provide internal CDP solutions whereby personal deliveries are tagged with the individual or department name and stored in an open box. One traditional cargo operator who noticed this need initiated a locker point service in several workplaces and shopping malls while another company introduced a locker point service for large gated apartment complexes that traditional cargo operators can use to leave household packages.

4.2.3. Security and trust concerns

Trust issues regarding CDP distribution network members have already been mentioned. In addition, there is also mistrust of consumer behaviour and security issues related to the macro environment. Several interviewees thought that the system is vulnerable to fraud while traditional cargo operators admitted that even they experience problems with fake identities, people not wanting to show their identity, or people claiming that they are a family member, friend or neighbour in order to steal a package. They therefore believed that such incidents would increase with CDPs in small stores. Return packages are also a risk because they need to be prepared at home and dropped off, for example at a locker point, where there is no check of the package contents. The CDP provider admitted that "*the return value proposition was even higher with locker points, but we could not offer them for this service at all. In a city where the terror risk is so high, such as Istanbul, letting everyone to put anything into an unattended box in the city centre is impossible.*"

4.2.4. Regulatory environment

Traditional cargo operators in Turkey are subject to Ministry of Transport and Ministry of Trade regulations and also need special permission from the Information Technology and Communication Council to carry electronic goods for maintenance and repair. Traditional cargo operators meet these regulations by controlling their operations and networks. However, they were concerned about CDP distribution networks of small shops: "The *CDP service provider might have the required certification from the relevant institutions but how about*

the stationers on the corner? How can the CDP service provider hand over the authority of storing goods that have financial value to these stores?" (Traditional cargo operator 2). Another interviewee emphasized employee qualifications: "*All our employees are screened during the recruitment processes and they have the necessary documentation. How about the owner of a flower shop? How can he/she become the part-time employee of a cargo operator?*" (Traditional cargo operator 3).

Although the CDP service provider stated that they met legal requirements and had solved issues in time, the market needs new policies and regulations to accommodate these new urban logistics solutions. The current rules and regulations raise trust and security concerns regarding CDP services.

To summarize, the CDP service in the analysed context failed due to contingencies in its vertical and horizontal supply chain linkages, its inability to diversify the service by designing the supply chain differently. The failure was also triggered by existing market conditions, macro-environmental dimensions and consumer behaviour shaped within this market. The next section will discuss how these contingencies influence the diffusion of CDPs as forms of sustainable urban logistics solutions.

5. Discussion

This study explored the mechanisms required to enable CDPs diffuse in the market by investigating a failure case in Istanbul, Turkey. The findings contribute to the logistics literature in three main ways. Firstly, by using multiple data sources, they provide a dual perspective that includes both supply chain and market contingencies. This complements current CDP research, which is mostly based on consumer perceptions of sustainable urban logistics innovations (de Oliveira et al., 2017; Kedia et al., 2017; Moroz & Polkowski, 2016; Wang et al., 2018a, 2018b; Weltevreden, 2008; Yuen et al., 2018).

Second, a majority of current research focuses on successful CDP models that are penetrating markets (e.g. Morganti, Seidel, et al., 2014) or CDPs during their trial stage (e.g. Wang et al., 2018a; Yuen et al., 2018). In contrast, our study used a failed case example. Considering that a vast amount of sustainable urban logistics innovations is frequently introduced without knowing if they can solve the urban delivery problem, our exploration of this failed case offers many important insights. The framework integrates these insights holistically and provides a tool that can function as a baseline for future studies to analyse other sustainable urban logistics solutions. The failure factors analysed in this study provide information that is often overlooked in studies that only consider success factors in diffused and scaled-up urban logistics innovations. Our findings thus reveal potential barriers for sustainable urban logistics innovations that need to be mitigated when such initiatives are introduced.

In terms of the classification of Triantafyllou et al. (2014), CDPs are a form of UCCs. The UCC literature has focused on failures and their reasons (Simoni, Bujanovic, Boyles, & Kutanoglu, 2018; Van Rooijen & Quak, 2010; Verlinde, Macharis, & Witlox, 2012) but also successes and mechanisms that made them viable business models (Björklund et al., 2017). However, these cases are examples of B2B logistics solutions serving defined urban areas and mostly subsidized by local authorities. Therefore, while some reasons for failure are shared with the present study, such as lack of horizontal collaboration, other factors, such as dependence on municipal subsidies or consolidation costs, are not relevant for CDPs, which are mainly driven by private actors who perceive cost and efficiency advantages. Instead of relying on a consolidating partner for the final delivery process, they rely on the consumer. That is, the differences in service characteristics call for a failure analysis specific to CDPs. The findings of this study contribute to this end.

Finally, this study conceptualizes CDPs as a sustainable urban logistics innovation that is rarely observed in the relevant literature. Even the mainstream logistics literature has yet to explore sustainable logistics innovations widely (Björklund & Forslund, 2018). Our findings support Grawe's (2009) model for diffusion of logistics innovations by confirming how the lack of a competitive advantage caused a failure of diffusion. We also extended it by exploring the reasons behind the inability to achieve competitive advantage through Rogers' (2003) DoI theory to suggest how CDPs can become viable solutions. The existing solutions in the market, such as work-place delivery, or problems, such as lack of horizontal collaboration between multiple last-mile actors, reduce the relative advantage of CDPs. Such innovations only provide an advantage if not being at home for a delivery creates a significant problem for consumers with CDPs being their only alternative. In addition, both supply chain and market related contingencies indicate CDPs' compatibility issues. Current rules and regulations, established delivery patterns and problems with IT integration all reduce compatibility with the existing last-mile delivery systems. The complexity of the CDPs in metropolitan areas increases as the number of actors in the distribution network increases, areas such as in the case context for our study. Other contextual factors can also increase complexity, such as safety and security issues in large cities. In the case of CDPs, trialability and observability is provided by a distribution network comprised of convenience stores or urban transportation stations, both of which are visited by many consumers every day. Although these attributes were secured in this failure case, they were not enough to generate wider diffusion because the other attributes were lacking.

5.1.1. Supply chain contingencies

CDPs sell their service concept in B2B markets but provide their service benefits in B2C markets. To reach large customer segments and achieve economies of scale, they need partnerships with large e-commerce companies. In the failure case, their customer portfolio could not provide the required end consumer volume, which might also have reduced the trialability of the CDP service. For enhanced trialability of sustainable urban logistics innovations, companies need to reach a large consumer base, which is only achievable in the case of CDPs through the customer networks of very large e-retailers.

Another critical issue about supply chain structures is the availability of a large distribution network (Weltevreden, 2008). Although the example in this case had a similar distribution network structure with some counterparts in European countries, which comprise small convenience stores, this could not support the compatibility and complexity attributes of the service. Morganti, Seidel, et al. (2014) also demonstrated the difficulty of recruiting and maintaining distribution network members. Managing a highly diverse set of distribution actors in a very large city creates great complexity for the daily operations of the CDP provider and consumer-provider interaction. IT integration and the technology use capabilities of network members also increase the complexity of the service. Finally, mistrust of small stores can create doubts in consumers' minds, which indicates that this distribution network design is incompatible with consumers' beliefs.

Like previous research (e.g. Kedia et al., 2017), we found that one essential requirement for consumers was that CDPs are located near them. However, this creates a burden for CDP providers and forces them to manage a large distribution network. To reduce this complexity, successful CDP providers have built their distribution networks via partnerships with supermarket chains, which tend to expand using various shop sizes targeting highly dense residential areas. This enables a more standardized management of the distribution network, makes IT integration easier and should increase consumer trust as the majority of supermarket chains are well-known brands. Such a network building strategy could reduce the complexity and increase the compatibility of CDPs with consumer expectations.

In addition to vertical network structures, a high degree of horizontal collaboration is required to enable CDPs to offer a complimentary

service for failed home deliveries. As Liu et al. (2019) note, market conditions in some countries mean that CDPs are the only way for consumers to collect their online purchases. However, in markets that still offer home delivery services, CDP providers must collaborate with conventional cargo carriers. Such collaboration can significantly increase the relative advantage of the service because, without this complementary nature, consumers will see CDP as a burden. Because of increased relative advantage and in line with Grawe's (2009) theory, conventional cargo carriers may switch to CDP business models to increase operational efficiency while reducing damage to the environment.

Lastly, CDP services should try to diversify their value propositions to solve multiple problems in urban logistics to enlarge their market. Such a strategy requires building multiple supply networks for different value propositions. Examples include return cargoes, warranty, repair flows, same-day, next-day and specific-day delivery solutions, and combined solutions with offline shopping. Such diversity would increase the relative advantage of the service by providing alternative solutions to existing problems and improve its sustainability as many of these flows are expected to replace individual trips to further points than CDP locations.

5.1.2. Market contingencies

Regarding market contingencies, the availability of options like work-place deliveries reduces the relative advantage of CDP services. This may be both a problem and an opportunity for CDP providers. Building distribution networks within plazas, government office regions and shopping malls, could solve a major problem for workplaces trying to handle personal cargo and consumers that want to receive their deliveries at their workplaces. Locker points could become very successful solutions in such areas while CDP services at these locations make the service more visible to non-users, who might then want to try it. Lemke et al. (2016) argue that combining a commuting trip with a cargo pick up is an environmentally friendly habit. Building such a network would also contribute to the sustainability component in the CDP service offering.

Regarding sustainability, another essential factor is the way consumers travel to and from CDPs. Our results showed that consumers want CDPs within walking distance of home, which would increase environmental sustainability. To achieve this, CDP distribution networks should grow rapidly in residential areas whereas distant CDPs could generate new car trips that would make CDPs less environmentally sustainable as urban logistics solutions.

Security and trust concerns in markets introduce complexity into the system. These need to be considered while designing the service, for example so that returns are only allowed if they are packed at the CDP location. Because current regulatory frameworks are generally prepared to accommodate existing systems, there are many clashes with innovative business models, which reduces the compatibility of CDPs with existing systems. However, considering that sustainability is on the agenda of many policymakers, a change in favour of these services could be beneficial for both parties.

Lastly, consumer market characteristics, such as late-adoption or scepticism, or a lack of a technology orientation reduce the compatibility of CDPs with existing beliefs and habits. Enhanced relative advantage plays an important role in encouraging consumers to try a new solution. Collins (2015) reports that if CDP networks have higher densities, then consumers are more likely to shift to environmentally friendly modes like walking or cycling. In our study, too, respondents said they were willing to walk if CDPs are located within walking distance, which shows the potential to increase the environmental sustainability of urban deliveries.

6. Conclusion and implications

This study explored the reasons behind the failure of a sustainable urban logistics innovation, in this case a CDP service. The findings indicate that sustainable logistics innovations fail due to both supply chain-related and market-related factors. From the supply chain side, network structures, IT integration and diverse value propositions were significant factors while consumer market characteristics, regulations, security issues and the convenience of existing alternatives were major factors from the market side. Several suggestions were discussed for managing these contingencies so that sustainable urban logistics innovations like CDPs can diffuse successfully.

The study has several implications for practitioners. Firstly, it is important for new CDP initiatives to consider these contingencies when designing their service offerings. Important success factors include finding horizontal collaboration opportunities and building strong network partnerships with customers and distribution channel actors. The service should be supported by powerful IT integration among the partners to prevent new users experiencing complex problems. In addition, a CDP service should be complemented with other urban logistics services to diversify the value proposition.

While current research has provided information about successful CDP applications, failing cases provide new insights to practitioners about overlooked variables in successful examples. The extended framework and findings from this case can be used as a benchmark for new CDP initiatives in different cities and for other sustainable urban logistics innovations. In addition, contextual variables are important in urban logistics studies because different urban settings have different realities. Acknowledging hinderances for some sustainable urban logistics innovations due to local conditions can pave the way for other sustainable innovations that solve the last-mile problem in their specific contexts.

Surprisingly, neither the case company nor the new solution provider with a broader service scope positioned themselves with a sustainability value proposition. However, such a positioning could be beneficial in many respects. First, it could increase the compatibility of the innovation with environmentally sensitive consumer segments. Second, many large e-retailers have sustainability agendas. A joint communication effort regarding the sustainability benefits of such systems could support the relative advantage of the CDP service. Third, the sustainability aspect could be used to motivate regulatory bodies to change laws and regulations that currently hinder such initiatives. As Yuen et al. (2018) also suggest, the authorities could be persuaded to promote CDPs to reduce negative externalities. Recent developments in London, for example, indicate that more public policy intervention will be introduced to increase CDP services while consolidating the service provision aspect (TFL, 2019).

This study is not without its limitations. Considering that it is a case study with many context-dependent characteristics, the findings cannot be generalized to all markets. However, while providing insights for similar markets where existing urban logistics services have a competitive advantage over CDPs, the findings also pinpoint some general factors to consider when introducing sustainable urban logistics innovations. Further research is required to understand the dynamics behind the success or failure of sustainable logistics innovations. Supply chain contingencies indicate that such innovations require various degrees of reconfiguration in supply networks and horizontal collaborations between actors that have never worked together. Understanding how these sustainable logistics innovation networks can be established, operated and maintained would provide valuable insights for the logistics literature. Furthermore, powerful online retailers tend to introduce their own logistics solutions to control their entire chain. It would be interesting to explore how such initiatives will impact sustainable urban logistics start-ups. Will large online retailers use them or eliminate them? Lastly, many sustainable logistics innovations are based on sharing economy business models. This also applies to CDPs that share space with convenience stores or retail chains. Research focusing on the challenges facing sustainable urban logistics innovations that utilize these sharing economy platforms could provide useful insights to understand emerging phenomena in logistics and e-commerce.

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