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ORIGINAL PAPER

MOST SUCCESSFUL BUSINESS MODELS IN LOGISTICS INNOVATIONS – THE REVIEW OF CROWD LOGISTICS SOLUTIONS

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ABSTRACT. Background: Crowd logistics is a relatively new phenomenon that has emerged due to the growing demand for flexible, efficient, and sustainable delivery solutions. This paper presents an empirical study of crowd logistics initiatives by collecting a comprehensive dataset of companies operating in this field. Our research aims to identify the elements of the most successful crowd logistics business models and identifies the causes for their failures.
Materials and methods: To achieve these goals, we conduct a systematic screening of the world market, which allows us to identify a diverse set of crowd logistics initiatives, ranging from small startups to well-established companies. We then classify these initiatives based on their business models, main business areas, and services. We also review the EU-funded projects related to the development of crowd logistics. Finally, we analyze the main business areas of each initiative, such as urban logistics, last-mile delivery, and transportation of goods.
Results: We present the full view of crowd logistics solutions worldwide, their main characteristics, and models to build a complete picture of those solutions and assess them as being successful or unsuccessful by providing the list of the features identified as success factors and failure factors.
Conclusions: Finally, we conclude that crowd logistics, despite many failures observed worldwide, can be a successful solution for urban logistics if it meets the requirements mentioned in the results section. Our findings provide insights into the emerging landscape of crowd logistics and offer practical implications for managers, policymakers, and researchers.

Keywords: crowd logistics, sharing economy, urban logistics, urban flows, crowdfunding

INTRODUCTION

In the literature on innovation, no single theory explains how innovation occurs. It is a research area constantly evolving due to economic development. In the context of logistics innovations, various theories should be considered to help explain and understand the ongoing process. Logistics innovation literature covers the most suitable approaches to this topic, such as Schumpeter's creative destruction concept, theory of S-curves, network theory, or resource-advantage theory [Grawe 2009]. Moreover, a few concepts are perceived as innovative within the sharing economy, e.g., crowd logistics (CL).

CL is a concept that leverages the power of the crowd to provide logistics services. CL has emerged as a new way of organizing and optimizing last-mile delivery (L-MD) in urban areas. The idea is based on the sharing economy model, where individuals or businesses can offer their unused resources and capacities, such as space in their vehicles or storage facilities, to provide different logistics services to others. The concept has recently gained considerable attention due to the increasing demand for fast and efficient delivery services, particularly in urban and suburban areas. However, there is still no homogeneous approach to defining CL, its essence and scope, no classification of successful business models, and no determination of elements which would allow it to achieve success. In this paper, we fill these gaps.

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This paper's aim is to discover the characteristics and elements of the most successful applications as the elements of business models for CL solutions operating on different continents. We begin by defining the logistics innovation, CL concept, and its key characteristics. Then, we examine the advantages and challenges associated with CL, such as cost-effectiveness, scalability, and reliability, as well as the potential impact on traditional logistics models. Next, we present the results of the analysis of the features of failed CL projects and successful implementations, providing the list of must-have elements. Finally, we offer insights and recommendations for practitioners and policymakers interested in adopting or regulating CL. In summary, this paper contributes to the ongoing debate on the potential of CL. By providing a comprehensive overview of the concept, its advantages, challenges, and current state of adoption, we hope to facilitate a better understanding of the potential of CL for smoothing the flows of goods in urban and suburban areas.

THEORETICAL BACKGROUND

Innovations

Schumpeter's approach related to economic development, entrepreneurship, economic cycles, and creative destruction has become a permanent part of the considerations regarding innovations. Schumpeter divided innovations into six types [Schumpeter 1934, Schumpeter 1942]:

1. launch of a new product/service or a new species of already known product/service
2. application of new methods of service or production or sales of a product (not yet proven in the industry)
3. opening of a new market (the market for which a branch of the industry was not yet represented)
4. acquiring new sources of supply of raw material or semi-finished goods
5. new industry structure, such as the creation or destruction of a monopoly position
6. application of the new organization of industry

The above approach has become the basis for distinguishing several types of innovation over the last decades. Public actors, stakeholders, and authorities creating legal frameworks were not without significance for isolating the above types of innovations.

Schumpeter believed that innovation is an essential driver of competitiveness [Porter and Stern 1999] and economic dynamics [Hanush and Pyka 2007]. He also believed that innovation is the center of economic change, causing gales of "creative destruction" [Schumpeter 1942]. Rapid technological change referring to Schumpeter's theory also appears in the resource-based view of the firm, which has evolved to a dynamic capabilities framework where innovation can be characterized as a dynamic capability [Grawe 2009].

A similar reference can be observed in the case of "radical innovations" placed in the exploration-exploitation framework. In this instance, radical innovations are designed to meet the needs of new markets and require new knowledge or a departure from existing knowledge within a company. Such innovations are incremental and designed to meet the needs of existing customers or markets and are characterized by refinement, implementation, and efficiency [Cheng and van de Ven 1996, Grawe 2009].

Knowledge management is the second theoretical framework for considering innovation. As a strategic resource for supporting the logistics innovations globalization of logistics processes, development of collaborative logistics partnership, the role of human resources, and the digitalization of logistics processes have been proposed [Lönnqvist 2017]. This framework also highlights that knowledge's uniqueness is fundamental in developing a sustained competitive advantage [Turner and Makhija 2006, Grawe 2009].

The third theory related to logistics innovations is the S-curves theory. It explains the origins and evolution of radical innovations, where consumer benefit is created in the introduction phase, benefits increase as the technology develops, and benefits increase at a slower rate as the technology enters maturity

[Christensen 1992, Chandy and Tellis 2000, Grawe 2009, Lee and Trimi 2021].

A reference should also be made to the network theory and resource-advantage theory. Network theory framework concerns position, power, embeddedness, and density in long-term inter-actors' relationships. Network theory research has also considered the roles of each actor in a network and the resulting impact on innovation [Dhanaraj and Parkhe 2006, Grawe 2009].

According to resource-advantage theory, companies and individuals use their resources to gain a competitive advantage against competitors, which in turn will lead to above-average financial results [Hunt and Morgan 1996]. Mentioned resources include a firm's assets, processes, information, and knowledge that can help a company improve efficiency and effectiveness [Barney 1991]. According to the resource-advantage theory, companies' primary goal is superior financial performance, which can only be attained by achieving a competitive advantage in the marketplace by implementing innovations [Hunt 2002, Grawe 2009].

Crowd logistics

The transition towards CL and sharing mobility contribute to the goals of low- and zero-emissions economies [Cohen and Kietzmann 2014]. Urban areas are seen as critical centers of sustainable growth [Ly 2020]. Commonly it is indicated that the sharing economy is the future for cities, especially its multimodal integration and optimization of the use of means of transport [Nikitas et al. 2017].

CL is a relatively new phenomenon, and a limited but growing body of literature exists on this topic. The genesis of CL was between 2000 and 2008, when the term first appeared in the literature. Initially, the term 'crowdsourcing' was used to refer to bottom-up initiatives, a form of online community and many more areas further adopted it. CL originated from crowdsourcing and means leaving logistics tasks to the 'crowd', i.e., the individuals who might be both service providers and customers [Carbone et al. 2017]. In this way, it can be defined as crowdsourcing in logistics. The development of the CL concept occurred during the rapid growth of the Internet, which enabled people to communicate with each other on social networks and platforms. In 2008, the company Uber started its operations, first as a shared mobility initiative, later enhanced to parcel and food deliveries. Since then, CL has started to become more business-like. CL should be understood as a part of sharing economy but both concepts constantly change in definition and their relations are no longer as sharp as they were a couple of years ago. Nowadays, CL solutions are also broadly known as crowd shipping but should be defined broadly since they include solutions dedicated to urban mobility [Buldeo Rai et al. 2017].

In the literature and other sources, there is one dominating approach to CL. The most accepted and complex definition of CL states that it "designates the outsourcing of logistics services to a mass of actors, whereby the coordination is supported by technical infrastructure" [Mehmann et al. 2015]. Following this approach, CL helps to benefit all stakeholders (not necessarily in the matter of money but time optimization or convenience). One of the key features of CL is its reliance on the crowd (a number of individuals and/or companies) to perform the delivery tasks, instead of traditional logistics providers. The individuals from the crowd are willing to transport goods using their own vehicles, bicycles, public transport, or even walking to deliver the parcels. This approach has several advantages over traditional logistics models, including lower costs, increased flexibility, and reduced environmental impact.

CL has emerged as a promising solution for L-MD and more generally, short-distance delivery, leveraging the collective efforts of individuals and businesses to transport goods more efficiently and sustainably. However, despite its potential benefits, many CL initiatives have failed to gain traction and achieve long-term success. The reasons behind these failures are often attributed to defects in the implementation process, such as inadequate technology or insufficient planning. However, some argue that external factors can also significantly impede the success of CL initiatives. In this paper, we examine the factors contributing to the failure of CL initiatives and explore whether these failures result primarily

from defects in the implementation process or a matter of misfortune. By identifying the root causes of these failures, we aim to provide insights for logistics industry stakeholders to help improve future CL initiatives' success rate.

Defects in the implementation process may include inadequate technology, insufficient planning, or poor execution. For example, a CL platform may lack the necessary features to match supply and demand effectively, leading to inefficient routing and suboptimal deliveries. Alternatively, inadequate planning may result in a mismatch between demand and supply, leading to either overcapacity or underutilization of resources. Finally, poor execution may manifest in delays, low-quality service, or poor communication, leading to decreased user satisfaction and, ultimately, failure.

However, external factors may also contribute to the failure of CL initiatives. These may include changes in market conditions, such as shifts in consumer behavior or the emergence of new competitors, that render the existing business model obsolete. In addition, unforeseeable events such as natural disasters, pandemics, or economic downturns may also disrupt the normal functioning of a CL platform, leading to decreased user engagement and, ultimately, failure.

Several studies have examined the potential benefits of CL. For example, Nijden and van Meerkerk [2017] conducted a study in the Netherlands and found that using crowdsourcing in logistics could reduce delivery times and costs while increasing customer satisfaction. Similarly, Klumpp [2017] investigated the use of crowdsourcing in urban logistics and concluded that it has the potential to reduce delivery costs and carbon emissions significantly.

Despite its advantages, CL also faces several challenges. One of the main challenges is the lack of control over the delivery process, as the crowd is not a formal logistics provider and may not have the same level of expertise or reliability as traditional logistics companies. This challenge can be addressed by using technology platforms that provide real-time tracking and monitoring of deliveries and by implementing quality control measures.

METHOD

Research procedure

To collect data on different initiatives of CL, we adopted a systematic approach to screen the world market. First, we conducted a comprehensive literature review of peer-reviewed articles, conference proceedings, and industry reports related to CL. This review allowed us to identify a preliminary list of CL initiatives and their associated business models. We then used this list as a starting point for our data collection.

Next, we used a combination of online search engines and business directories to identify additional CL initiatives. We searched for companies operating in various geographical regions, including North America, Europe, Asia, and Australia. We used a variety of keywords in abstract search, such as "crowd logistics," "peer-to-peer delivery," "collaborative logistics," "on-demand delivery," and "crowd shipping" to ensure that we captured a diverse range of initiatives.

Once we identified a potential CL initiative, we conducted a more detailed analysis of its business model and main business area. We collected data on the following aspects of each initiative:

1. Business model: We identified the type of business model adopted by each initiative, such as peer-to-peer (P2P) networks, on-demand delivery platforms, and collaborative logistics networks.
2. Main business area: We assessed the main business area of each initiative, such as urban logistics, last-mile delivery, and transportation of goods.

To ensure the accuracy and completeness of our dataset, we cross-checked our findings with publicly available information on company websites, industry reports, and news articles. We also consulted with experts in the field of CL to validate our findings.

In total, we collected data on over 50 CL initiatives worldwide (see Table 1). We analyzed the data using descriptive statistics and presented

our findings in tables and charts. Our results provide a comprehensive overview of the emerging landscape of CL and offer insights into the most prevalent business models and main business areas.

Table 1. The list of identified CL initiatives

Solution	***Country***	***Main scope***
Airmee	Sweden	Carbon free delivery
Axlehire	USA	Improve logistics services
Bitsout	Spain	Smart tools
Boxconn	Ghana	Improve logistics services
Bringg	Israel	Last-mile delivery solutions
Clean Motion	Sweden	Improve logistics services
Convoy	USA	Carbon free delivery
Darkstore	USA	Last-mile delivery solutions
Deliverr	USA	Improve logistics services
Delhivery	India	Smart tools
DroppX	Finland	Last-mile delivery solutions
EasyPost	USA	Smart tools
Everstock	Germany	Improve logistics services
Fabric	USA	Smart tools
Flash Express	Thailand	Improve logistics services
Flock Freight	USA	Improve logistics services
Hive Logistics	Europe (many locations)	Improve logistics services
Juma Peisong	China	Last-mile delivery solutions
Lizee	France	Smart tools
lock Freight	USA	Smart tools
Loggi	Brazil	Smart tools
Mastery Logistics Systems	USA	Smart tools
MVXchange	Niger	Improve logistics services
Navines	Israel	Smart tools
Nuvocargo	Mexico	Smart tools
Onfleet	USA	Smart tools
Report a Car	Saudi Arabia	Improve logistics services
Stone Rooster Distributors	USA	Improve logistics services
Tyltgo	Canada	Last-mile delivery solutions
Volta Trucks	United Kingdom	Improve logistics services
w8time	Canada	Smart tools
WareIQ	India	Last-mile delivery solutions
Yimidida	China	Smart tools
Zeus Labs	United Kingdom	Improve logistics services
Zoodbox	Canada	Last-mile delivery solutions

Source: own elaboration.

In the screening process, we identified most of the CL solutions to be started in EU countries (we recorded the highest number of failures in this geographical area but also many successes). To screen EU-funded projects related to CL, we adopted a systematic approach that involved searching multiple databases and using specific keywords to identify relevant projects. We used the following steps to conduct our search:

1. Identification of relevant databases: We identified several databases that contained information on EU-funded projects, including the European Commission's CORDIS database, and additionally, TRIMIS database.
2. Selection of keywords: We selected a set of keywords related to CL and its associated concepts. These keywords included "crowd logistics," "crowdsourcing," "crowd shipping", "collaborative logistics," "on-demand delivery," "urban logistics," and "last-mile delivery."
3. Filtering and selecting projects: We filtered the search results based on several criteria, such as the project's relevance to CL, its funding source (i.e., EU funding), and the project's stage of development (i.e., ongoing or completed). We also excluded projects that were not related to logistics or transportation.
4. Data extraction: Once we had identified relevant projects, we extracted data on their key features, such as their project title, duration, funding amount, consortium members, and main research areas. We also collected information on the project's approach to CL, including their business model and main business area.
5. Data analysis: We analyzed the collected data using descriptive statistics and visualizations. We also conducted a qualitative analysis of the project descriptions and the content of the projects' websites to identify the main research areas and approaches adopted by each project.

Our systematic approach to screening EU-funded projects related to CL enabled us to identify and analyze a comprehensive dataset of relevant projects. Our findings provide insights into the current state of crowd logistics research and the various approaches being pursued by EU-funded projects in this field.

Qualitative review

Additionally, a few more reviews were prepared to achieve the research goal:

- Review of solutions
- Review of business models
- Review of lifetime of those solutions

Review of solutions:

The review of solutions is a research method that involves analyzing existing solutions that have been proposed or implemented in a particular CL solution. The materials are then analyzed to identify common solutions, as well as the strengths and weaknesses of the solutions, e.g., regarding using the IT tools or particular functionalities.

Review of business models:

The review of business models involved analyzing the various business models that are used by CL companies—usually providers of IT applications. We collected data about the pricing model, prices for using the IT application, payment models, etc.

Review of lifetime of those solutions:

Reviewing the lifetime of those solutions involved gathering relevant information on CL initiatives that have been implemented, including their start and end dates, as well as any factors that contributed to their success or failure. We identified commonalities and differences between the initiatives and the factors contributing to their longevity or lack thereof. The longevity of solutions meant successful implementation and accepting the solution by the market.

RESULTS

Crowd logistics solutions

As mentioned earlier, many CL solutions failed. We identified 35 successful CL solutions being launched from 2010 to 2021 (we identified that the failures of CL solutions were observed in 93% of failures in the first 2 years after launching the solution, so those that survived the first 2 years were considered successful). CL is developing most rapidly in the United States and Canada (see Figure 1). Nine solutions have been located in EU countries, but no single country reports many solutions. Also, Europe has the highest score of failed solutions and the highest number of started CL initiatives. Therefore, Europe is perceived as an accelerator and testbed for CL solutions.

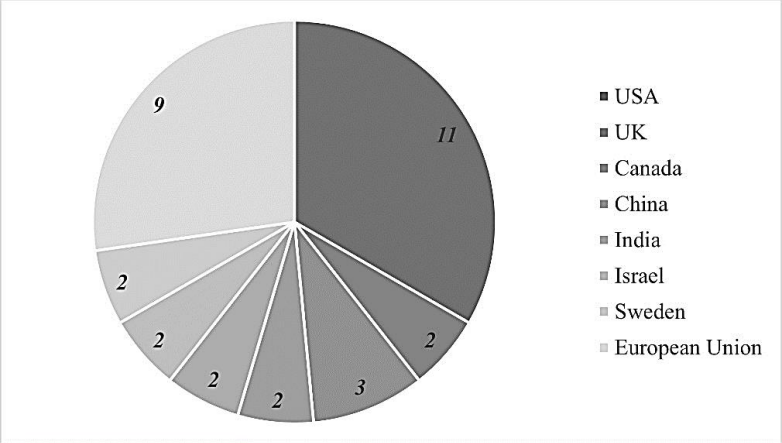

Fig. 1. Number of crowd logistics solutions identified in the respective countries
Source: Own elaboration.

Specific solutions were examined regarding the organization's purpose, year, and country of establishment. The oldest still-existing solution, Clean Motion, was implemented in Sweden in 2010. In the following years, CL development moved from Europe to the USA and Canada, which is linked to North American countries' economic and social development.

Then, all the existing CL solutions were analyzed (see detailed results presented in Appendix). The main findings are as follows. Implementing CL solutions requires several conditions to be met: (1) a well-developed technical infrastructure, (2) a well-developed crowd network, i.e., connections between community members, (3) high capacity and the possibility of voluntary work, (4) unidentified nature, (5) remaining external to the organization, and (6) the existence of some sort of compensation for the work performed [Buldeo Rai et al. 2017]. Technical infrastructure refers to several types of infrastructure essential for logistics processes in general and digital infrastructure, high-speed internet public infrastructure, mobile applications, and other similar infrastructures. Thus, the development of CL is mainly concerned with networks of connections between the organization, users, and customers, which requires high-quality social resources.

The analysis of the identified CL solutions has highlighted specific areas necessary for developing these solutions (Figure 2.).

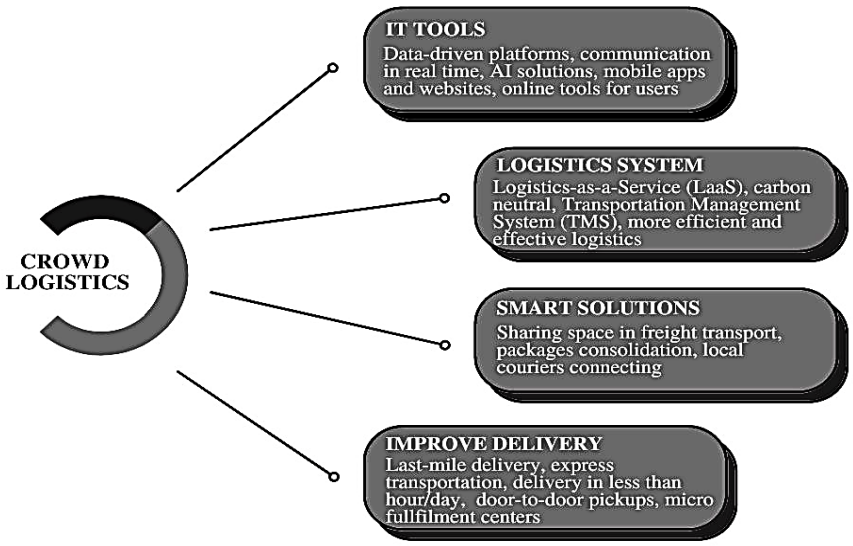

Fig. 2. Key areas for the crowd logistics development
Source: Own elaboration.

Key areas for successful implementation and growth of CL are developing IT tools, the logistics system itself, the development of smart solutions, and improvement of processes. IT tools need a lot of data provided in real time. Data-driven platforms and algorithms are the most important part of a CL system; they offer the constant, ongoing monitoring of the free capacities of the crowd. The most successful CL solutions in this regard included Bringg (Israel), Convoy, Flock Freight, Fabric, Mastery Logistics System, Onfleet (USA), Delhivery (India), DroppX (Finland), Everstock (Germany), Loggi (Brazil), Nuvocargo (Mexico), Ymidida (China), and Zoodbox (Canada). IT tools, mainly available for laptops and (especially) different mobile devices, help connect stakeholders in the system and make it possible to create new actions using Artificial Intelligence (AI) or cloud-based mobile applications. The same stakeholder may become the service provider and customer in one transaction at the next time. Many price models are developed in the identified solutions, starting with the pre-paid systems, lump sums, fixed wages, and flexible agreements between the users and the crowd. There is no gold standard in the analyzed models; however, the most often used is the system with capacities in the form of an offer published by the CL service provider together with the wage or lump sum for the specific service from the offer.

The core of the successful implementation of CL is the structure of the offer. The logistics system needs a new paradigm to meet ecological standards and stakeholders' needs. Therefore, emerging companies need to demonstrate a new perspective on logistics, as in the case of Everstock (Germany), which based its growth model on the Logistics-as-a-Service concept (LaaS). A LaaS solution is an approach that presents holistic logistics, where the company treats the delivery process as a service that uses different means and modes of delivery. Therefore, even if the service needs to involve different solutions to be implemented, it will be planned and delivered using the complex offer. Moreover nowadays, logistics processes, especially delivery, should be based on environmentally friendly solutions. Furthermore, improving process efficiency following the direction of customer expectations is also a significant growth factor for companies. Then, the most successful CL solutions we analysed provided the basic data analytics for users, helping them monitor the times, costs, and performance (if they are service providers or customers). Also, data can be exported in Excel format to be further used by the user if they want to analyze the data independently.

Another critical element of the CL is allowing the use of smart solutions as a part of the previously mentioned CI IT application– especially sharing space, consolidation of parcels, or solutions to connect couriers. Such

solutions have been implemented by companies such as Deliverr, Flock Freight, Onfleet (USA), DroppX (Finland), and Loggi (Brazil). Space sharing (which means sharing the space of means of transport or place for warehousing) can be used at various stages of delivery and storage. Space sharing is then combined with the consolidation of shipments. Consolidation can take place in consolidation centers, warehouses, or vehicles. Finally, connecting couriers with shipments is done via mobile apps. Local couriers deliver shipments based on the data received from the app, planning the whole route for the parcel together with proposing crowd members (service providers), waiting times (while switching between them), and travel time with the estimated time of reaching the destination. This occurs in real time. Moreover, the crowd member providing the service may consent to be tracked by the customer or give the details about the Whatsapp or mobile number. Not popular but highly successful is assessing the service providers by customers and giving them badges according to their score and number of provided services. It impacts the customer choice and also the price of the service.

Finally, successful CL solutions provide details about the processes, the whole transaction history and proposes solutions for the identified bottlenecks, even sometimes proposing alternative means of transport or routes and crowd members with the highest scores among the customers. Improving the quality of shipment delivery is now one of the main determinants of success in freight transportation. Delivery quality solutions include door-to-door transportation, as in the case of Flash Express (Thailand), and last-mile solutions using different types of vehicles, as in the case of Delhivery (India) or Bringg (Israel). For customers, a fast delivery time is essential, so many startups opt for a delivery guarantee within a certain period, maybe the next day, an hour, a few hours or less than an hour, as in the case of Darkstore (USA), DroppX (Finland), Tyltgo (Canada) and WareIQ (India). In addition, micro-fulfilment centers can provide additional value in conjunction with shipment consolidation. Urban consolidation centers (UCC) are currently being implemented, but there is a lack of this occurring on a large scale. In the analyzed companies, such a solution is proposed by Darkstore and Fabric (USA).

CL solutions also have some weaknesses, which may include:

1. formal problems in communication between supplier and customer and delays resulting from the supplier's unawareness on the spot [Alharbi et al. 2022].
2. issues related to trust in the service and the supplier in general. Service provision requires submitting sensitive data that can be used improperly [Bortolini et al. 2022, Cieplińska and Szmelter-Jarosz 2020].
3. standardization of the service. Nonqualified personnel may provide CL solutions [Bin et al. 2021, Carbone et al. 2017]. The quality of the service may also be lowered by inadequate technical infrastructure, including a lack of security for mobile applications [Buldeo Rai et al. 2017, Cieplińska and Szmelter-Jarosz 2020].

Poor actor involvement may contribute to accumulating the above problems and the consequent failure to implement a solution. In addition, the security of sensitive data and a sense of trust in providers influence whether an individual will use a CL solution. Therefore, investing in developing networks and IT systems is necessary to support CL functioning.

DISCUSSION

According to the theory of innovation, innovation is not just an idea. The developing market for this type of service can now be observed. Some experts can also assess the development phase of this market as the initial one. Consequently, it cannot be stated that CL is not an innovation. CL is part of the so-called process innovations identified both by Schumpeter [Schumpeter 1934, Schumpeter 1942] and other researchers [Carbone et al. 2017, Buldeo et. al. 2017, Li et. al. 2019] and included in the Oslo Manual [OECD/Eurostat 2018]. The location of CL in the innovation theory is an attempt to identify a relatively new phenomenon in various combinations of processes and opportunities for the emergence of new markets in the economy in the 21st century.

According to various definitions of innovation, CL is a new idea on the logistics services market. It is also a qualitatively different service from the traditional ones provided by companies. Considering the price reduction strategy, CL meets the requirements of innovation as an example of an already existing service, but at lower prices resulting from a new approach to business. In other words, CL successfully exploits new ideas [Porter 1990]. According to the Olso Manual, CL is a new, improved process used to deliver the service (process innovation). According to Schumpeter, CL will introduce a "new organization of the industry".

This study's added value is the focus on identifying why some CL initiatives have failed to optimize L-MD and some have provided value for the customer, allowing them to be assessed as successful. By understanding the reasons for past failures, researchers and practitioners can develop more effective solutions to optimize L-MD using CL.

There are several reasons why some CL solutions did not survive on the market:

1. Lack of user adoption: CL solutions rely on a critical mass of users to be successful. If there are not enough users using the platform, the network effects that are necessary for the platform to function will not materialize.
2. Technical limitations: CL solutions often require sophisticated algorithms and technical infrastructure to operate effectively. If these technical components are not developed or maintained properly, it can lead to poor performance, reduced reliability, and negative user experiences. This can result in user churn and damage to the platform's reputation.
3. Regulatory challenges: CL solutions can face regulatory challenges that prevent them from operating effectively. These challenges can lead to a lack of supply and demand, and ultimately, failure of the platform.
4. Financial challenges: CL solutions can be expensive to develop and maintain and may require significant capital investment. Additionally, competition in the market can lead to price wars and reduced margins, further exacerbating financial challenges.
5. Lack of differentiation: CL solutions can face challenges in differentiating themselves from competitors in the market. If many platforms offer similar services, users may not see a compelling reason to use one platform. This can result in a lack of user adoption and ultimately, failure of the platform.

Overall, the success of CL solutions depends on a complex set of factors, including user adoption, technical capabilities, regulatory environment, financial sustainability, and differentiation. Addressing these challenges requires a comprehensive approach that considers each platform's unique characteristics and the broader logistics ecosystem in which it operates.

CL solutions have seen the most success in densely populated urban areas, particularly in regions with high internet and smartphone penetration rates. Some of the most successful regions for CL solutions include the US, Europe, and parts of Asia. One reason for this success is that urban areas often have high traffic congestion, making traditional delivery methods inefficient and slow. CL solutions, which rely on a network of individuals and vehicles, can be more agile and flexible in navigating traffic and delivering packages. This can lead to faster delivery times, reduced costs, and improved customer satisfaction.

Another reason for success in these regions is the availability of a large pool of potential users and service providers. Densely populated urban areas often have high numbers of potential users and service providers, which can help create the network effects necessary for CL solutions to function effectively. Additionally, the high internet and smartphone penetration levels in these regions make it easier for users to access and use these platforms.

Finally, many successful CL solutions in these regions have addressed user adoption challenges, technical capabilities, regulatory environment, financial sustainability, and differentiation that can lead to failure. By

developing effective marketing strategies, investing in technical infrastructure, navigating regulatory challenges, ensuring financial sustainability, and differentiating themselves from competitors, these platforms have gained traction and established themselves as viable alternatives to traditional logistics solutions.

Overall, the success of CL solutions in specific regions is a complex interplay of factors, including population density, infrastructure, regulatory environment, and platform-specific characteristics. Understanding these factors is crucial for developing effective CL solutions that can thrive in specific regions and markets.

CONCLUSION

In conclusion, CL has emerged as a promising alternative to traditional logistics solutions, offering greater agility, flexibility, and cost-effectiveness. Furthermore, successful CL platforms have established themselves in densely populated urban areas, particularly in regions with high internet and smartphone penetration. Therefore, understanding these factors is crucial for developing effective CL solutions that can thrive in specific regions and markets and for creating a sustainable future for the logistics industry as a whole.

On the one hand, CL is undoubtedly different from traditional logistics models, as it relies on a decentralized and flexible network of individuals rather than a centralized logistics provider. Moreover, CL can potentially disrupt the existing logistics industry by offering a more cost-effective and environmentally friendly alternative. On the other hand, CL can also be seen as continuing the trend towards the sharing economy and using P2P (peer-to-peer) platforms to connect individuals with goods and services. In this sense, CL may not be a fundamentally new idea but rather a new application of existing technologies and business models. However, it should still be considered an innovation–a process innovation.

Even if this study provides some valuable insights, it still has a few limitations:

Lack of data: The study may have been limited by a lack of data on CL solutions, particularly concerning their performance and impact on the logistics industry.

Changing market conditions: The study was conducted during a specific period and may not have accounted for changes in market conditions that could affect the performance and sustainability of crowd logistics solutions over time, especially after January 2023 when the solutions were reviewed.

Overall, these limitations highlight the need for further research on CL solutions and their limitations, particularly as the logistics industry continues to evolve and adapt to changing market conditions and technological innovations.

In conclusion, CL is a relatively new phenomenon, but it has already attracted significant attention from researchers and practitioners. The existing literature suggests that CL has several advantages over traditional logistics models, including lower costs, increased flexibility, and reduced environmental impact. However, it also faces several challenges, such as the lack of control over the delivery process. Whether CL represents an innovation is a matter of debate, but it is clear that it can disrupt the existing logistics industry and offer a more efficient and sustainable alternative. Further research is needed to fully understand the potential of CL and its implications for the logistics industry.

There are several potential future research directions on CL, including:

1. Sustainability: Research could focus on the environmental impact of CL solutions and ways to make them more sustainable, such as reducing emissions and optimizing delivery routes.
2. Adoption and usage: Research could explore the factors that influence user adoption and usage of CL platforms, and how these factors vary across different regions and industries.
3. Technology: Research could examine the role of technology in the development and adoption of crowd logistics solutions, including the use of AI, blockchain, and other emerging technologies.

4. Regulation: Research could investigate the regulatory environment for CL solutions, including issues related to liability, data privacy, and worker protections.
5. Collaboration: Research could explore ways to promote collaboration and coordination among different CL platforms and stakeholders, including logistics companies, retailers, and customers.

These research directions highlight the need for a multidisciplinary approach to understanding and developing effective CL solutions. By addressing these issues, future research can help to create a more sustainable, efficient, and equitable logistics industry.

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