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Value Proposition for Sustainable Last-Mile Delivery. A Retailer Perspective

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Abstract: The sustainability of last-mile (LM) freight delivery is crucial to add value to the stakeholders in the distribution chain. However, its achievement is often hindered by a poor consideration of their needs by both literature and practice. The goal of this paper is to address the point of view of local retailers by exploring their needs about innovative LM delivery services and identifying sustainable value propositions (VP). A survey was submitted to retailers operating in the limited traffic zone of Torino (Italy). The survey data were analyzed by a factor analysis using a principal component analysis (PCA) to extract the factors. A correlation analysis was also conducted between the needs and selected contextual variables. The results show that retailers accept higher costs for more reliable deliveries and stock reduction. Retailers also correlate punctuality and flexibility because flexible and on-time deliveries allow for better inventory management, higher control, and, in turn, improved customer service level. This work is one of the first research attempts to quantify local retailers' LM delivery needs and provides guidelines about how to design value-added logistics services. Moreover, from a practical point of view, the analysis shows the main VP that managers and practitioners should consider in the development of LM initiatives.

Keywords: last-mile delivery; sustainability; value proposition; retailers; factor analysis

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1. Introduction

The whole set of activities performed for delivering goods in urban areas—namely, last-mile (LM) delivery—is one of the most expensive and complex within supply chains, adding up to 40% of supply chain costs [1,2], which in turn is an important fraction of operating costs [3]. It involves a set of activities for the delivery process from the last transit point to the final drop point [4]. The complexity of LM delivery systems arises from the multitude and heterogeneity of stakeholders and their business links [5]. In fact, logistics service providers (LSPs) offer their logistics services to the cargo owners, located outside of the urban boundaries, who need their goods to be delivered to local retailers, who operate inside the city on the receiving end of the supply chain [6]. Thus, last-mile is not merely a logistics problem, but it has become a crucial urban planning challenge [7], with the ultimate goal of making the associated services sustainable from an operational, economic, and environmental point of view. As a matter of fact, the continuously increasing number of freight vehicles in urban areas undermines sustainability in the economic, societal, and metropolitan landscape [8,9]. Logistics activities are often outsourced to professional LSPs, and this decision has been the subject of a vast literature. For instance, Anderson and others [10] underline the reliability of the delivery service as the most important attribute, as well as the ease of interacting with the LSP. Other attributes such as cost, speed of delivery [11], flexibility, and service quality [10] are taken into account by shippers when deciding their LSP.

In essence, LSPs focus their value proposition (VP) to their customers—namely, the cargo owners, i.e., the manufacturers, the distributors, or the wholesalers local retailers buy from and who need to ship goods to stores. LSPs usually do take into account their customers' customers, i.e., the retailers, in formulating their VP. However, cargo owners ultimately need to satisfy their customers, and thus some of the LSPs VPs also fit with the basic needs of local retailers, such as accessibility to the required goods and low cost deliveries [6]. Moreover, the quality of the logistics service has been found to be positively related with the final customers' satisfaction and loyalty to the retailer [12]. Given the interplay between retailers, cargo owners, and LSPs, it may be argued that the criticalities that emerge in LM deliveries are caused in part by the needs of local retailers. This is an interesting issue because creating sustainable urban freight systems cannot ignore the perspectives of all the stakeholders involved [13]. In such a context, several LM innovations have tried to cater to local retailers' needs, hoping to reduce some of LM criticalities and gather enough demand to become financially sustainable in the long term. This topic has been explored by a stream of literature that focuses on the requirements of the service and thus the usefulness provided to the retailers by LM innovative technologies [14]. Such a stream provides methods suitable to assess the retailers' sensitivity toward LM innovations as well as their effects on retailers' perceptions and performance. City logistics measures such as off-hour deliveries (OHD), delivery time-windows, environmentally friendly freight vehicles, and urban consolidation centers (UCC) [14–21] are studied. More recent works aim to identify and assess the challenges encountered by local retailers and propose a VP tailored to their needs [22]. Existing literature thus focuses on assessing the response of local retailers to a specific LM service rather than exploring the logistics service needs as instrumental to a more formal business relationship between LSPs and local retailers aimed at guaranteeing sustainability. In this regard, Zenezini [23] denotes that the problem of selecting a third-party logistics service provider is often overlooked in the LM literature. For instance, Anand and others [24] advance the idea that suppliers choose the carrier with the lowest price. This approach fails to take into account other important factors that have been significantly highlighted in the literature, such as timeliness of deliveries [25] or value-added services such as extra storage space [26]. In this context, more work is needed to identify and evaluate the relative importance of local retailers' needs when assessing a logistics service. As a matter of fact, to our best knowledge, there are no works available in the literature that quantify the local retailers' LM delivery needs or that give clear indications for designing value-added logistics services. In particular, investigations should be carried out to point out the characteristics LM logistics services should have in order to be sustainable, and thus attractive, to retailers. Not only economic and environmental sustainability are to be considered here but also operational aspects. Additionally, the current state of the art asks for approaches that do not deal with single LM delivery measures but encompass a plethora of urban freight distribution initiatives.

The current study aimed to build on this stream of literature by analyzing the perception of local retailers and their needs in terms of LM delivery services. Based on that, and by using a quantitative empirical approach, its objective was to put forward the key VP that should be taken into account when designing services relying on the most common LM innovations. Such VP are able to drive the definition of sustainable delivery processes for retailers. In fact, LM has become a critical source for market differentiation, and retailers have been motivated in investing in a plethora of delivery innovations [27]. Therefore, the purpose was to contribute to the existing literature by assessing the relative importance of eight service needs retrieved from the literature and cluster them into factors, or VP [28], by means of a factor analysis with principal component analysis (PCA). To this end, a survey was submitted to retailers of different sizes and types located in the limited traffic zone (LTZ) of Torino, a city located in the north west of Italy.

The rest of the paper is structured as follows. First, an overview of current literature focuses on the most important needs of retailers and proposes the VP offered by LM initiatives that can make LSPs sustainable. Then, the methodology is described, and the results of the analysis are shown. Finally, implications and conclusions are addressed.

2. Literature Background

2.1. Local Retailers' Needs for a Sustainable Delivery Service

From a logistics point of view, retailers usually strive for a reliable, consistent, and smooth delivery process to fulfil their orders at the time agreed with both the LSP and the supplier of the goods [29]. Timely and reliable last-mile deliveries are the source of conflicts between LSPs and retailers, who often complain that LSPs do not always respect the agreed time slots for the delivery [30]. In addition, retailers benefit from a flexible and quick delivery service, one able to respond to more on-demand, dynamic restocking requests [31,32]. In this sense, logistics activities play a crucial role in a store retailer's success, and they are more and more becoming strategic elements for achieving higher consumer satisfaction [33,34], especially in more recent years with the dramatic change introduced by online shopping [35], further exacerbated by the Covid-19 pandemic [36]. Additionally, it has been proved that logistics activities involving different actors in the retail chain are essential elements to the creation of sustainable value in smart cities [37]. Moreover, the delivery of goods should not hinder a retailer's daily operations. In particular, the operations of loading, unloading, and controlling inbound goods should take little time and personnel so as to devote these resources to the actual selling of the goods [38,39]. Therefore, retailers usually establish strict delivery time windows for receiving goods [40]. Such time windows are to be matched with the time-access regulations and vehicle restrictions issued by governments to improve social sustainability in urban areas, which have relevant effects on the distribution process of retail value chains [17]. In highly congested cities, retailers, but also LSPs, might even prefer night deliveries due to the advantages they bring in terms of increased ability to check and store goods, enhanced delivery schedule reliability, easier vehicle parking, and decreased route time as a consequence of more favorable traffic conditions [15]. In the LTZ, retailers often demand a large number of vehicles for frequent deliveries [41]. Thus, the impacts on their activities of initiatives that focus on delivery processes become particularly crucial [42]. Balancing the amount of goods displayed on the shelf (i.e., display stock) and the backroom inventories (i.e., logistics stock) is a key capability of retailers, especially because retail shelf space has been referred to as "the most expensive real estate in the world" [43]. Whereas an empty shelf (i.e., no display stock) may result in lost sales [44], too much backroom storage can lead to increased costs and greater operational complexity [45]. Hence, retailers seek to reduce their inventory carrying costs and the related operational complexity by decreasing the overall stock or its unit cost [46]. Local retailers are usually not aware that they are partially responsible for the level of pollution generated by LM deliveries [47]. However, there are increasing concerns raised within the industry, as retailers, especially fashion chains, are becoming more committed to include sustainability in their supply chain processes [48]. Finally, retailers' key capability is to create the right assortment mix of goods in order to attract customers and increase revenues. Hence, by adding extra services retailers could increase the inflow of potential customers. Such is the case of the collection-and-delivery points delivery solutions offered by express couriers [49]. As shown by the example of the collection-and-delivery points, LM delivery innovation can provide benefits to the local retailers [8].

The retailers' needs, as they have emerged from the discussed literature and which constitute the foundation of the present research, are summarized in Table 1. Additionally, to strengthen the theoretical background of this work and support the development of the survey, the next sub-paragraph explores several LM delivery innovations from the perspective of the VP they might offer to local retailers.

Table 1. Needs of local retailers taking into account the last-mile delivery service.

Needs	Source
Reliability of deliveries	[50]
Flexibility and quickness of deliveries	[31]
Devoting little personnel time for inbound operations	[38]
Reducing inventory carrying costs	[45]
Environmentally sustainable deliveries	[48]
Generating extra revenues	[49]

2.2. The Value Proposition of Last-Mile Delivery Innovations

Research on last-mile delivery investigates the last leg of the supply chain process taking place from the last distribution center, consolidation point, or local warehouse, and focuses on the ways in which products reach their final destination [51]. In this context urban consolidation centers (UCCs) are one of the most studied LM delivery innovations in terms of supply chain structures for city logistics [52,53]. UCCs are warehouses where goods are delivered by different suppliers or LSPs and are later handled and transshipped onto freight vehicles for the last leg of the journey inside the city center. Usually UCCs target local retailers by offering benefits in terms of fewer deliveries per day, a more pleasant business environment, increased service levels, more professional qualifications, and also by offering buffer storage to decrease inventory costs [18,19,47]. In addition, a proper facility location is a lever for the enhancement of the overall logistics performance [54]. To lessen the negative impacts of LM deliveries, goods can be delivered to smaller warehouses, called terminal satellites or micro-consolidation centers, located inside the city centers. Mobile depots are also used in order to reduce the necessity for real estate space and to move the inventory closer to the final customers [55]. Mobile depots consist of a trailer fitted with a loading dock, and they are used as a mobile inner-city base from where LM deliveries and also first-mile pick-ups are performed [56]. From such satellite terminals, goods can be transshipped to even lighter and more environmentally friendly vehicles for the final leg of the delivery. The combination of different low impact vehicles is able to reduce the cost of LM logistics [53]. This "two-tier system" coupled with zero-emission vehicles has proved to be impactful in reducing total distance travelled and CO2 emissions [57], hence aiming to deliver a sustainability VP, also for retailers [13]. Such an aspect is acquiring more and more importance in addressing the increasing demand for sustainability in logistics processes [58]. Through collection-and-delivery points, express couriers can consolidate more deliveries into one single point of delivery, asking the final recipients of the parcel to do the final pick up themselves [59]. Pickup points are physical stores that benefit from increasing the number of potential customers but also from adding extra revenues, as they receive a reimbursement fee by express couriers [60]. Pickup points thus fulfil a logistics role that helps improve the last-mile delivery service for large Business-to-Consumer (B2C) retail chains, especially within an omnichannel distribution network [61]. While pickup points require a physical presence to deliver the parcel, automated parcel lockers (APL) represent one of the most adopted unattended last-mile delivery solutions. APLs are composed of modules resembling a locker where the parcel is retained until the final recipient picks it up by typing the order ID or her name [62]. Recently, the option of opening APLs remotely by specific mobile phone applications has also been introduced. Unattended deliveries through technological solutions such as APLs allow for improved operational, economic, environmental, and social efficiency, without sacrificing the level of service, and are mostly used for B2C deliveries [63]. Retailers however are still dubious about their value, given the fact that they would need to devote time and personnel to the pickup activities [64]. Nevertheless, such a solution might provide buffer storage for small volume items, as in the case of UCCs, as well as potentially enabling same-day deliveries by filling up the lockers during the night [65]. Additionally, the APL innovation can increase customer value in online retailing [53].

Crowd logistics is an alternative to traditional deliveries, whereby excess capacity of private vehicles is used as parcels and passengers are co-transported along a trip that was originally intended for another purpose [66]. Local retailers can benefit from crowd logistics since they can receive quick, same-day deliveries at lower costs and with a low risk of delivery failure [53,67]. Moreover, under certain circumstances crowd logistics could reduce the environmental impact of LM deliveries, for instance by achieving a critical mass of users [68]. Other crowd logistics services also offer additional storage solutions using space from the crowd [69].

The concept of collaborative logistics is based on the sharing of existing resources to coordinate and consolidate last-mile flows, aiming at improved performance and cost savings [65]. Reducing the negative externalities of last-mile transportation through savings in total distance travelled can also be achieved by pooling resources such as delivery vans [70]. Local retailers must also participate in a collaborative last-mile effort, as shown in [71].

Finally, several off-hour delivery initiatives have been tested to reduce the level of congestion by moving deliveries to off-peak hours. This solution could increase the efficiency and reliability of delivery operations due to lower and less uncertain journey times [72]. Moreover, the additional labor costs from working overtime might be offset by the more efficient delivery inbound process [16]. Table 2 summarizes the main VP offered by LM innovations.

Table 2. Main value propositions offered by last-mile innovations.

Main Value Proposition	Innovations
Fewer daily deliveries	Urban Consolidation Centers (UCC), Micro-Consolidation Centers, Mobile Depots, Collaborative Logistics
More reliable deliveries	Off-hour Deliveries
Maximize personnel time for inbound operations	Off-hour Deliveries
More pleasant business environment	UCC, Micro-Consolidation centers, Mobile Depots, Low Emissions Vehicles
Providing buffer storage	UCC, Automated Parcel Lockers, Crowd-shipping
Same-day deliveries	Crowd-shipping
Low cost deliveries	Crowd-shipping, Collaborative Logistics
Sustainable deliveries	UCC, Micro-consolidation Centers, Mobile Depots, Low Emissions Vehicles, Crowd-shipping, Collaborative Logistics
Providing extra revenues	Pickup Points

Based on the analysis of relevant literature, it can be stated that a complete achievement of sustainable LM freight delivery is hindered by a scarce consideration of the operational, environmental, societal, and economic requirements of the main stakeholders in the distribution chain [73]. Thus, the introduction of viable LM delivery solutions asks for more thorough analyses of the preferences, the VP that could satisfy the needs of the key process actors, and, above all, retailers, who constitute the vital final link with end-consumers [9]. In fact, to our best knowledge, the literature has so far paid poor attention to the quantification of the local retailers' needs, failing to provide guidelines about the levers for making LM delivery services sustainable and attractive for them. This was the main aim of the present work.

3. Materials and Methods

3.1. Data Collection

3.1.1. Questionnaire

To answer the proposed research objectives, a questionnaire was administrated to local retailers between October 19, 2018, and November 5, 2018. The questionnaire was developed based on the retailers' needs, LM innovations, and the associated VP emerging from the literature review discussed in Section 2, which were then integrated by the results of two sessions of brainstorming among two of the authors of this paper and two external researchers, wherein the previously identified needs were assessed. After that, the questionnaire was tested with 10 retailers and based on their concerns some parts related to the description of the needs were clarified and better explained in order to guide the respondents and to reduce the risk of misunderstanding. The first part of the questionnaire related to the relative importance to the retailer's economic success of eight needs, which was assessed through a 5-point Likert Scale. Table 3 highlights the operative definition of the eight needs, as provided to the interviewees.

Table 3. Operative definition of retailer's needs.

	Retailer's Need	Operative Definition
N1	Cost	The overall cost of receiving the goods (i.e., inbound operations)
N2	Reliability and Safety	Receiving the ordered items in the right amount and without damages
N3	Punctuality	Receiving the ordered items within the agreed delivery date and time
N4	Flexibility	The possibility of changing the time of the delivery according to the retailers' necessities
N5	Stock Reduction	The possibility of having access to extra goods storage
N6	Convenience	Inbound delivery activities that do not hinder daily operations
N7	Environmental Sustainability	Receiving goods via low impact delivery systems
N8	Extra revenues	Gaining extra revenues by providing services connected to the delivery to final customers

In the second part, questions related to the respondent's profile were administered. Such questions were posed in order to highlight correlations between the retailers' needs and their size in terms of warehouse floor area, usable store area, and number of employees.

3.1.2. Sample Selection

In order to identify the main VP that LSP might offer based on local retailers' needs for sustainable LM services, a structured questionnaire was administered to retailers operating in the LTZ of Torino. In particular, retailers active in the city center have to deal with all the public policies related to the LM processes, and they also represent a crucial part of the city from an economic point of view [41]. Therefore, it is important to assess the impacts of the most recent technologies for urban logistics process from the retailers' perspective. Torino has a population equal to about 900,000 inhabitants, and its metropolitan area is estimated to have a population of about 2.2 million inhabitants [74]. Its LTZ hosts many venues, such as restaurants, opera houses, libraries, museums, and shops and cafeterias [75]. The choice of this city was based on the presence of a LTZ that imposes restrictions on logistics operations [76]. In addition, Torino, as do many other European cities, shares the need for initiatives aimed at enhancing LM processes [77]. Thus, in a preliminary study, it can be considered to be representative of other urban contexts. A total number of 500 retailers were contacted, and 81 out of the total agreed to take part in the study, resulting in a response rate equal to 16.2%. This value of response rate can be considered acceptable for carrying out further analysis on the answers since it is close to those experienced in previous studies [78]. For a factor analysis, many studies provide some guidelines for defining the sample size in relationship with the number of variables considered. In particular, according to Gorsuch [79], the ratio between the sample size and the number of variables should be 5:1. On the contrary, Everitt [80] considers as a good ratio a value equal to 10:1. This ratio has become a rule of thumb for many researches for determining the sample size [81]. In the current analysis the sample was made up of 81 respondents with 8 different variables, considered to be an associated ratio equal to 10:1. Aiming at obtaining more insights, the respondents were selected based on different sizes. In terms of employees working in the stores, there are typically three to four employees per retailer. However, a significant minority (20%) of retailers occupy only one person (i.e., the shop owner). By analyzing the usable floor area of the stores, their average value was equal to 130 square meters, and they ranged from 12 to 1500 square meters. Finally, the area of warehouses showed an average value equal to 60 square meters. In some cases, this value was equal to zero, in the sense that there was no space associated with the storage of goods in the store.

3.2. Data Analysis

The gathered data were then analyzed via statistical analysis. Two prior tests on the data were carried out in order to validate the goodness of the sample. In particular, the Kaiser–Meyer–Olkin test showed a value equal to 0.542. The typical threshold for considering the available data as suitable for the purpose of the study is 0.5 [82]. After that the Bartlett test checked the null hypothesis with regard to homoscedasticity (namely, the same variance of the variable) [83]. Given a *p*-value equal to 0.009, the null hypothesis was rejected, and it was possible to conduct a reliable analysis.

In particular, a correlation analysis was carried out, both within the needs and between the needs and the demographic variables. To this end, a Spearman correlation was deemed to be more appropriate since the needs were expressed via a Likert scale and thus the data were not normally distributed [84]. This method is typically adopted to quantify how much two columns of data monotonically depend on each other [85]. The reliability of the Pearson coefficient is associated with a *p*-value, ranging from 0 to 1, and it is the probability of rejecting the null hypothesis given below:

Hypothesis 1 (H1). *There is no significant relationship between the two variables.*

Hypothesis 2 (H2). *There is a significant relationship between the two variables under analysis.*

For the current study, the critical value was set at 0.05. As such, lower values indicated that the null hypothesis had to be rejected, and in turn that the two variables were significantly related. Values greater than 0.05 indicated that the null hypothesis was accepted and consequently there was not enough evidence to prove a significant relationship [86]. A factor analysis was also performed on the needs in order to obtain their classification into identifiable factors. As a matter of fact, factor analysis is broadly used to obtain a classification of data [87], in the sense that correlated measured variables are expected to reflect the presence of a smaller number of hidden underlying factors [88]. To this end, two steps were followed. First, the un-rotated loading factor matrix was extracted by means of a principal component analysis (PCA) in order to show whether the variance related to a variable was homogeneously shared among the factors. Second, the loading matrix was rotated. Through the rotation, it was possible to assign the variable to the extracted factors, in the sense that it was possible to understand which factor was able to explain the variability of every variable.

4. Results

The results of the correlation analysis carried out among the needs are shown in Table 4.

Table 4. Results of the correlation analysis for the needs

	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**
(1) Cost	1							
(2) Reliability and safety	**0.272** **0.014**	1						
(3) Punctuality	0.0329 0.7706	−0.0189 0.8671	1					
(4) Flexibility	0.0348 0.74	0.0378 0.7378	**0.3545** **0.0012**	1				
(5) Stock Reduction	**0.2278** **0.0408**	0.0853 0.449	−0.0653 0.5627	−0.0172 0.8786	1			
(6) Convenience	0.2358 0.034	0.155 0.1669	158 0.8883	0.0547 0.6275	0.0317 0.7787	1		
(7) Environmental Sustainability	0.0438 0.6979	−0.0138 0.9024	0.037 0.7428	0.0078 0.9448	0.1531 0.1725	**0.2664** **0.0162**	1	0
(8) Extra revenues	0.0469 0.6777	0.1596 0.1546	−0.1761 0.1158	−0.0237 0.8338	0.1421 0.2058	0.1319 0.2404	**0.2851** **0.0099**	1

Values in bold represent the significant relationships.

In each cell, the upper value is related to the Spearman Coefficient that explains the level of strength of the relationship. The lower value in each cell is the *p*-value showing the level of significance (and consequently of reliability) of the relationship. The results show that there is a significant relationship between reliability and safety and the cost. This outcome reveals that retailers are able to accept higher costs in order to benefit from deliveries that are more reliable. Cost is also related to stock reduction. This is due to the fact that higher costs are often associated with the exploitation of external warehouses, allowing retailers to need less warehouse space in a store. The positive relationship between punctuality and flexibility points out that typically if a retailer asks for flexible shipments, he expects to obtain a consequent on-time delivery. Environmental sustainability appears to be positively correlated with convenience and extra revenues. In particular, sustainable logistics activities are carried out with small and low impact vehicles that are more suitable to be used in the city center, allowing easier deliveries. Additionally, sustainability is considered a lever to get more revenues, especially for retailers more aware about environmental issues.

Table 5 shows the results of correlation analysis carried out between the needs and the demographic variables, considered to better identify each respondent.

Table 5. Results of the correlation analysis for the demographic variables

	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**
(a) Number of employees	−0.2117 0.0578	−0.022 0.8453	0.0309 0.7843	0.1976 0.077	0.0293 0.7948	0.1438 0.2004	0.0805 0.4751	0.0817 0.4685
(b) Store area	−0.1797 0.1084	**−0.2195** **0.049**	−0.0416 0.7126	−0.1365 0.2243	−0.0162 0.8859	0.0087 0.9387	0.1104 0.3267	0.0299 0.7911
(c) Warehouse area	−0.0057 0.9594	**−0.2699** **0.0148**	0.039 0.7298	−0.1522 0.175	0.0546 0.6281	0.0608 0.5895	−0.0588 0.6019	0.1284 0.2534

Values in bold represent the significant relationships.

In particular, a negative relationship comes up between reliability and safety, and warehouse and store area. This means that the higher the usable floor areas, the lower the importance associated with the reliability of the delivery. This result can be explained by the fact that a greater space can accommodate more stock and thus wrong deliveries have lower impact on the available assortment.

Table 6 shows the results of the factor analysis carried out to group the needs into VPs.

Table 6. Results of the factor analysis.

Factor	Eigenvalue	Variance %	Cumulated Variance
Factor 1	1.78745	22.34%	22.34%
Factor 2	1.39159	17.39%	39.74%
Factor 3	1.17542	14.69%	54.43%
Factor 4	0.98930	12.37%	66.80%
Factor 5	0.85008	10.63%	77.42%
Factor 6	0.65500	8.19%	85.61%
Factor 7	0.62653	7.83%	93.44%
Factor 8	0.52462	6.56%	100%

Factors with eigenvalue greater than 1 were extracted. Thus, 3 factors were considered and the 54.43% of the variability was explained. No fixed threshold exists for assessing the explained variance, although certain percentages have been suggested in literature. A good model is able to explain a percentage of variance between 50 and 60% [89]. Thus, the proposed model can be considered to be reliable. Table 7 shows the results of the rotation of the loading matrix. Columns report the variables, the values of the loadings of the three main factors previously extracted, and the uniqueness. Uniqueness describes the amount of variance not explained by the factors that is just associated with the need. A value of uniqueness equal to zero indicates that a factor is perfectly able to explain the variability of a variable.

Table 7. Rotation of the variables

Variables	Factor 1	Factor 2	Factor 3	Uniqueness
Cost	**0.7863**	0.0265	0.1226	0.3659
Reliability and safety	**0.7689**	−0.0275	−0.1753	0.3773
Punctuality	−0.0835	−0.0683	**0.8153**	0.3237
Flexibility	0.0897	0.0411	**0.7558**	0.4191
Stock Reduction	**0.3381**	0.2669	0.0531	0.8116
Convenience	0.3868	**0.4669**	0.1317	0.6151
Environmental Sustainability	−0.0670	**0.8478**	0.0609	0.2730
Extra Revenues	0.1059	**0.6704**	−0.2819	0.4598

Values in bold are associated with the factor of the column.

All variables present at least an absolute value of 0.3 on at least one factor loading, which has been considered an acceptable threshold for representing a meaningful relationship between a variable and a factor [90].

Based on the values of the loadings, three factors are identified as reflecting a specific VP, namely Economics (factor 1), Attractiveness and Simplifications (factor 2), and Time Windows Delivery (factor 3). The Economics factor includes the cost, reliability and stock, and reduction needs. The variable stock reduction was included in this factor since, even though it does not show the same loading as the other two variables on Factor 1, it is significantly correlated with them. This factor is mainly associated with the costs required for receiving goods. Therefore, it comprises the cost of the order, the lower cost related to a decrease of the stock levels, and the additional cost that has to be borne in the case of wrong delivery. The Attractiveness and Simplification factor includes environmental sustainability, extra revenues, and convenience variables. These variables show the highest loadings on Factor 2 and thus they can be grouped together. Such a factor refers to the extra revenues that can be generated through new sustainable initiatives and to the convenience associated with delivering an item. Finally, the Time Windows Delivery factor includes the punctuality and flexibility variables. In the present case, the highest loadings are related to the third factor. This factor addresses the need for dealing with time windows in order to obtain a higher percentage of on-time deliveries and more flexible activities.

5. Discussion and Conclusions

This paper proposes an investigative analysis on the perception of LM projects by urban retailers. The obtained results show that there are three most important VP associated with sustainable urban operations. In particular, the Economics VP reflects an attention to cost, which is typical in the retail business. As a matter of fact, retailers aim at receiving their goods with low delivery fees [8,91]. The Attractiveness and Simplification VP highlights issues related to the more and more complex activities that are required to be carried out in order to enhance competitiveness. As a matter of fact, the simplification of LM processes is a challenging task due to the high level of complexity of urban systems [92]. In this context, urban retailers might significantly benefit from smooth delivery processes since they are the final recipients of the goods. The simplification of the processes together with their environmental sustainability enhances the attractiveness of the business environment. The third identified VP is Time Window Delivery, which is a lever for competitive advantage [17,93]. As a matter of fact, flexible and on-time deliveries allow for better inventory management, higher control, and, in turn, an improved level of customer service from the retailer. The VP highlighted in this analysis do not show any significant correlation with the number of employees working in the store, meaning that small stores with only one employee (i.e., the shop owner) share the same needs as large stores (e.g., retail chains). However, smaller stores bearing less warehouse space require more reliable and safer deliveries in order to avoid keeping extra stock to account for failed deliveries.

It is worthwhile to underline the relation between the VP sought after by retailers in order to take advantage of sustainable delivery services and the innovations of LM processes. This outcome reaffirms the importance of innovation for the sustainability of urban retail logistics [13]. In particular, the Economics VP seems to be addressed by the crowd shipping, automated parcel lockers, UCC, and off-hours delivery innovations. However, a trade-off among these innovations should be figured out. As a matter of fact, crowd shipping allows a decrease of the cost of the delivery, but it could jeopardize the reliability of delivery since it exploits unskilled and professional carriers. Similarly, off-hours delivery brings an improved level of reliability to the delivery processes, but it could potentially increase cost because the retailer must be willing to allocate extra time for dealing with the delivery. Thus, the cost here is not just the delivery cost per se, but the cost encompasses all the activities related to the receiving and storing of the goods. Therefore, LM innovations should integrate all these described aspects in their VP. Moreover, UCCs usually focus their Economics VP on the stock reduction needed by retailers, stating that small retailers might benefit from additional stock at the UCC [47]. However, this study confirms the findings from more recent works (e.g., the paper by [14]) that small retailers do not care for stock reduction but rather manage their stock levels through reliable deliveries. Hence, it appears that UCCs should offer reliable deliveries rather than the possibility of renting out space for additional stock. The second VP—namely, Attractiveness and Simplification—could be provided by UCCs, micro consolidations centers, mobile depots, and low emissions vehicles. Through these innovations, the number of daily deliveries are minimized, and, in turn, a reduction of the congestion can be obtained. In order to increase the level of success of this VP, the use of low impact vehicles should be integrated with the deployment of the other infrastructure innovations (e.g., UCCs). Finally, no innovation appears to focus specifically on the Time Window VP. In fact, it is assumed that every operator should effectively offer this VP to customers. In this sense it is considered as a "must have" VP for all LM delivery operators, which is consistent with the findings from the literature relating LSPs' strategies to their customers' needs [94].

This work addresses some theoretical and practical implications. From a theoretical point of view, this study might stimulate research about the most crucial aspects retailers need in order to achieve operational, environmental, and economic sustainability in the LM arena. In this context, it can be considered as one of the first contributions of the VP for sustainable LM services for urban retailers. In fact, most of the studies have been mostly focused on one single-city logistics measure or a single need of retailers. On the contrary, this work offers a comprehensive perspective on the variety of needs of the retailers in relation to the offered services provided by LM innovations. Additionally, the proposed analysis offers a roadmap related to the urban retailers' needs based on an empirical analysis that might drive research about LM delivery models that are able to satisfy those needs and the main innovations that can be adopted for such a purpose. Consequently, the identified key retailers' VP can also purposefully integrate the literature on LSPs to explain how these urban logistics stakeholders can operate to enhance the service level wanted by local retailers. Finally, as a pioneering attempt to quantify retailers' LM delivery needs, the present study can foster further research on approaches to identify viable VP in an objective way. From a practical point of view, the analysis shows the main VP that should be taken into account by managers and practitioners in the design of LM innovation initiatives that are actually sustainable. As a matter of fact, a more precise awareness about the most relevant VP might support a project sponsor in identifying the most promising innovative services in terms of a service–market fit. Thus, the obtained results could contribute to the development of services more tailored to the retailers' expectations. This work might also support public policy makers in the development of new strategies associated with the LM processes, in the sense that such strategies can also take into account the retailers' needs for designing more attractive VP.

However, this work suffers from some limitations. First, the sample was limited to 81 retailers. A broader number of respondents would increase the robustness of the data. Then, new technologies associated with LM processes, such as autonomous vehicles [95] or Big Data, and Internet of Things (IoT) [96] are not considered in the study even though they are likely to significantly impact the VP of the related initiatives. This choice depends on the current scarce knowledge about these technologies among retailers. In addition, there is still a scarce awareness on the relationship between such new technologies and the retailers' needs. For these reasons, future studies will be carried out among a larger number of respondents in order to further validate the VP emerging from the present research, as well as assessing the new technological paradigms. This will help to better understand the retailers' perspective and to design more effective LM delivery services tailored to their business needs. In order to define more attractive VP, future research will also explore the relation between the identified VP and the characteristics of the store, such as size and type of goods sold. Additionally, the relationships between the identified VP and LSP strategies in LM delivery will be explored to provide knowledge about how LSPs' VP can be set in order to be coherent with the urban retailers' ones. Finally, given the proved positive economic and social effects of the coexistence of e-marketplaces and physical stores, particularly in city centers [97], the retailers' expectations about such a new business model will also be taken into account.

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