

Juan Antonio Marco Montes De Oca
Faculty of Technology and
Science, Camilo José Cela
University
✉ juanantonio.marco@alumno.ucjc.edu

Tomás García Martín
Faculty of Technology and
Science, Camilo José Cela
University
✉ tgmartin@ucjc.edu

Marta Serrano Pérez
Faculty of Technology and
Science, Camilo José Cela
University
✉ mserrano@ucjc.edu

Economic Factors Relating to Last-mile Urban Logistics

Factores Económicos Relacionados con la Logística Urbana de Última Milla

I. INTRODUCTION

It is currently estimated that the area of the planet occupied by urban centres represents 2% of the total, although 55% of the world's population resides in them. Of this urban population density, almost half live in cities with fewer than 500,000 inhabitants, whilst one-eighth reside in 33 megacities with more than 10 million inhabitants. Furthermore, this trend is set to increase, as it is predicted that the global urban population will reach almost 70% by 2050 (World Urbanization Prospects, 2019).

One of the first areas affected by this rise in urban population density is the directly proportional increase in demand for urban freight transport, which must meet the needs of the public. This correlation highlights the urgency of taking action, as evidenced by the data provided by the Alliance for Logistics Innovation through Collaboration in Europe (ALICE) (Blinge et al., 2021), as urban freight transport accounts for: between 15% and 25% of the total kilometres travelled by all vehicles in a city, occupies between 20% and 40% of all roads, and contributes between 20% and 40% of CO₂ emissions (among other polluting gases). These alarming figures give rise to a series of negative externalities within urban centres, such as: a decline in air quality, increased noise pollution, greater congestion on access roads, roads and traffic areas, and a reduction in road safety, which has worsened even more sharply since the global Covid-19 health crisis, with the rise in *e-commerce* purchases reaching global revenues of over €5.8 trillion in 2024 (a 14.6% increase on the previous year), accounting for a quarter of all retail purchases in 2025 (4th Study on *E-Commerce Logistics*, 2024).



EXECUTIVE SUMMARY

One of the fundamental services for a city is the existence of an efficient urban goods distribution system that meets the needs of its citizens and businesses. This service is known as last-mile urban logistics. A little-studied approach, which this study has set as a priority objective, is to determine how this logistics system is closely linked to certain economic factors relevant to the companies providing this service, the public authorities that regulate it, and the citizens who must live with it.

RESUMEN DEL ARTÍCULO

Uno de los servicios fundamentales para una ciudad es que exista una eficiente distribución urbana de mercancías que permita cubrir las necesidades de sus ciudadanos y negocios. A este servicio se le denomina logística urbana de última milla. Un enfoque poco estudiado, y que este trabajo se ha marcado como objetivo prioritario, es determinar cómo esta logística está fuertemente relacionada con algunos factores económicos relevantes para las empresas que realizan este servicio, las autoridades públicas que lo regulan, y los ciudadanos que deben convivir con ella.

In addition to these three interrelated factors (growth in urban population, growth in *e-commerce* sales, growth in urban freight transport), another contributing factor is the lack of standardisation in urban planning rules and regulations imposed by individual cities within the context of their mobility instruments (through, for example, their Sustainable Urban Mobility Plans (SUMP) or Sustainable Urban Logistics Plans (SULPs)), for the benefit of the quality of life of their citizens or visitors and the free exercise of any economic activity. The lack of effective multi-level governance policies between the various public authorities adds further operational barriers for private operators responsible for planning and executing various urban

logistics activities (Macharis et al., 2014), which jeopardises the survival of their businesses due to the loss of profitability resulting from operational inefficiencies, and in the use of their various logistics assets, which impacts their operating costs. It is for this significant reason that *last-mile* logistics is the most inefficient and costly stage of the entire supply chain (Boysen et al., 2021), with the cost of this final phase estimated to account for between 13% and 51% of the total costs incurred in the chain (with some estimates reaching as high as 75%) (Millar, 2015; Skiver & Godfrey, 2017).

Given this evidence, it is not difficult to conclude that human activity in these urban centres will come under strain; consequently, certain economic factors within cities will be affected by this development, in some cases positively and in others negatively. In the approach of this study, the authors define economic factors as those arising from

the organisational and management inefficiencies occurring in many organisations in response to changes in the requirements of customers demanding urban logistics, and also those arising from the new business, management, organisational and public-private governance models for urban mobility proposed by the ' ', which generate, amongst other things, new organisational costs and benefits and new models of the employer-employee relationship within the logistics sector.

Studies have been conducted in the literature on the allocation of costs arising from the operations and processes of urban logistics (Mangiaracina et al., 2019), but it is necessary to broaden the scope of the study to include other economic factors that arise as a result of necessary changes in both the organisation and management

... another contributing factor is the lack of standardisation in urban planning rules and regulations imposed by individual cities within the context of their mobility instruments...

of goods distribution networks in urban centres. For this reason, the originality of this manuscript lies in the need to analyse the economic factors related to urban logistics activity that lie outside traditional analyses of direct and indirect cost allocation for logistics assets linked to highly focused and specific business processes and operations, which have limited impact, applicability and replicability. The authors' objective is, therefore, to answer the following research questions:

- Question 1 (Q1): What are the main research areas and emerging trends that can be studied from the perspective of the relationship between *last-mile* urban logistics and urban economic factors?
- Question 2 (Q2): What are the economic and business challenges and new lines of research associated with *last-mile* urban logistics?

To provide a comprehensive answer to these two questions, the study presents a systematic review of the literature (scientific and specialist business literature) and a bibliometric analysis, with the aim of identifying the relationship between last-mile urban logistics and the economic factors involved in it or arising from its activity. Section 2, Methodology, outlines the approach taken to carry out the systematic review and the accompanying bibliometric analysis. Section 3, Analysis, describes the literature analysis process followed (descriptive and bibliometric). Section 4, Results, presents a concise and critical summary of the results obtained from the co-occurrence analysis carried out at the end of the previous section. Section 5, Conclusions, addresses the conclusions and future lines of research on the economic factors related to last-mile urban logistics.

2. METHODOLOGY

A systematic review involves the use of a standardised method to analyse the state of the art in a specific field of research (Briner & Denyer, 2012; Tranfield et al., 2003). This entails selecting a time frame that limits the volume of documents to be reviewed, thereby establishing the most representative and up-to-date period for the subject under study. It also involves defining a reference database and inclusion and exclusion criteria to help delimit the corpus of documents under study. This manuscript is based on the systematic procedure followed by Denyer and Tranfield (2009), which has been summarised in Table 1 (Appendix 1).

KEYWORDS

Last mile logistics, sharing economy, sustainability, e-commerce, gig economy.

PALABRAS CLAVE

Logística de última milla, economía compartida, sostenibilidad, e-commerce, gig economy.

The procedure begins in its **first phase** by defining the scope of analysis within which the review study will be conducted, which is done by formulating the previously defined research questions (Q1, Q2).

The **second phase** aims to establish the context within which the literature will be identified, in line with the objectives of the analysis to be carried out. To identify the most reliable sources, Scopus was used as an academic and research database, alongside a selection of prestigious specialist business journals (grey literature) (**Appendix 2**). The search of these information sources was based on the design of a keyword search equation capable of gathering all relevant documents on the topic(s) under study in this manuscript. Given that one of the main problems in this field of knowledge is the lack of standardisation and homogenisation in the coining of terms defining last-mile urban logistics, the appendix by Dolati Neghabadi et al. (2019) was examined to compile a comprehensive list of terms that the scientific and professional community has used to refer to the logistics activity taking place in the urban environment or, in other words, in the final stage of supply chains. Using this appendix, terms were compiled which, in the authors' view, should appear—based on their most widespread use among researchers and professionals—in the search query used in the selected data sources: “*city logistics*”, “*courier delivery*”, “*express delivery*”, “*food delivery*”, “*last mile delivery*”, “*last mile distribution*”, “*last mile logistics*”, “*package delivery*”, “*parcel delivery*”, “*urban delivery*”, “*urban distribution*”, “*urban freight*”, “*urban logistics*”. To link these terms to the economic factors to be analysed, the term “*economy*” was also added to the search equation. The result of this second phase allowed for the filtering of 1,002 publications that met the criteria set by the search equation (Phase 2 of Table 1. Appendix 1).

During the **third phase** of the review, the focus was on evaluating and selecting relevant literature (from 2015 onwards), with the aim of identifying those publications directly linked to the central topic of interest, based on the results obtained following the completion of phase two. To achieve the objective of this phase, the CASP (*Critical Appraisal Skills Programme*) method was used, involving the design of a weighted checklist to evaluate and ultimately select documents focused on the subject of study, alongside a series of inclusion and exclusion criteria to ensure that the resulting publications centred on the core theme of the review (Phase 3 of Table 1. Appendix 1). Limiting

the time frame to the last decade allows us to gather publications that truly reflect the most recent changes in relation to the central theme of the study, whilst the removal of publications included in thematic areas unrelated to the focus of this study eliminates the noise of conclusions not aligned with the thematic focus of the manuscript, which could distort the results of the subsequent bibliometric co-occurrence analysis. The result of this third phase was a corpus of manuscripts comprising 445 documents.

In the **fourth phase**, this corpus was analysed and synthesised by characterising the documents through a bibliometric study consisting of a co-occurrence analysis of the keywords used, which provided qualitative information on the field of analysis under consideration.

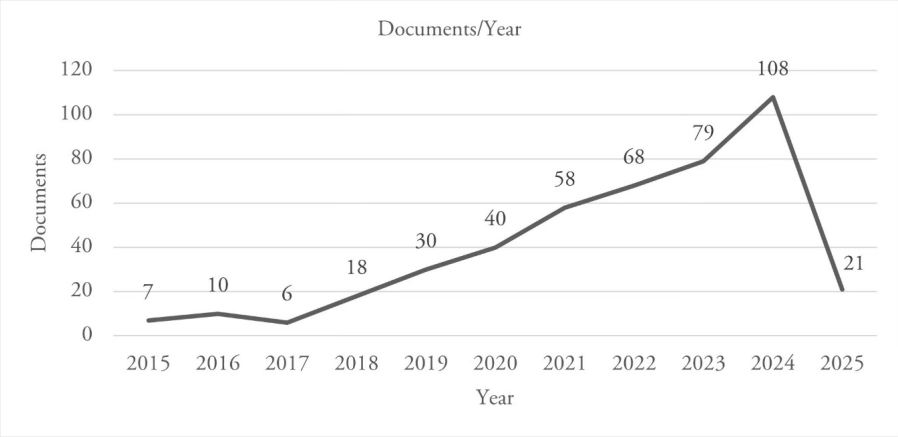
The **fifth phase** of the systematic review, which is of greatest relevance within the manuscript, describes the results obtained to identify the economic factors related to last-mile urban logistics, based on the thematic clusters obtained from the co-occurrence analysis carried out on the document corpus compiled in the fourth phase.

3. ANALYSIS

Following Mucowska's (2021) method, the systematic review analysis was carried out using descriptive analysis and bibliometric analysis. Taking only the data extracted from the Scopus database as a sample for the descriptive analysis (**Figure 1**), the output of documents linking the two variables under study (economic factors and last-mile urban logistics) has continued to grow since 2017 (and the trend indicates that this will continue throughout 2025). These data show that interest (both academic and business) in the relationship between these two variables continues to rise.

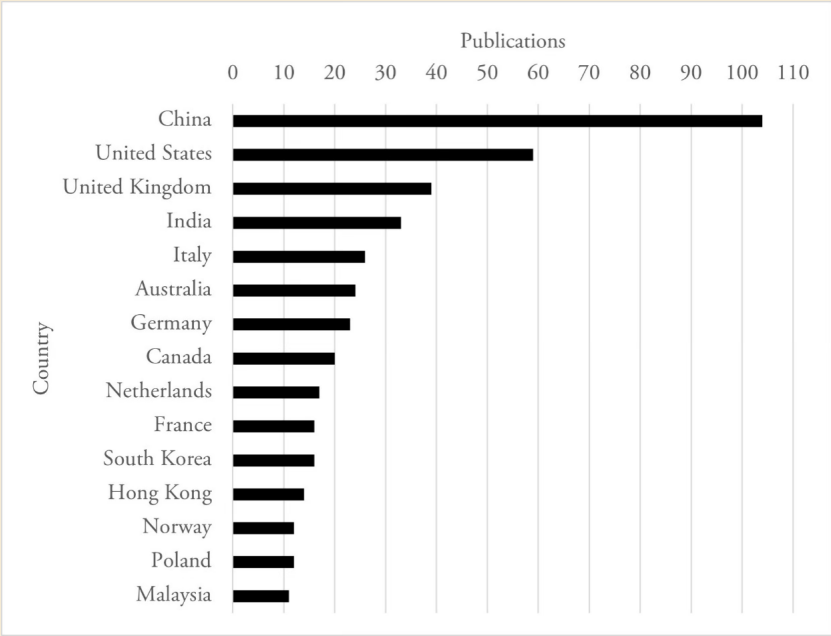
Continuing with this same database, the output by country (**Figure 2**), which shows the 15 countries with the highest number of publications, indicates that China leads the ranking of publications generated (accounting for 17% of the global total). This data reflects the interest in the two topics under analysis, an interest that seems logical given the high population density of Chinese urban centres and their urban logistical and economic needs. The breakdown by continent is more varied, with Europe accounting for the highest number of publications, followed by Asia.

Figure 1. Published documents/year since 2015



Source: Compiled by the authors using the Scopus database

Figure 2. Publications by country

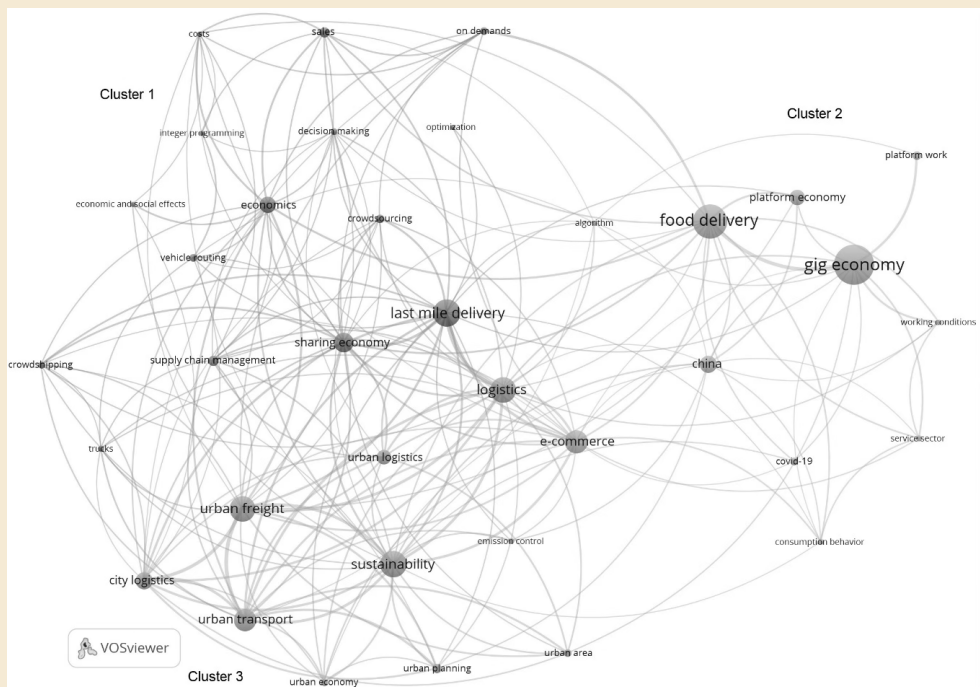


Source: Compiled by the authors using the Scopus database

The bibliometric study consisted of a co-occurrence analysis of keywords carried out using VOSviewer software version 1.6.20, applying a series of filters such as occurrence limits per keyword and

the creation of a customised thesaurus to identify the most relevant terms in relation to the two topics under study. The combination of these parameters resulted in a keyword co-occurrence map that defines current trends of interest in relation to the subject of the study (**Figure 3**).

Figure 3. Keyword Co-Occurrence Analysis Map



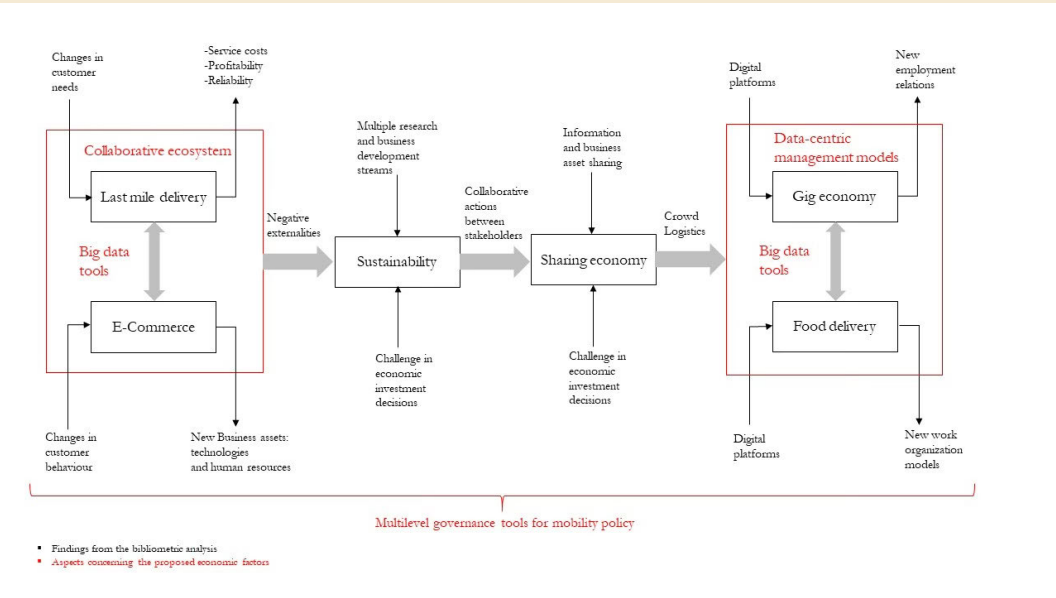
Source: Prepared by the authors using VOSviewer software

In terms of highlights, it can be seen that six keywords stand out above the rest in terms of the number of occurrences when the two topics under study—last-mile logistics and economic factors—are combined: *last-mile delivery*, *sustainability*, *e-commerce*, *gig economy*, *sharing economy* and *food delivery*. The following section will analyse the results obtained from the co-occurrence analysis, highlighting the most relevant keywords in relation to the economic factors linked to urban logistics, the relationship between them, and the future implications proposed by the authors (**Figure 4**).

4. RESULTS

The co-occurrence analysis in the previous section revealed the existence of six key themes linking last-mile urban logistics with various economic factors. **Figure 4** presents an explanatory conceptual framework.

Figure 4. Conceptual framework of keywords related to economic factors



Source: Author's own work

Last-mile urban delivery represents an area of significant economic interest both for the professional logistics sector, which operates at a business level within a highly variable and complex environment, and for academics who focus their research on this final stage of supply chains. This is reflected in the study conducted by APQC and Brown (2023) among more than 1,100 organisations, according to which 61% of them indicate that, since the Covid-19 pandemic, there have been changes in their customers' logistics needs that have had a significant impact on certain economic factors such as: their service costs, profitability and reliability of order fulfilment. According to this same study, this is driven by a need on the part of customers to receive their orders more quickly whilst having broader and more accurate visibility of their tracking; this is why many companies are opting to incorporate technologies that enhance this traceability of

order processing and do so with the least possible economic impact so as not to reduce their profit margin. Although the relationship between urban goods distribution and the economic factors it impacts is clear, both academic literature and the sector lack a macro-level framework and research that would enable the development of organisational and management models adapted to the new needs of their customers and the regulatory policies of public authorities, thereby limiting the potential to achieve greater efficiency in their business profitability.

Following on from the previous point, *last-mile delivery* is therefore a key factor in enhancing user satisfaction with the *e-commerce* shopping experience. According to Collins(2025), which presents one of the latest studies carried out by Avery Dennison, online shoppers require flexible delivery options, personalised time slots and real-time order tracking. This represents a shift in customer behaviour that has not only an operational impact on the companies providing this service, but also financial implications in terms of investment in certain areas such as new business assets, whether these be human resources or technology to be implemented. In other words, this study corroborates almost exactly the findings of the previous APQC study. Among the technologies mentioned in the literature, it is striking how little interest has been shown in the emerging set of big data tools that can help exponentially to meet customer demands, as they are capable of collecting large amounts of data from various sources and formats to transform them into valid information (through trend patterns and lines of opinion) and, furthermore, to do so in real time, according to Marco-Montes-de-Oca et al. (2024). To strengthen the close link between *last-mile delivery* and *e-commerce*, a key challenge in current research remains the creation of efficient collaborative working ecosystems that can, if not increase, at least maintain the profitability and survival of the businesses of the various stakeholders involved in the urban logistics sector.

Sustainability is another aspect of *last-mile* logistics that is closely linked to various economic factors, many of which are measured in terms of investment in technology to minimise the negative externalities arising from *e-commerce* and its *last-mile delivery*. Some sustainable initiatives launched by companies and public authorities involve financial outlays and investments that can pose a significant challenge for all stakeholders involved in the last mile (whether private or public). Taking into account the study by Aung et al.(2025) , there are various lines of research and business development aimed at ensuring that the range of activities comprising urban logistics

are carried out with high levels of *sustainability*. One category of these initiatives relates to collaborative actions between the agents involved in *last-mile delivery*, such as *Crowd Logistics* (Buldeo Rai et al., 2017; Schliwa et al., 2015), an example of the *sharing economy* that involves the need to establish mechanisms, through appropriate technologies, to facilitate the sharing of information and various business assets. A well-studied and typical example of these collaborative initiatives is public-private investment and funding of *urban freight consolidation centres*, *micro-hubs*, etc. Another group of initiatives relates to strategies for organising goods distribution, such as: *home delivery* (involving investment in vehicles and delivery drivers), *click & collect systems* (involving investment in customer service at the point of sale to collect orders purchased online), or the installation of *parcel lockers* (involving investment in technology, construction, transport and rental of the *locker* location). Another category of initiatives directly linked to *sustainability* is the adaptation of urban logistics vehicle fleets through the acquisition of alternative engines powered by non-polluting fuels, such as: *battery electric vehicles*, *plug-in hybrid vehicles*, and *hydrogen fuel cell vehicles* (among others). This category is closely linked to the use of new forms or modes of transport as alternatives to traditional methods, which also involves financial investment by the companies involved, such as: *cargo bikes*, *drones* and *autonomous delivery robots*, and even *electric cargo scooters*. Other factors, such as *routing models*, *night-time deliveries* and *toll payments* (known as '*pricing*') to gain access and parking rights in certain urban areas, are also significant economic considerations that must be taken into account and are closely linked to *sustainability*. All these initiatives inherently present an economic challenge for the organisations involved, requiring them to make significant investment decisions.

One economic factor affecting the organisations and workers involved in *last-mile delivery* is the *gig* economy – also known as *the on-demand* or *platform economy* – which is emerging as a new model of employment. According to Tassinari and Maccarrone (2020), the *gig economy* refers to the performance of small jobs (gigs) by workers hired through digital platforms (*platform work*), which act as intermediaries between workers and the companies offering such jobs. These *gigs* are digitally assigned to workers via algorithmic management, which makes the decision regarding who should carry out the work (order details, time, location, worker and amount to be paid). At this point, it is worth taking a critical look at whether this new model of employment relationship lacks ethical

consideration towards workers (mostly delivery staff or drivers) due to the lack of wage protection they suffer from the absence of a clear legal employment relationship. One business model that utilises this contractual relationship with its workers through the platform economy is *food delivery*, where customers place their orders and pay for the prepared meals they wish to receive via digital platforms on the internet, and *gig economy* workers carry out the delivery and perform their work according to the *on-demand* requirements of the customer and the company (Goods et al., 2019; Veen et al., 2020). The use of these platforms has led to a new organisational model for many entities focused on this emerging segment of *e-commerce*. The evidence and managerial and public policy implications arising from the results obtained can be translated into new lines of research and work that address some of the most significant economic knowledge gaps in the field of urban logistics. Some of these are outlined below:

- Urban logistics networks driven by data-centric management models and operated by technologies capable of handling both large volumes of data and diverse varieties and types (e.g. big data), which help managers make decisions based on accurate premises and create collaborative ecosystems among stakeholders.
- Models for organising logistics assets that cater to data-driven business models (such as digital platforms for the direct allocation and assignment of resources: modes of transport, workers, delivery types, routes, time slots, etc.) and that can efficiently meet both changing customer demands and new *e-commerce* models (for example, *food delivery*), as well as the urgent need for environmental sustainability in urban centres.
- Innovative company-worker labour relationship models that can fit within data-driven frameworks and which, in turn, enable compliance with customer requirements without compromising competitiveness.
- Multi-level public governance tools that enable the design of balanced public policies on mobility, striking a balance between citizens' well-being and environmental *sustainability*, thereby supporting economic development compatible with the interests of stakeholders in urban logistics.

5. CONCLUSIONS

The purpose of this study has been to present a general overview of the set of economic factors that are related (directly or indirectly) to current urban last-mile logistics activity and to identify gaps in knowledge in order to propose new lines of research.

Therefore, the value of this publication for all those involved in the urban distribution of goods lies in the fact that it enables them to understand, from an economic perspective, where the efforts of companies and researchers are being focused to achieve more efficient, less costly urban logistics processes, thereby allowing for greater business profitability for all stakeholders involved.

To this end, a systematic review procedure and a bibliometric analysis were employed to examine the co-occurrences between keywords, enabling the identification of current sources of interest related to the two study topics taken as the starting point: last-mile logistics and the economic factors associated with it. Furthermore, as a distinguishing feature compared to previous publications, a conceptual framework has been provided that interrelates the points of interest and proposals for improvement that may guide future lines of research and work in this field.

The results analysed in this study have yielded six areas of interest linked to economic factors or impacts for stakeholders in urban last-mile logistics:

- When analysed from the perspective of changing customer needs, *last-mile delivery* can be summarised as requiring greater speed of delivery, visibility in order tracking, and service customisation. Companies in the sector and researchers are responding to these needs primarily by incorporating technology into their logistics processes to reduce service costs, increase profitability and improve the reliability of their response. All of this has a significant economic impact on these stakeholders, which in some cases threatens the survival of their business models.
- Alongside the above approach, *e-commerce* is another key focus for researchers and industry professionals who are concentrating their efforts on adapting their business assets (both technological and human resources) to cushion the impact of changes in consumer behaviour— —as reflected in the consumer's shopping experience. The reality is that many *e-commerce* models pass this economic impact on not to their end customers, but to their logistics partners, by further adjusting rates for urban delivery services, thereby achieving results contrary to those sought, given the deterioration in the end customer's experience.
- *Sustainability* is another issue that is financially and economically

shaping the way last-mile logistics processes are designed, making them greener and more environmentally friendly by reducing the negative externalities generated by the combination of *last-mile delivery* and *e-commerce*. From collaborative strategies between participants in the design of distribution networks and inventory management, to shared financing of logistics assets (facilities and staff), and finally the development and implementation of new technologies that are less harmful to the environment, it is clear that achieving sustainability is posing a significant challenge in terms of economic investment decision-making for logistics stakeholders.

- With the aim of making processes more sustainable (both environmentally and economically), certain solutions based on the *sharing economy* have emerged in specific areas of last-mile urban logistics. The most relevant category of strategies, according to the results, is *Crowd Logistics*, with business models focused on *food delivery* being its most prominent example. The economic impact of this strategy for utilising crowd resources has fostered the growth of certain urban restaurant chains, which has inevitably led to new investments such as the development and/or acquisition of digital platforms for the joint management of users, catering companies and delivery workers. The challenge posed by these models is twofold: firstly, that inherent in decision-making regarding the financial investments to be made; and secondly, the transformation implied by the new models of organisation and labour relations (*the gig economy*).
- Last but not least, the efficiency of urban policy governance—led primarily by the public authorities responsible for urban mobility—can either drive or limit the impact of these new business and organisational models. The introduction of regulatory and enforcement measures in this regard does not benefit urban logistics stakeholders economically either, as some of these measures are difficult for small entities to comply with, limiting many of them from accessing this market and, in the worst-case scenario, driving them out of it.

The aim of this paper is to propose new approaches to research and practice focused on the design of new data-driven business and organisational models (data-centric models), which can foster collaborative ecosystems (using big data tools) amongst urban logistics stakeholders, thereby minimising the economic impact caused by changes in customer behaviour and their expectations regarding the *E-Commerce*. This will require public authorities to begin using multi-level governance tools to design urban mobility policies, thereby reducing the economic impact that any regulatory

measure may have on other stakeholders.

Although every effort has been made to approach the subject of study rigorously and precisely, it is appropriate to highlight at this point the limitations acknowledged by the authors during the manuscript's preparation. Firstly, as noted, both academic and grey literature lack the necessary standardisation of terminology related to urban and/or last-mile logistics. In this regard, it is possible—and assumed—that publications of some relevance may have been excluded from the corpus solely through the application of the keywords used in the search query in the Scopus database. Nevertheless, the authors consider that the bias resulting from this decision is minimal and does not affect the results obtained, and therefore the conclusions of this study. The same applies to the thesaurus constructed on the basis of the results obtained from the co-occurrence analysis generated by VOSviewer. The thesaurus has made it possible to avoid the dispersion of terms that, in essence, have the same meaning, thereby providing a clearer and more accurate picture of the most relevant thematic clusters addressed in the literature. Another limitation adopted to ensure the quality of the collected corpus is the decision to select only peer-reviewed articles (including reviews) as the document type. Finally, the exclusive choice of the Scopus database is justified by the fact that it provides superior coverage (it indexes a significantly larger volume of journals and offers greater geographical and thematic representativeness when compared to other databases (Visser et al., 2021)).

The authors of this manuscript hope that this work will serve as a point of reflection for other researchers and professionals in urban logistics on the subject under study, and also as a starting point for opening up new lines of research through the proposals presented.

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