



Last Mile Logistics

Challenges and solutions in Spain

February 2020

This study has been developed by the following professionals of Deloitte:

- **Vicente Segura (Partner)**
- **Ana Fuster (Partner)**
- **Fernando Antolín (Senior Manager)**
- **Carlos Casellas (Senior Manager)**
- **Marta Payno (Manager)**
- **Alberto Grandío (Manager)**
- **Albert Cagigós (Manager)**
- **Miguel Muelas (Consultant)**

Deloitte consulting has over 45,000 professionals in more than 150 countries.

To navigate the future with confidence, organisations need to make the right decisions: clear, timely and inspirational choices that deliver growth in a dynamic world. Deloitte's professionals combine deep industry insights with cutting edge methods to help leaders resolve their most critical decisions, drive value and achieve transformational success.

Contents

1. Executive summary	6
2. Challenges and the Last Mile ecosystem	12
3. Stakeholders and sectors involved	18
Consumer	18
Citizens and public authorities	20
Sectors of activity	22
4. Solutions in Last Mile logistics	32
Enablers of the transformation	32
New models and solutions in Last Mile logistics	41
5. Conclusions and recommendations	64

1. Executive summary

Executive summary

Last Mile logistics is undoubtedly a crucial challenge for society and companies that work and operate mainly in large cities. Its significance lies in its increasingly important **impacts** on:

- **Environmental sustainability**, where freight transport represents approximately 25% of the contaminating gas emissions¹ and the worsening in air quality may jeopardise the health of more than 80% of the Spanish population living in urban areas².
- Urban **traffic congestion**, where 20% of urban traffic is caused by freight traffic¹ with the result that, for example, a driver in Madrid is stationary an average of 2 days per year¹.
- **Logistic efficiency** and the **costs associated** with freight transport and distribution, which erodes the net profit of many companies in the transport industry to negligible levels.

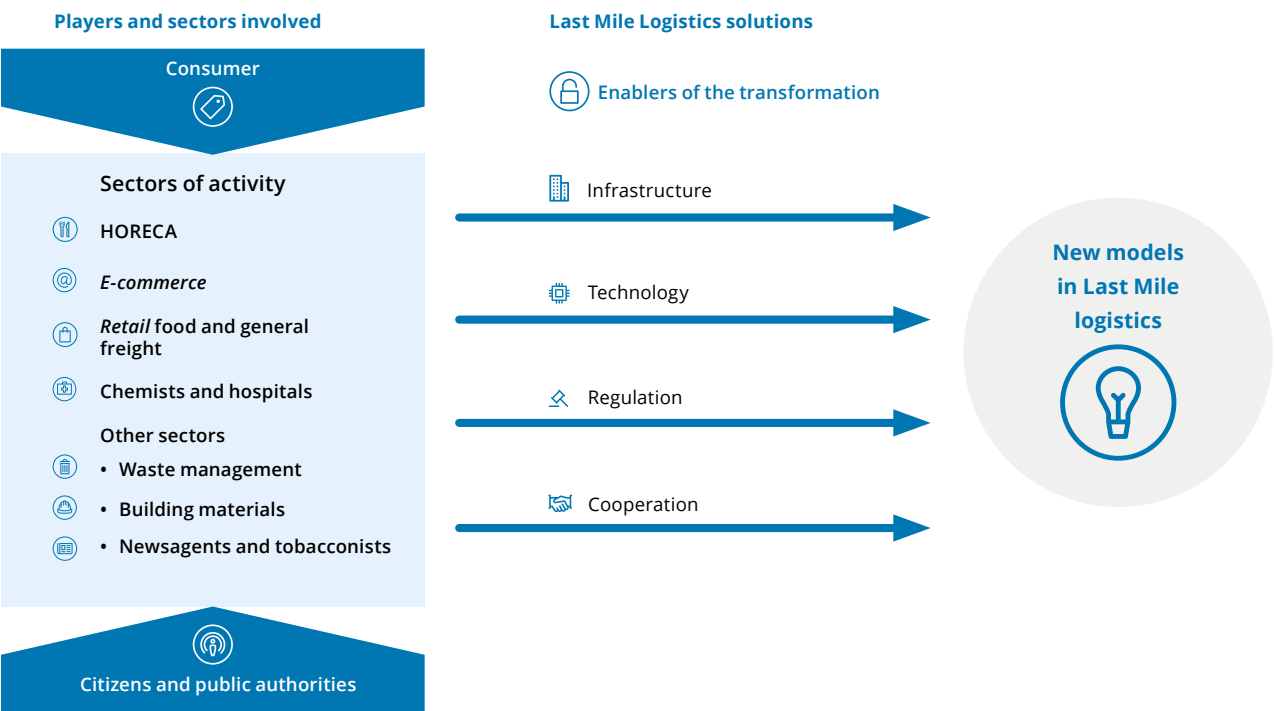
Consumers increasingly demand greater quantities of products and services. Also, super fast service and high frequency fulfilment have become the norm, without assuming on many occasions the actual cost associated with the service provided. In certain sectors, the consumers themselves have propagated a “free delivery” culture that severely hampers sustainability and balance in a sector of activity undergoing a complete transformation. Paradoxically, however, it is this same consumer who, from the perspective of the citizen, is increasingly concerned about the environment and sustainability.

Public authorities, driven by citizens, act as regulating bodies to alleviate the impacts of last-mile logistics, establishing measures in Spanish cities such as the “Low emission zone” in Barcelona and the “Madrid Central” area of low emissions.

Numerous **sectors of activity** include last mile logistics; however, this study focuses on the hotels and restaurants (HORECA) and *e-commerce* sectors in view of the significant total impacts arising as a result of their logistics activities.

Various players coexist within the Last Mile logistics ecosystem:

Figure 1. Last Mile Ecosystem



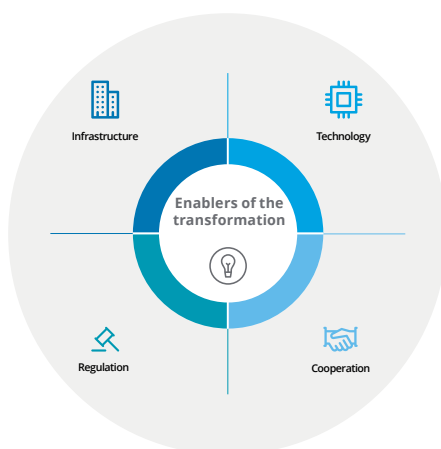
1. Deloitte Research; see detail in Appendix I (Bibliography)

2. Spanish National Statistics Institute (INE)

- **Distribution for HORECA** channel, supplying more than 376,000 establishments in Spain³, means competing in a highly fragmented sector with more than 12,000 distributors³. Customers demand more frequent deliveries and food manufacturer's current competitive dynamics make it difficult to increase the size of the average order per stop and to improve delivery operation efficiency: an average of 6 distributors a day are required to supply one establishment, 98% of stops occur in the same time slot and 40% double park⁴. Furthermore, 9 out of every 10 distributors have not substantially digitalised their operations and 45% of the fleet of delivery trucks are more than ten years old⁴. As a result, Spanish benchmark distributors are 2 to 3 times less efficient than the main European and global distributors³.
- With annual growth in *e-commerce* business of over 20%⁵, **e-commerce parcel delivery** has given rise to a highly aggressive, competitive commercial environment in terms of prices in which the level of service customers' demand continues to grow (86% of fulfilments are home deliveries and over half of them are contracted for next-day delivery⁴). Also, the highly seasonal nature of the e-commerce business in the latter months of the year leads to structural inefficiencies that only serve to worsen the low profitability in this sector.
- New **infrastructure**, providing support for the implementation of the new logistics models, allows access to and/or facilitate end-user delivery capabilities. In this study we identify, highlight and develop the three main logistical infrastructures of particular importance in Last Mile logistics, such as warehouses, lockers (parcel delivery and collection boxes accessible at all times and located in strategic places) and loading and unloading areas. Being equipped with much more appropriate, digitalised logistics infrastructure is crucial to the transformation of Last Mile Logistics.
- New **technologies** and start-ups that enhance the possibility for improvement (or even redefinition) of logistics operations and customer communication channels to make them more efficient and user friendly. In our study we develop the eleven main technologies identified in the various field studies carried out which are classified based on their status (technologies already implemented, to be implemented shortly or for future deployment) and their impact on the three main drivers of the model (environmental sustainability, urban traffic congestion and logistical efficiency). The technologies referred to above are as follows: new communication channels, geolocation services, dynamic/big data, smart lockers, electric scooters, reusable packaging, mobility platforms, electric vehicles and alternative fuels, drones, autonomous vehicles and robotisation.
- **Regulation** by public authorities as a proactive element of the transformation, adopting the role of strategist, coordinator, catalyst, regulator and operator. In this way, we define the main current inefficiencies that public authorities will have to adapt to enable the implementation of new models and solutions that optimise Last Mile logistics and, above all, aim to maximise the interests of the players involved while ensuring public welfare.
- **Cooperation** among the various players and sectors of activity, since the complexity of the Last Mile logistics environment significantly undermines the development of isolated, uncoordinated initiatives. Cooperation between the public authorities, the various players involved, and the companies and sectors of activity is essential to be able to undertake the development of a new regulatory framework with any assurance of success and to implement the new models and Last Mile logistical solutions that solve the current problems swiftly and efficiently.

In addition to involving all the above players and sectors of activity, the transformation of goods transport and distribution models required must be based on a series of **enablers**: infrastructure, technology, regulation and cooperation.

Figure 2. Enablers of the transformation



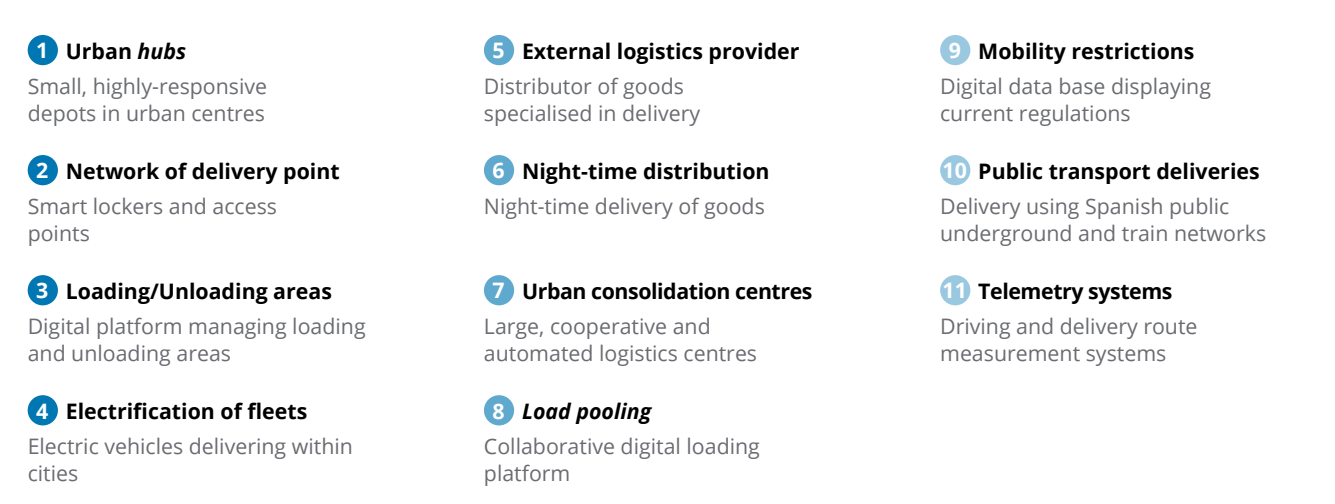
3. Deloitte. HORECA distribution POV - Monitor Deloitte

4. Deloitte Research: see detail in Appendix I (Bibliography)

5. BBVA Research E-commerce billing

Given the challenges, agents and sectors of activity involved and the transformation enablers, the study identified a series of **Last Mile models and logistical and distribution solutions that must be implemented and fostered** in certain urban areas. The detail of the models and logistical solutions defined in the study is as follows:

Figure 3. New Last Mile models and logistical solutions

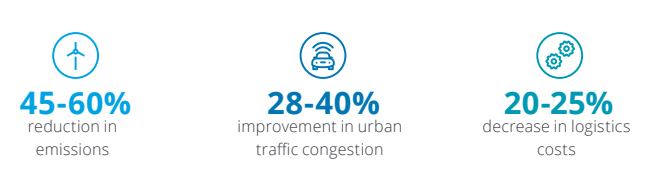


In addition to providing details of the aforementioned logistics models, our study classifies them based on the level of impact on the various challenges (Kg CO₂ emissions, delivery vehicles per km²/day, parcel delivery cost) and the complexity/difficulty involved in implementation of the models.

The study also describes a case study in Madrid combining three solutions to provide e-commerce parcel deliveries within the city: using **urban hubs, partial electrification**

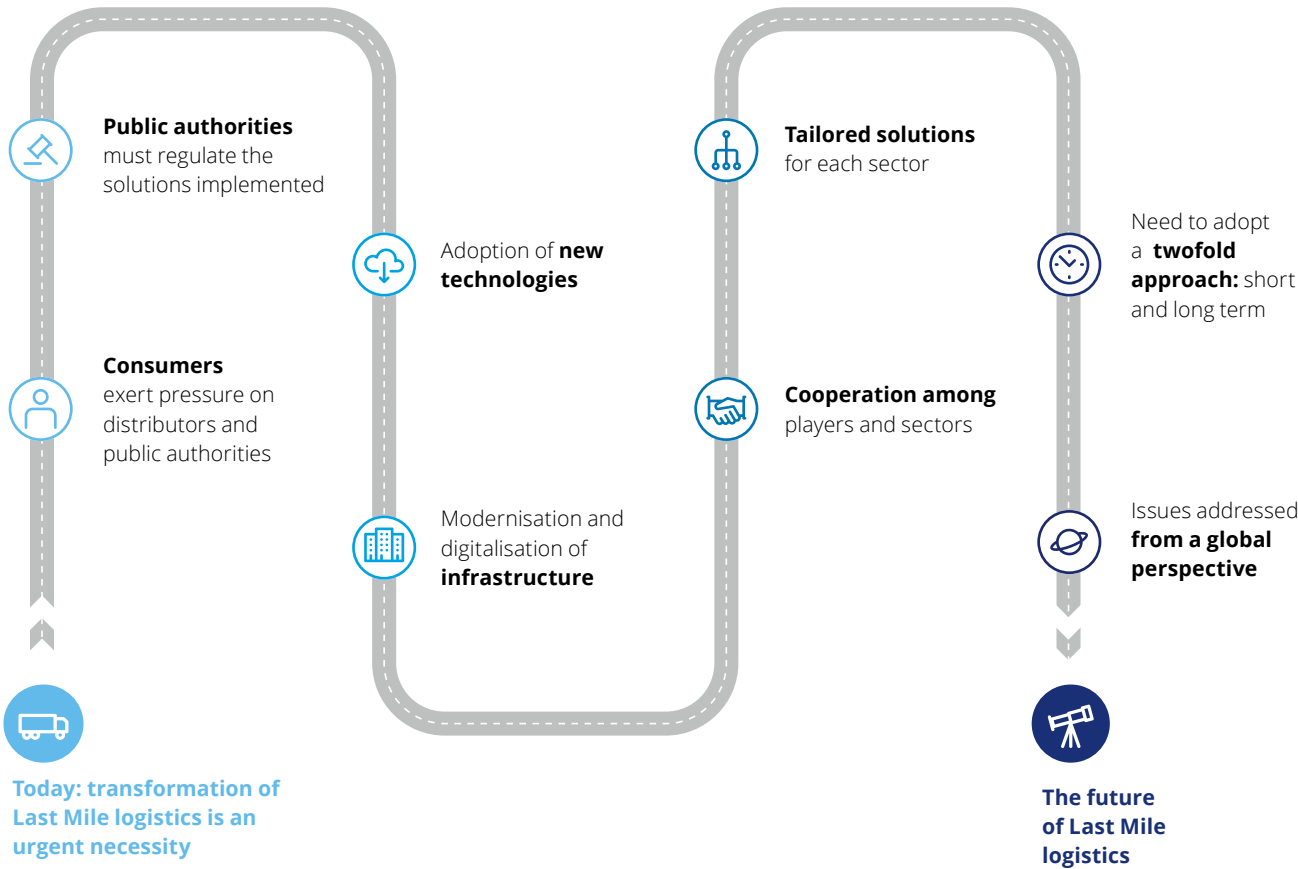
of current delivery fleets (40% electric vans) and with the incentive of **smart locker** collection and delivery points (35% of e-commerce deliveries). The detail of the estimated impact of the implementation of the three *e-commerce* delivery solutions in Madrid on each of the Last Mile challenges identified is as follows:

Figure 4. Impact of the solutions described in Madrid



Lastly, in order to ensure that Last Mile distribution in Spain achieves the envisaged goals and the solutions proposed, including the associated gradual transition, can be implemented immediately, it is advisable to follow a series of recommendations which are described in the following diagram:

Figure 5. Recommendations for transformation of Last Mile logistics



In conclusion, the purpose of this study is illustrate the complexity of ecosystems such as Last Mile ecosystem, which has seen exponential growth in recent years and is confronted by enormous challenges, both from an environmental perspective and also in terms of urban traffic congestion and the efficiency and sustainability of the companies and sectors that interact within it. As consumers we demand greater levels of service and more immediate delivery of our parcels; as citizens we want an environment that is healthy and sustainable. To achieve the

balance a series of solutions and enablers of the transformation are available that will enable us to manage and accelerate this transition in order to achieve the defined goals. Effective management of the transformation currently facing the urban freight logistics and distribution in the segment widely known as “Last Mile” is within our grasp.

2. Challenges and the Last Mile ecosystem

Challenges and the Last Mile ecosystem

Last Mile is defined as the last stage of the journey followed by transported goods until they reach their destination. More specifically, for the purposes of this study, Last Mile refers to the logistics of distribution and delivery of freight from the business to the end consumer (Business to Consumer - B2C) and from the business to new points of sale (Business to Business - B2B). The study focuses on the Last Mile performed inside cities and large urban areas due to the significance of its impact.

Challenges

Last Mile logistics in Spain is without doubt a key issues in view of the undeniable impact it is having in the following areas:

1. Environmental sustainability.
2. Urban traffic congestion.
3. Logistical efficiency.

Environmental sustainability



Up to **80%** of the population is subject to levels of contamination that exceed the WHO's guidelines



Deaths caused by air pollution are **20 times** higher than those caused by traffic accidents



25% of total pollutant gas emissions in Spain are caused by freight transport

Urban traffic congestion



More than **20%** of the traffic in cities is caused by freight transport



A driver in Madrid spends an average of **2 days** a year in traffic jams



1.5 million e-commerce parcels are delivered in Spain every day.

Logistical efficiency



Last Mile represents up to **40%** of the total logistics costs



Around **80%** of the transport companies are microenterprises



The **HORECA** benchmark distributors in Spain are **2 to 3 times** less efficient than the global benchmark distributors

Environmental sustainability

The challenge posed by environmental sustainability is one of the **main concerns facing today's society**, in view of mounting evidence demonstrating the deterioration being suffered by the environment and the permanent shortfalls observed on the part of certain countries when required to comply with international agreements. Spain is by no means an exception and, accordingly, is being closely monitored by the European Community and Spanish society.

Cities account for a significant portion of the environmental causes and impacts Up to 80%⁶ of the population in Spain live exposed to levels of contamination that exceed those permitted by the WHO, which gives rise a mortality rate caused by air pollution that is 20 times higher than that caused by traffic accidents⁷.

Public authorities are aware that approximately **25% of the pollutant gas emissions in cities are produced by freight transport**⁸, and that this figure may be higher in cities such as Barcelona and Madrid, and as a result they have already adopted measures in relation to Last Mile logistics in an attempt to minimise the environmental risks.

Urban traffic congestion

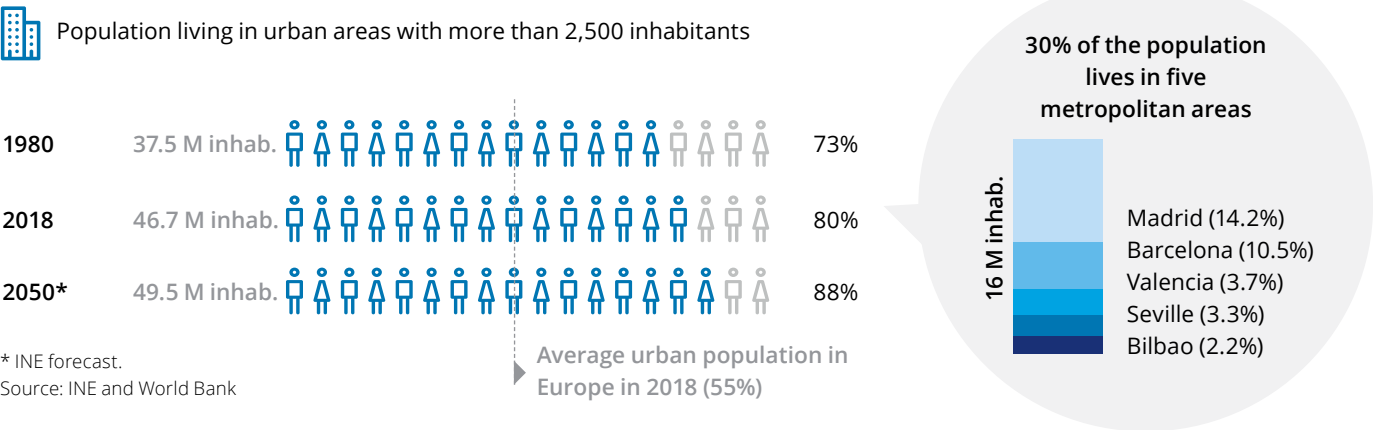
Urban traffic congestion is also a daily problem particularly for those people and companies living and operating in urban areas; for example, in Madrid on average **drivers waste approximately 2 days a year in traffic jams**⁸. In addition, urban traffic congestion and new mobility formats and models unfortunately result in additional road safety risks.

Over **20% of the traffic in urban areas is caused by the freight transport**⁶ of various sectors/businesses. For example, over the last ten years the e-commerce business has grown by more than 23% year-on-year⁹, giving rise to the delivery of approximately 1.5 million parcels per day in Spain.

Increases in the volume of freight transport per capita are exacerbated by the impact of higher population density in urban areas: **Up to 80% of Spain's population** (37.4 million people) **is concentrated in urban areas** and it is estimated that it will reach 88% of the population by 2050 (average annual growth of 0.5%¹⁰). This figure is even more alarming in Spain's case if we consider that on average only 55% of the European population live in urban areas¹¹.

The increased population density in urban areas has produced the "empty Spain" effect which only serves to further jeopardise the profitability of Last Mile logistics in rural areas.

Table 1. Evolution of urbanisation in Spain



6. World Health Organisation (WHO)
7. European Environment Agency
8. Deloitte Research; see detail in Appendix I (Bibliography)
9. BBVA Research. E-commerce billing
10. Spanish National Statistics Institute (INE)
11. World Bank

Logistical efficiency

Last Mile logistical efficiency clearly represents a challenge for companies engaging in freight distribution and delivery in view of its **significant, direct impact on operating margins**, in which the Last Mile can represent up to 40% of the total parcel delivery cost¹².

As a consequence of the difficulties of Last Mile logistics and the issues specific to each sector (e.g. high levels of service inherent to the business, exclusive nature of relationships, high fragmented market, etc.), the average profitability of couriers has been significantly eroded while the volume managed has grown annually at double digit rates. Similarly, in the HORECA sector, benchmark distributors' profitability is 2 to 3 times lower than that of the large global competitors¹³ and, in the retail food and general freight sector, a substantial portion of the retailers are finding it very difficult to generate revenue from their e-commerce channels.

In turn, the tight margins and the widespread, high level of fragmentation in the transport sector make tackling the structural and operational transformations required in the freight distribution and delivery business -in order to enhance logistical efficiency- more challenging.

Last Mile logistics in Spain is without doubt a key issue in view of the undeniable impact it is having on the challenges posed by environmental sustainability, urban traffic congestion and logistical efficiency

12. Deloitte Research: see detail in Appendix I (Bibliography)

13. Deloitte. HORECA distribution POV - Monitor Deloitte

The Last Mile ecosystem

Last Mile logistics forms part of an ecosystem in which various players participate that impact on and condition the various sectors of activity for which logistics services are provided.

The different interests and dynamics of each of the players and sectors of activity involved give rise to a highly complex ecosystem that makes it necessary to seek coordinated solutions that will not always accommodate the interests of all the players involved.

Consumers and public authorities, as a result of the increasing volumes, high levels of service, price and regulatory pressures, are obliging the sectors of activity to transform their Last Mile logistics in order to comply with stringent regulation and to be able to protect their profitability.

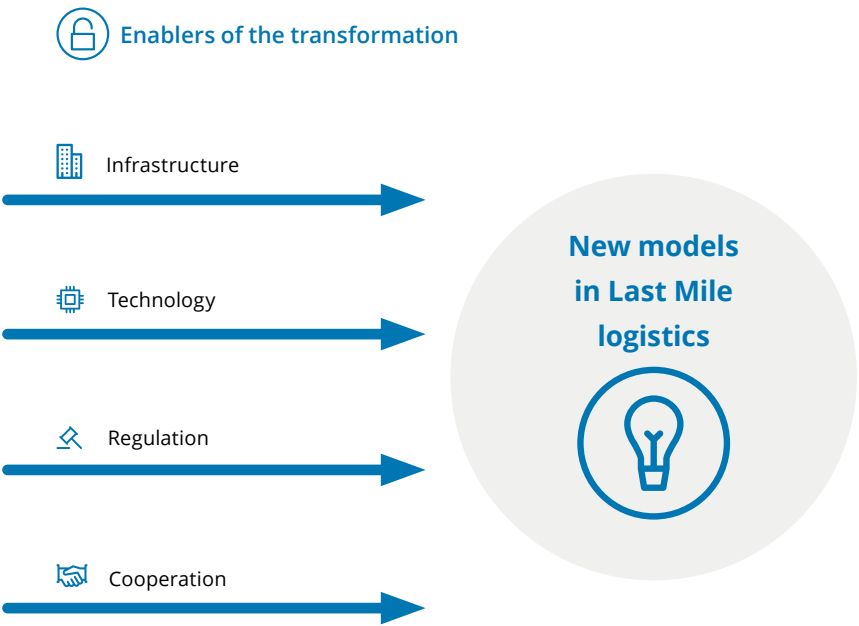
To achieve the required transformation, the sectors of activity must be based on a series of change enablers such as infrastructure, technology, regulation and cooperation for the development of new logistics models.

Table 2. Last Mile Ecosystem

Players and sectors involved



Last Mile Logistics solutions



The Last Mile logistics models must be transformed engaging the entire ecosystem of players and sectors of activity in order to develop the most advantageous logistical solutions.

3. Stakeholders and sectors involved

Consumer

Citizens and public authorities

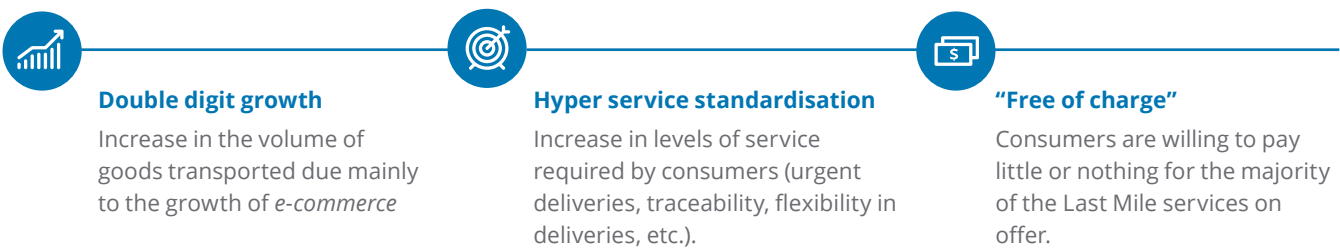
Sectors of activity

Stakeholders and sectors involved

Consumer

In recent years, consumer expectations have become increasingly demanding on the various activity sectors involved in Last Mile logistics. Including most notably:

Table 3. Last Mile demand trends



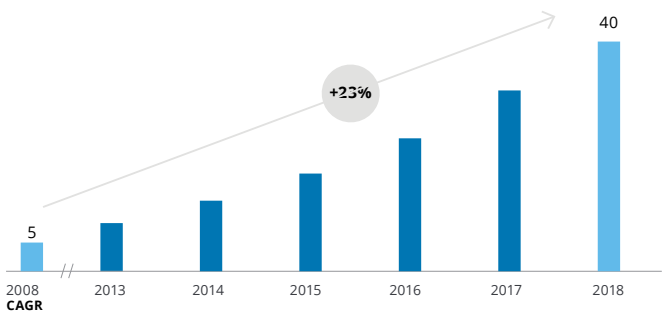
These demand trends arise from the extreme pressure exerted by the *e-commerce* consumer on courier companies that undertake deliveries. In recent years however, this pressure has extended to deliveries for B2B consumers who demand the same levels of service at ever lower prices from their respective distributors

Online consumer

E-commerce billing has increased by more than 23% on average in the last ten years, and in 2018 it grew by 29% ¹⁴ reaching EUR 40,000 million. This growth arises primarily from the increase in the population that buy products online which has risen from around 20% in 2008 to 50% in 2018¹⁵.

This huge increase in demand means that courier companies undertaking Last Mile deliveries must manage **the delivery of approximately 1.5 million parcels per day on average¹⁴**. Also, in some product categories, demand is aggressively concentrated in the latter months of the year, creating a seasonal demand where operators may handle three times the volume compared to their yearly average.

Table 4. Change in *e-commerce* billing in Spain (EUR thousands of millions *)



* Includes all *e-commerce* categories.
Source: BBVA Research

14. Deloitte Research: see detail in Appendix I (Bibliography)

15. BBVA Research. *E-commerce* billing

In addition to this increase in volume, consumers demand ever greater levels of service. Express deliveries (in less than 24 hours) have increased by over 10% each year¹⁶ and 86% of all deliveries are home deliveries, which can generate costs up to three or four times greater than those that arise from selling products in establishments¹⁷, as is the case with supermarkets.

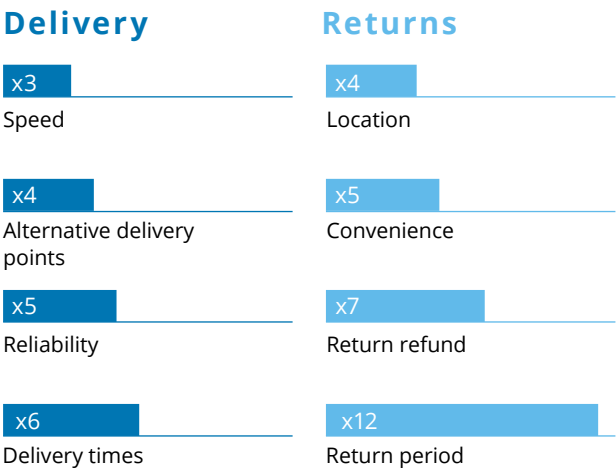
Also, consumers demand greater levels of flexibility (the ability to change orders) and traceability (56% of consumers need to know the real time location of their parcel¹⁷).

If they want to be competitive, courier companies must offer deliveries and returns free of charge (70% of consumers repeat the purchase if the delivery processes were satisfactory¹⁷). Only 18% of companies however offer deliveries completely free of charge¹⁸.

The huge importance that delivery costs have for consumers in the purchase decision gives rise to a progressive reduction in the prices that they are prepared to pay for Last Mile deliveries.

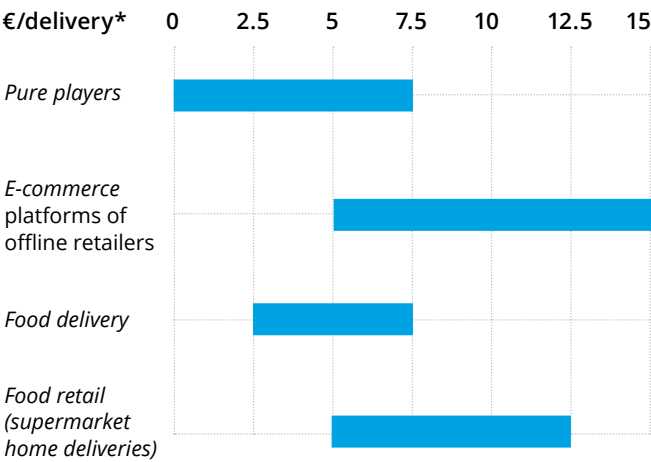
The prices (see Table 6) which are charged as delivery costs to the customer, do not generally cover all the costs that courier companies must incur to provide all the services consumers require, which gives rise to a reduction in profitability that only large companies can meet.

Table 5. The cost of delivery is considered x times more significant than...



Source: Deloitte Digital NL, Omnichannel Fulfilment

Table 6. Range of delivery prices depending on the e-commerce category



* Excludes free delivery on minimum orders

Source: Deloitte analysis

16. Spanish National Markets and Competition Commission (CNMC). Analysis of the postal sector and the courier and package delivery sectors.

17. Deloitte Research: see detail in appendix I (Bibliography)

18. Deloitte Digital NL. Omnichannel Fulfillment

The business customer or consumer

As a consequence of the huge benefits offered by e-commerce, companies require a greater number of services, such as increased order traceability, supplier flexibility and the inclusion of demand forecasting tools that would result in up to 50% reduction of inventory shortfalls¹⁹.

Accordingly, it is becoming essential for distributors to offer business consumers integrated services, i.e. the performance of all supply chain activities and tasks, from complete warehouse management to the transport of goods to their customers' establishments.

As with e-commerce, **customers regard the performance of these services as one and the same thing and are not prepared to pay higher prices to supply their establishments and convenience stores.**

The growing demands of e-commerce consumers has shifted to retail supply services, increasing pressure on costs for distributors and parcel and delivery companies.

Citizens and public authorities

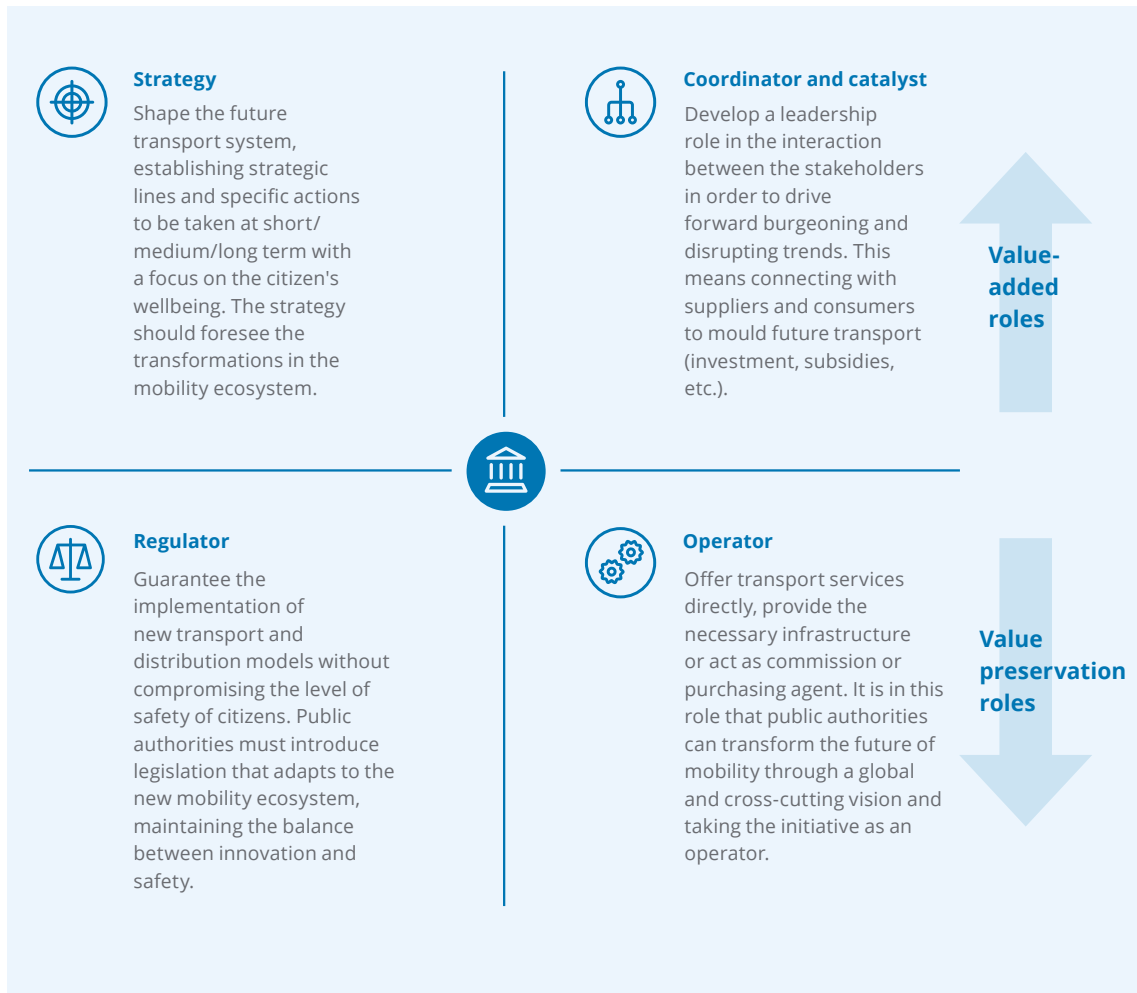
In addition to consumer expectations and demands, in recent years citizens have demonstrated a growing interest **in the environmental situation and the high level of urban traffic congestion.** Surveys indicate that more than 76% of the population openly acknowledge to being concerned by environmental sustainability¹⁹. This social awareness has been recognised by public authorities in their municipal bylaws, which is indicative of their desire to reduce CO₂ emissions and congestion caused by transport.

As regulating bodies, public authorities have a key role in encouraging and guaranteeing efficient and sustainable urban mobility that meets the needs of the population, and in turn, encourage sustainable behaviour patterns.

In Table 7 **four roles** are identified that must be adopted to undertake future regulation.

The paradox is that the same citizen who is concerned by sustainability and congestion is the same e-commerce consumer who demands ever greater levels of service and immediacy of deliveries, without consideration of the impact that this has.

19. Deloitte Research: see detail in Appendix I (Bibliography)

Table 7. Roles of public authorities

Some examples of current measures in big cities for each of these roles are as follows:

Strategy – Barcelona: the “ÁreaDUM” application enables optimisation in the use of loading and unloading zones, avoiding unnecessary fines and reducing delivery times. The system is able to use geolocation, locating the vehicle in the area and offering a detailed record of all the transactions performed over the course of the working day.

Coordinator and catalyst – New York: the New York City Department of Transport (NYCDOT), is developing a plan to manage smart trucks (Smart Truck Management Plan) to enable goods delivery management in the city.

Regulator – London: Greater London is one of the pioneers in establishing restricted access in specific zones, targeting solely large and goods distribution vehicles. Implementation of the ULEZ Zone (congestion charge zone) involves the payment of a daily charge within a specific timeframe. This results in a reduction in circulation of approximately 15% ²⁰.

Operator – Brussels: the municipal authorities worked with the logistics company TNT Express to install a mobile depot that moves from the regional parcel hub to the city centre.

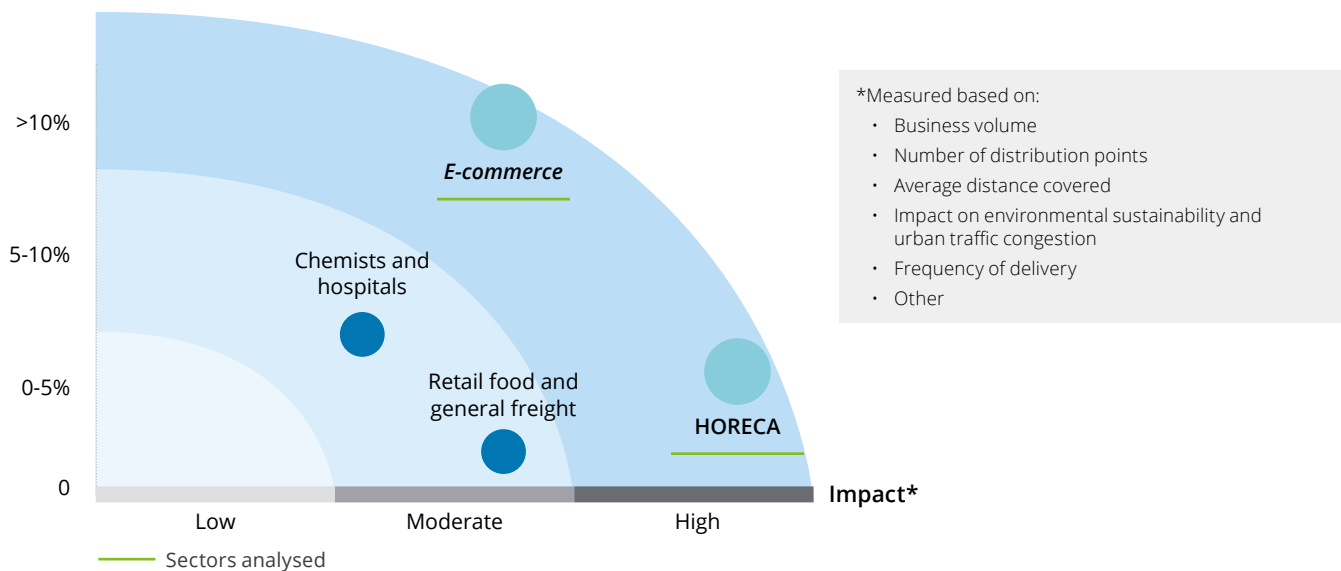
20. Deloitte Research: see detail in Appendix I (Bibliography)

Sectors of activity

There a multitude of sectors in which Last Mile logistics have a significant impact on cities. For this study the main sectors in which logistical activity is carried on were classified based on their growth and the impact of their Last Mile.

To measure the impact of Last Mile logistics, various aspects were considered such as business volume, the number of distribution points, the average distance covered, the impact on environmental sustainability, urban traffic congestion and the frequency of delivery, among others. With all of the foregoing, the sectors of activity are segmented according to the following table:

Table 8. Transport and distribution segmentation of Last Mile activity sectors
Growth 2017-2018



A detailed analysis of the two sectors with greatest impact was chosen in this study:

There are other sectors that, although they are not detailed in this study, are very significant:

- **HORECA:** this sector of activity was selected due to its large size (376,000 establishments²¹), the impact of its deliveries on city centres (frequencies of up to six times per day per establishment ²²) and the underdevelopment of Last Mile logistics in this sector, which demonstrates the huge potential for improvement in this area.
- **Chemists and hospitals:** in order to ensure daily supply of more than 22,000 delivery points of this sector, approximately 150,000 orders are distributed with an average frequency of four deliveries per establishment. This involves management of 3,000 different routes and travelling distances of more than 550,000 kilometres each day²².
- **E-commerce:** the on-line sales sector is of great importance to this study given its year-on-year growth of over 20%²³ and the significant volume that must be handled.
- **Food retail and general freight:** this sector, in spite of its large size and high number of distribution points has fewer daily frequencies, has capacity to make deliveries at night and, in many cases, specific unloading zones, which is why it is considered to be a sector with a moderate impact.

21. Deloitte. HORECA distribution POV - Monitor Deloitte

22. Deloitte Research: see detail in Appendix I (Bibliography)

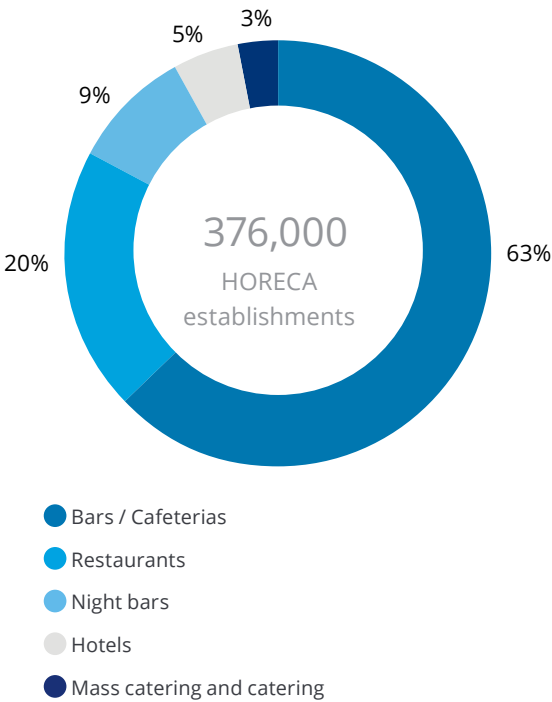
23. BBVA Research. E-commerce billing

HORECA

The HORECA sector (Hotels, Restaurants and Cafés), is comprised of approximately 376,000 establishments, of which more than 80% are bars/cafeterias and restaurants²⁴. 80% of these establishments are independent²⁴ (which represents 65% of sector revenue²⁵) and the rest are establishments that belong to large chains. This share of organised chains in Spain is still far from the more than 35% organised HORECA chains present in other European countries²⁵.

The HORECA sector impacts greatly on Last Mile logistics due to the huge number of establishments, their high delivery frequencies and current logistics inefficiencies.

Table 9. HORECA establishments in Spain



Source: Deloitte analysis

The main issues that can be observed in Last Mile logistics are as follows:

Distributors are highly fragmented

More than 12,000 distributors²⁵ supply the vast majority of the sector's establishments. This means that each establishment usually works with eight different distributors.²⁴. Also, their logistics chain is structured in a way that favours manufacturers, as this is a sector dominated by a few producers of certain types of products (beer, soft drinks, etc.), which have a greater negotiating power in their agreements with the distributors. The distribution companies' lack of expertise and high level of atomisation results in poor service provision to establishments. This situation creates an erosion of margins of benchmark distributors, which do not exceed 2%, in contrast with the profitability that can be attained by manufacturers²⁵.

Lack of specialisation

These distribution companies are those that perform the commercial activity (promotions and sales), and the delivery logistics on the same routes. There is a lack of focus therefore on the logistic activity, which slows down delivery to each establishment (long waits in loading and unloading zones), and creates high levels of urban traffic congestion.

High delivery frequency

The sector's establishments must continuously receive goods from manufacturers as they mainly involve perishable food items. In addition, the storage areas at the establishments are very small in size in accordance with legislation (regulations require that only 5% to 10% of the total size of the establishment may be allocated for storage depending on the municipal authority²⁴). This situation means that delivery frequencies are up to six times a day per establishment and the time spent managing distributors occupies HORECA sector employees more than four hours a week on average²⁴.

24. Deloitte Research: see detail in Appendix I (Bibliography)

25. Deloitte. HORECA distribution POV - Monitor Deloitte

Last Mile logistics inefficiencies

Almost all routes and stops are performed during the same time slot, 98% of instances are between 07:00 and 13:00²⁶. Stops to supply the sector have to be performed in loading and unloading zones, but lack of availability of these zones and vehicle congestion at rush hour means that 40% of stops are illegal, due to excessive unloading time and double parking. Also, 45% of trucks used for deliveries have more than ten years' service and consist entirely of diesel and petrol engines²⁶. These inefficiencies significantly increase the impact of the sector's distribution on urban traffic congestion levels and environmental sustainability.

Low level of digitisation

95% of the distribution companies have yet to digitise their delivery chain and more than 60% have not drawn up a digital plan or strategy²⁷. A clear evidence for this is the fact that many establishments and distributors in this sector still use paper receipts. The lack of digitisation creates huge difficulties when predicting the establishments' demand, which compromises the levels of services offered.

Table 10. HORECA last mile logistics key data

+12,000	< 2%	>8	6
HORECA distributors	profitability of benchmark distributors	different distributors per establishment	average deliveries a day per establishment
98%	40%	45%	95%
of deliveries between 07:00 and 13:00	of stops illegal	of trucks with more than ten years' service	of companies operate without digitisation



Specific challenges of HORECA Last Mile logistics

1

Increase profitability and efficiency of distribution companies

2

Gain expertise and increase the quality of Last Mile logistic services

3

Optimise the high frequency of deliveries

4

Solving Last Mile delivery inefficiencies

5

Strengthen and improve digitisation levels

In light of the aforementioned issues, the efficiency of HORECA sector benchmark distributors in Spain is between two and three times lower than the average for overall distribution in this sector.

26. Deloitte Research: see detail in Appendix I (Bibliography)
27. Alimarket. Logistics 4.0: A challenge representing an opportunity

E-commerce

The e-commerce sector is made up of all those companies that sell products online to consumers (web portals or computer applications). Goods are transported from the shop, restaurant, supermarket or warehouse (hub) of the competitors in the sector to the consumer's chosen delivery point, (home address, offices, access points or smart lockers, etc.).

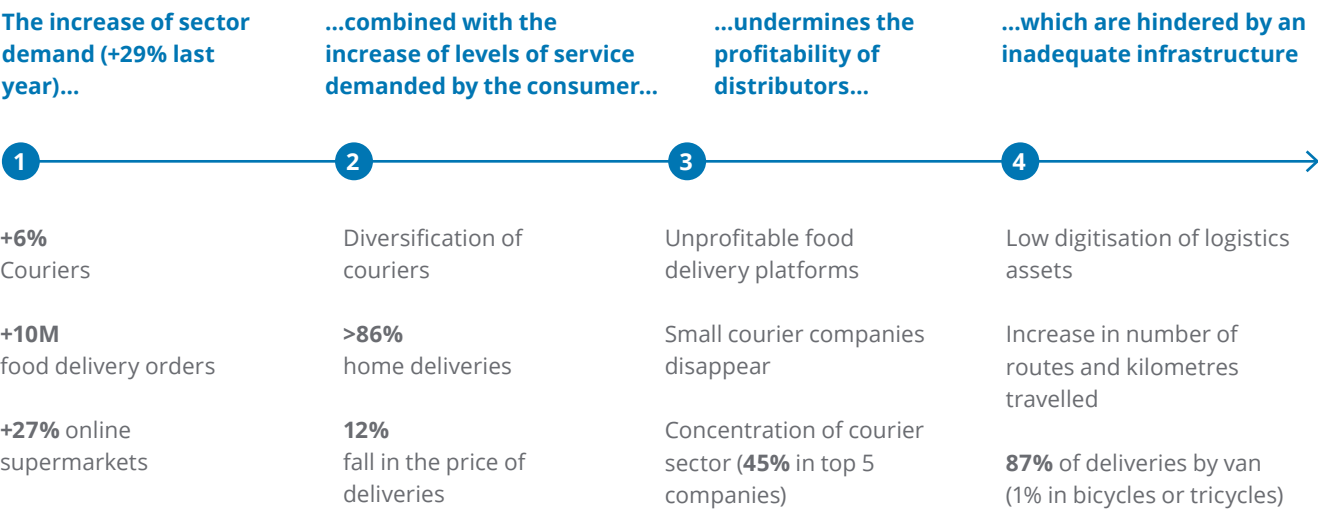
E-commerce competitors can be divided into four categories according to their activity:

- **Pure players:** those companies whose sales activity is performed entirely online, commonly known as online stores. Such is the case of big companies such as Alibaba, Aliexpress, PcComponentes, VeePee as well as the leader in sales in Spain and worldwide, Amazon. Last Mile logistics for this type of company is usually performed by specialist parcel delivery companies (couriers).
- **E-commerce platforms of general goods retailers:** companies with establishments that are engaged in the sale of products of various categories (fashion, electrical goods, sport, etc.), and which also have online platforms where they offer consumers products without having to go to their stores. The online platforms of retailers such as El Corte Inglés, Mango or Media Markt are examples of this category.

In view of the exponential growth of online demand, traditional retailers are making a huge effort to compete in the e-commerce market with companies that were established directly to sell over the internet (the pure players). Retailers also rely on couriers to deliver their online orders.

- **Food delivery:** Companies that act as intermediaries between restaurants and the consumer. Their activity is based on receiving the customer's order, collecting the food from the restaurant and delivering it to where the buyer wants. Some examples are: Just Eat, Glovo, UberEats or Deliveroo. These types of companies are usually start-ups that engage in home delivery of food through their own fleets.
- **Food retail (online supermarkets):** Last Mile is performed, in the majority of cases, by the same company using their own fleet of home delivery vehicles, which, in some instances, increases costs and inefficiencies as they do not involve specialist delivery companies.

Table 11. Last mile e-commerce logistics issues

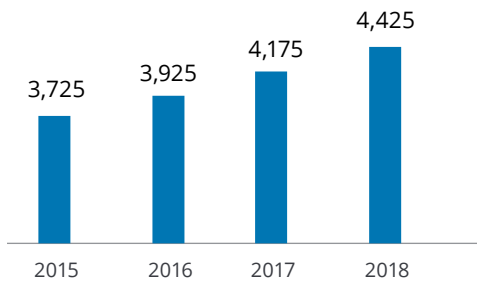


The main issues that can be observed in Last Mile e-commerce logistics are as follows:

Increase in demand of thee-commerce sector

The growth of the sector (+29%²⁸) and the large number of orders that have to be managed (approximately 1.5 million deliveries a day²⁸), cause a clear upward trend in the courier sector with billings of EUR 4,425 million in 2018 and an increase of 6% on 2017²⁹.

Table 12. Change in billings of the courier sector (EUR M)



Source: DBK Informa: Sectorial Observatory (courier and parcel delivery sector)

The increase is also seen in food delivery companies and online supermarkets. Food delivery companies have more than 3 million end customers and make over 19 million deliveries, 10 million more than 2016. Also, these new companies resulted in restaurants that use their services increasing their sales by more than 7%²⁸.

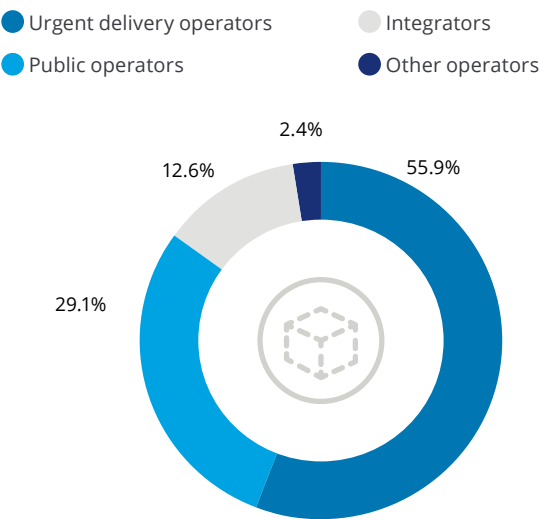
In relation to online supermarkets, although still only 2% of Spanish people buy their food over the internet, this sector has experienced a boom in recent years (27% year-on-year since 2014²⁸).

This increase in demand has led to the entry of new competitors into the Last Mile e-commerce delivery market. They include start-ups that compete digitally with the aim of capturing the surplus demand and providing the most sought after services for consumers through optimised delivery models (ultra-fast deliveries, use of environmentally-friendly vehicles, etc.).

Consumers are increasingly more demanding in relation to the levels of service required in their deliveries

Urgent delivery requests, greater flexibility, greater traceability, home deliveries and lower prices. This situation has led to the diversification of courier companies based on the services offered.

Table 13. Market share based on courier category (2017)



Source: DBK Informa: Sectorial Observatory (courier and parcel delivery sector)

- **Urgent delivery operators:** companies specialising in making express deliveries (within 24-48 hours of placing of the order). This is the type of operator that predominates in the courier ecosystem, with 55.9% of market share. These include large operators such as MRW, Seur, Nacex, Tipsa and ASM.
- **Public operators:** these consist of Correos and Correos Express. Each public company engages in urgent postal and courier services in inner cities.
- **Integrators:** operators that offer all the activities and tasks throughout the supply chain (air transport, warehousing, transport of goods to the final destination, etc.). The main competitors are UPS, DHL or TNT.
- **Other operators:** category that groups independent operators that engage in Last Mile parcel deliveries. These include GLS or ICS.

28. Deloitte Research: see detail in Appendix I (Bibliography)

29. Source: DBK Informa: Sectorial Observatory (courier and parcel delivery sector)

In addition to these differences among courier companies, there are various types of deliverers based on their employment terms and conditions:

- **Permanent/temporary deliverers:** are employed by courier companies. They perform their work under the Road Freight Collective Agreement and receive a salary (subject to income tax and social security, etc.), for delivery using the fleet of vehicles belonging to the hiring company.
- **Couriers:** similar to the aforementioned category, they are employed by courier companies. However, they work under the collective agreement of the courier sector (companies emerging from the B2B courier sector), that gives rise to employment terms and conditions that differ from those of the deliverers described above.

The employees of the company receive a minimum wage (subject to income tax and social security, etc.), but carry on their activity using their own vehicle (prerequisite to being employed), the expenses for which are met by the employees themselves. In exchange, the company pays an amount in relation to mileage and driving expenses.

- **Autonomous deliverers:** independent distribution companies or private deliverers that engage in the transport of goods for another company under a business relationship (service contract), and not through an employment relationship as in the two cases described above.

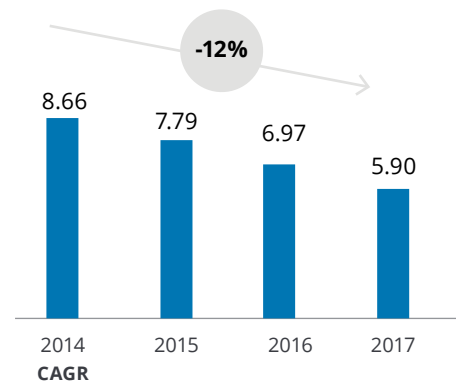
The contracting company pays a monthly amount to the delivery person based on the objectives and the parcels delivered. The self-employed worker meets the vehicle expenses and payment of the corresponding taxes.

These various hiring models of deliverers give rise to differences in delivery costs for courier companies, so that delivery costs will be higher for some of them in spite of engaging in the same activity.

In particular, the high demand for home deliveries (+86% of deliveries), causes an increase in logistics costs. Courier companies have a failure rate of between 10% and 15% on the first attempt at home delivery, which means having to make a second delivery and a doubling of the cost. Supermarket home deliveries are those most affected by high costs, as home delivery of food items is between three and four times more expensive than displaying products on a supermarket shelf³⁰.

Also in e-commerce, the operators experience a measure of seasonality of demand in the latter months of the year. The situation becomes more acute on days with special offers, such as the Christmas period or Black Friday, when three times the average daily volume of parcels must be handled. Over those days, companies have to enlarge their staffing requirements to cover the increase in demand and guarantee the delivery time requirements for consumers.

Table 14. Change in the price of deliveries (2014-2017) (EUR/delivery*)



*Average prices subject to a number of conditions and variables.
Source: Spanish National Markets and Competition Commission (CNMC) and Deloitte analysis

Delivery costs play a key role in the consumer's purchase decision, which means that courier companies must reduce the price of their services (-12% year-on-year between 2014 and 2017).

Due to the high levels of service demanded, there is a reduction in the overall profitability of the sector. The survival of smaller companies is in danger as they are unable to meet those levels of service at such low prices, which creates a high concentration in the sector (the five biggest companies account for up to 45% of market share³⁰).

This overall profitability and efficiency of the e-commerce sector is affected, in the main by the absorption of distribution logistics by large offline retailers and online companies, which have their own distribution operations with the aim of exclusively managing their deliveries. As a result, it is increasingly difficult for traditional competitors in the courier sector and distribution companies to maintain their market positioning.

30. Deloitte Research: see detail in Appendix I (Bibliography)

The profitability of food delivery companies is also affected by low prices. Many of them, in spite of reporting large yearly increases, are unable to be profitable and record losses due to the high costs that they must incur on their deliveries. Also, for online supermarkets, home delivery of food items is not profitable as consumers are not willing to pay the extra price that the delivery involves.

Existing infrastructures in Last Mile e-commerce Logistics are Inefficient and lack digitisation

The warehouses used by courier companies lack the digitisation required to manage large volumes of deliveries. Also, the majority of them are located on city outskirts, far from end delivery points. This necessitates long journeys, a greater number of routes and using more vehicles with less load capacity (the average occupied capacity of delivery vehicles is approximately 40%³¹), to be able to deliver orders to each consumer.

The fleet in use is old and highly polluting:

The use of highly polluting and large vehicles is still common (except for food delivery, where bicycles and motorcycles are mostly used). In the case of courier companies, 87% of deliveries are made using vans, while only 1% are made with bicycles or tricycles³². Also, supermarket home deliveries use large sized vehicles due to the high volume of food that they have to transport. These fleets pose a problem when environmental sustainability and urban traffic congestion reduction have become number one priorities for public authorities, which impose mobility restrictions on these polluting vehicle categories.

In order to meet the challenges of last mile e-commerce logistics, players responsible for deliveries must commit to new logistic models that are economically more profitable, with less impact on urban traffic congestion and are more environmentally sustainable.



Particular challenges of Last Mile e-commerce logistics

1

Create efficient operating models to cope with volume increases

2

Improve profitability in order to meet the required service levels and remain price competitive

3

Transform infrastructure and digitisation processes to increase competition and

4

Transform and modernise the fleet to meet sustainability and congestion requirements

31. Deloitte Research: see detail in Appendix I (Bibliography)

32. Spanish National Markets and Competition Commission (CNMC). Analysis of the postal and the courier and parcel delivery sectors

4. Solutions in Last Mile logistics

Enablers of the transformation

New models and solutions in Last Mile logistics

Solutions in Last Mile logistics

Enablers of the transformation

To define new logistics models for the optimisation of Last Mile logistics, a number of significantly influencing enablers of the transformation have been identified. These enablers are included in the various logistical models and make it possible to ad-

dress the aforementioned challenges of environmental sustainability, reduction of urban traffic congestion and improvement of logistical efficiency. The four most significant enablers of the transformation are:



Infrastructure

In recent years, public authorities, distributors and couriers have been forced to invest in improving and optimising the infrastructure that serves Last Mile logistics. This infrastructure is defined as those logistics assets, both publicly and privately owned (distribution centres, warehouses, smart lockers, loading and unloading areas, road networks, airports, etc.) that form the network through which Last Mile deliveries are made. Among all the logistics assets, warehouses, lockers and loading and unloading areas are of particular importance.

- **Warehouses:** the logistics real estate market is in full expansion. As a result, in 2019 in Spain, almost two million m² of logistics real estate was rented and between EUR 1,300 million and EUR 1,500 million was invested, compared to a mere one million m² and EUR 800 million three years ago³³.

It is important to consider the current situation of and the plans of action for public infrastructures, in which significant investments are being made. Clear examples of this are the creation of a large logistics complex, the creation of offices in Barcelona and the real estate plan of the Adolfo Suárez-Madrid Barajas Airport.

The first example is promoted by the Spanish public airports and aviation agency (Aena) and will entail an investment of EUR 1,264 million. The complex will include an area of 75 hectares dedicated to e-commerce. The project is expected to be completed within 20 years³³.

The Barajas real estate plan includes logistics centres that will play a significant role, accounting for 1.4 million m² of the total 2.7 million. This plan will transform Madrid's airport area into Spain's largest logistics hub with an investment of EUR 1,096 million. Attracted by this public investment, there are many companies interested in participating in the project in order to strengthen their presence in Barajas thanks to the opening of the international logistics hubs.

- **Lockers:** parcel delivery and collection boxes accessible at all times and located in strategic sites around the city, for example in densely populated districts, shopping centres, metro stops and large offices. Users can collect

their parcels from the locker they have selected by using a personal access code sent previously to their mobile phones.

This is an infrastructure in the early stages of development in Spain, since there are currently approximately 10,000 lockers, whereas in France, for example, there are more than 60,000³⁴. However, investments in this type of infrastructures have been growing rapidly in recent years. An example of this is Citibox, which aims to have 300,000 collection boxes in private buildings in Madrid, for which it will invest EUR 26 million³⁴.

- **Loading and unloading areas:** the existing loading and unloading areas in Spanish cities are not capable of absorbing the large volumes of Last Mile deliveries and collections, which generates an increase in congestion in Spanish cities when illegally delivering (double parking). As a solution to this problem, public authorities are investing mainly in digital platforms, which improve these infrastructures. In particular, the Madrid City Council is outlining measures that include the reservation of parking spaces for this type of area through an electronic parking ticket, enabling the user to know the time of use of the spaces assigned and, therefore, improving the management thereof.

To undertake the transformation through this enabler of transformation, the private agencies involved in Last Mile deliveries can either try to grow organically through internal development and own investment, or acquire or enter into a partnership with start-ups that have disruptive infrastructures, such as Mayordomo, a start-up that installs smart collection boxes in office and residential buildings.

There is an urgent need for the public authorities to invest and modernise the infrastructures for them to meet the current needs of Last Mile logistics.

Having adequate infrastructures, situated in optimal locations and with greater digitisation, is crucial to transforming Last Mile logistics, helping to improve levels of environmental sustainability, urban congestion and logistics efficiency.

33. Alimarket (2019). Logistics projects: New golden age

34. Deloitte Research: see detail in Appendix I (Bibliography)

Technology

There are numerous technologies and new technology companies that are transforming the supply chain. It is essential to integrate them into the Last Mile logistics digitisation process in order to meet the high demands of consumers.

The main technologies are listed below according to their degree of maturity:

Table 15. Last Mile technology trends



Technologies in use

New communication channels

The need to offer an omnichannel experience (unified in any type of channel used) highlights the importance of providing new methods of communication with customers. An example of this are chatbots, which enable completely digital and effective communication with the customer.

Geolocation services

The blockchain geolocation and traceability services enable us to know the route and location of a parcel in real time. By using this technology, couriers will be able to offer consumers the option of making changes with respect to the point of delivery and, in turn, will be able to optimise their route and reduce delivery costs, as well as ensure traceability and the origin of packages. Currently, more than 90% of short distance couriers do not have this technology³⁵.

Dynamic / Big data

Big data (mass storage and management of information) is a technological advance, the aim of which is the efficient management of information in order to transform it into specific and useful data to make correct decisions. Specifically, big data can help logistics companies to reduce costs by up to 50%³⁵.

Smart lockers

Smart lockers save couriers EUR 0.8/parcel, as a result of standardising delivery routes and eliminating failed deliveries. However, only 4% of Spaniards use this service³⁵.

Electric scooters

Electric scooters prioritise fast and non-polluting mobility to locations where larger vehicles cannot access. In this context, the e-commerce sector is the most capable of implementing this trend, reducing emissions caused by Last Mile deliveries by up to 70%³⁵.

35. Deloitte Research: detalle en Anexo I (Bibliografía)

2020



Reusable packaging for e-commerce

Reusable packaging is returned to a mailbox or smart box so that distributors can reuse them. This type of packaging reduces the environmental footprint to just 37 grams of CO₂ per parcel, whereas plastic packaging can generate up to 400 grams per parcel³⁶.



Mobility platforms

Data and information on mobility in cities are centralised on servers external to the companies so that everyone can have easy access (open data). These platforms can be used to manage routes efficiently and adapt them to the varying mobility circumstances that may occur in each of the deliveries.



Electrical vehicles and other alternative fuels

Electric motors and alternative fuels (ethanol, methanol, natural gas, propane and hydrogen) are gaining importance as congestion increases and access restrictions arise in cities. In order to reduce emissions by 50%, electric vehicles must be used for light goods transportation³⁷.

2024



Drones

Delivery drones enable e-commerce parcels to be delivered much more quickly and with a significant reduction in costs. Drones can currently deliver parcels that weigh between two and five kilograms. The implementation of this technology would enable up to 60% of all parcel deliveries to be made by drones, reducing significantly the number of vehicles in cities³⁶. Regulation is a crucial matter that must be considered and the use of drones for delivering parcels within cities remains to be seen.



Autonomous vehicles

The ability of a vehicle to intelligently transport itself to its final destination can save on staff costs, the parcel can be delivered at a time that suits the customer and it can avoid route errors. There are already company prototypes that use high levels of autonomous vehicle driving.



Robotisation

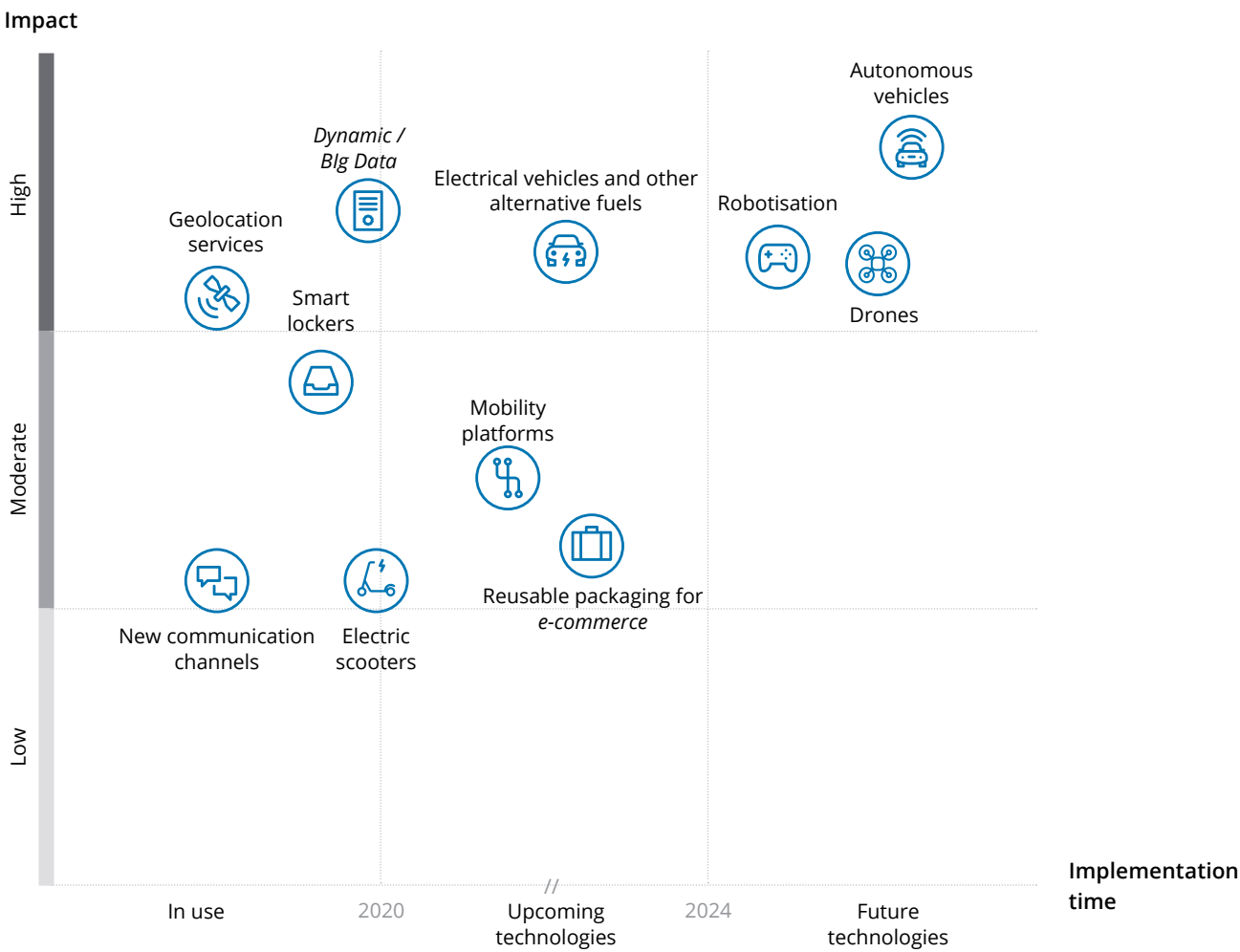
The use of automated warehouses will eliminate the need to include passageways for manual workers and, therefore, will increase the space available for storage by up to 50%. Also, replacing personnel in the warehouse with robots would give rise to cost savings of approximately 20%³⁶.

36. Deloitte *Research*: detalle en Anexo I (Bibliografía)

37. Deloitte. Un modelo del transporte descarbonizado para España en 2050

The technologies identified have been categorised in the table below according to their impact on the challenges faced in Last Mile logistics (environmental sustainability, urban congestion and logistics efficiency) and the time required for their implementation.

Table 16. Impact of the technology trends



Source: Deloitte analysis

The technological tools in use must be urgently implemented in Last Mile logistics in order for the benefits to be reaped as soon as possible. It is also necessary to continue developing and preparing an implementation plan in logistics for the technologies that are more disruptive (delivery drones, autonomous vehicles, etc.), since they are the tools that may have the most impact on optimisation of the Last Mile.

Start-ups

In recent years, a large number of new companies and start-ups have emerged with the aim of taking advantage of a changing logistics ecosystem. Many of these companies have achieved great success through the implementation of technological trends and have captured part of market growth.

The most significant start-ups in the market can be broken down into 4 main groups according to the activities they carry on:

- **Food delivery:** start-ups that have grown rapidly in recent years (+20% in 2018 to surpass EUR 600 million³⁸), spurred on by huge consumer demand. A feature common to all competitors in this group is low profitability, since the margins are impaired by high delivery costs. Glovo, Just-Eat, Uber Eats and Deliveroo are the most notable in this group.
- **New couriers):** new competitors in the Last Mile logistics sector that are responsible for carrying out the delivery processes through the use of more automated and digitised logistics fleets and systems. Examples include: Instapack, Kiwi Last Mile and Stuart. Other start-ups are more focused on competing by differentiating themselves through their zero emissions image. An example of this is Xiclo.
- **Development of logistics assets:** start-ups that install infrastructures (micro-hubs, lockers, etc.) and technological assets (ground robots) to optimise Last Mile logistics. Geever, PINC, Citypack and Mayordomo are the most representative of this group, as well as RePack and LoadHog, leaders in the development of reusable packaging.
- **Logistics optimisation:** companies that aim to improve the management of the Last Mile logistics, using digital and collaborative platforms in the supply chain. Examples of this type of company include Nektria, Last Mile Team, Parkunload, 300.000 km/s, Masternaut and Pulpomatic.

The growth and popularity of some of these start-ups demonstrates the need to implement new technologies in Last Mile logistics models. Many of these new companies may currently be a threat to traditional distribution companies and couriers, which must digitise their supply chain if they do not want to be left behind in the transformation process of the sector.

New technologies must be adopted by distributors and couriers in order to compete -efficiently and to a high quality-with the start-ups and offer improved levels of service to the consumer



38. DBK informa. Sectorial Observatory (food delivery)

Regulation

Public authorities play an important role in implementing new Last Mile logistics models. Their ability to legislate through regulations and municipal bylaws that enable the transformation of the sector has a significant influence. However, the current regulatory framework shows certain inefficiencies that significantly complicate the planning and efficiency of Last Mile logistics:

- **Uniformity in regulation:** there are various guidelines that affect the logistics and transport of goods. Uniformity occurs at two levels: territorial, since there are different regulations in each of the country's cities; and institutional, since city councils, autonomous community governments, the central government and even European bodies are responsible for legislating in these areas.
- **Reactive regulation:** with regard to mobility logistics, public authorities usually react somewhat late and to tackle existing inefficiencies, instead of acting more proactively and with the cooperation of the parties involved.
- **Little cooperation with the sectors involved:** public authorities focus on seeking citizen welfare. However, they rarely cooperate with the sectors and companies involved in the logistics and transport of goods when developing regulations that impact those involved.

As a result of this regulatory action, a tense situation has arisen in recent years, as recent regulations have implemented restrictions on the current logistics models of distributors and couriers, who are finding it increasingly difficult to deliver parcels. Future regulation must remedy these inefficiencies and adapt to the new environment in order to promote the transformation of the sector through new logistics models.

Public authorities must adapt their future regulations to enable the implementation of models that optimise Last Mile logistics, while guaranteeing the welfare of citizens.

Examples of mobility regulations recently enforced in large cities³⁹:



Barcelona *Low emission zone*

Creation of the low emission zone, an area of 95 km² that polluting vehicles have not been able to access since 1 January 2020.



Madrid *Air quality and climate change plan*

Creation of Plan A, the Air Quality and Climate Change Plan for Madrid. Plan A focuses on the "Madrid Central" area, which restricts the entry of polluting vehicles into the city centre.



Bilbao *Speed limit*

In 2018 the city council limited the speed limit to 30 km/h on most of the city's roads in order to reduce accidents, noise and pollution.

39. Deloitte Research: see detail in Appendix I (Bibliography)

Cooperation

Tight margins and the growing need to offer hyper-services at lower prices, are leading distributors and couriers, who perform Last Mile logistics, to look for solutions outside their own business practices. One solution to the matter is the cooperation with other agents also involved in delivering goods. As a result of this interaction, there are various associations forming:

Manufacturer - distributor cooperation

This seeks to eliminate inefficiencies in the distribution system, reducing costs and increasing the satisfaction of the end consumer through optimisation of two main areas:

- **Advanced planning of the services offered:** through more advanced communication and the use of applications, it is possible to minimise the time taken to manage orders, maximise efficiency in warehouses and reduce costs.
- **Demand stimulation:** by cooperating in customer information management, the commercial capacity of the agents in the supply chain can be improved.

Cooperation among distribution companies

To reduce costs, some of the main distribution agents must work together and implement innovative measures.

An example worthy of note is LOGICOM 4.0, an inter-platform solution that integrates and digitally manages transport documentation. Also, it is offered as a standard platform for the market which is capable of providing traceability of any delivery in real time. This innovative solution was the result of a joint project by a consortium of logistics operators, supported by the Spanish Ministry of Economy, Industry and Competitiveness, under the control of the Innovation Centre for the Logistics and Transport of Goods 40(CITET).

Cooperation between the sectors of activity and public authorities

Cooperation between private entities that carry on their activities in the Last Mile and the regulating public authorities is a key factor in encouraging change in Last Mile logistics. The following are examples of this type of cooperation:

- **Madrid:** various companies with an impact on Last Mile logistics worked with the Madrid City Council and the Madrid Municipal Transport Company (EMT) to create a consolidation centre in which the delivery routes are centralised and subsequently performed with electric vehicles.
- **Barcelona:** the Barcelona City Council worked alongside the company Vanapedal (goods transport with tricycles) for the management of a platform that functions as a loading and unloading bay from which the delivery of goods can be made in the Ciutat Vella district.
- **Copenhagen:** distribution companies worked with the Copenhagen City Council and the Danish Transport Authority to create a consolidation centre on the outskirts of the city.
- **London:** creation of an urban consolidation centre in Edmonton to centralise shipments from a single point.

Cooperation among public authorities and agents and companies in the sectors of activity is key to regulating and efficiently implementing the new Last Mile logistics models.

New models and solutions in Last Mile logistics

In order to face the challenges of Last Mile logistics, this study proposes a total of 11 new logistics models.

1 Urban hubs

Small, highly-responsive depots in urban centres

2 Network of delivery points

Smart lockers and access points

3 Loading/Unloading areas

Digital platform managing loading and unloading areas

4 Electrification of fleets

Electric vehicles delivering within cities

5 External logistics provider

Distributor of goods specialised in delivery

6 Night-time distribution

Night-time delivery of goods

7 Urban consolidation centres

Large, cooperative and automated logistics centres

8 Load pooling

Collaborative loading digital platform

9 Mobility restrictions

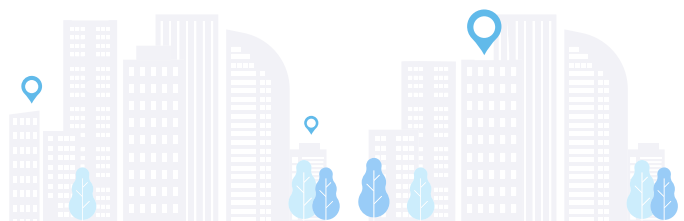
Digital data base displaying current regulations

10 Public transport deliveries

Delivery using Spanish public underground and train networks

11 Telemetry systems

Driving and delivery route measurement systems



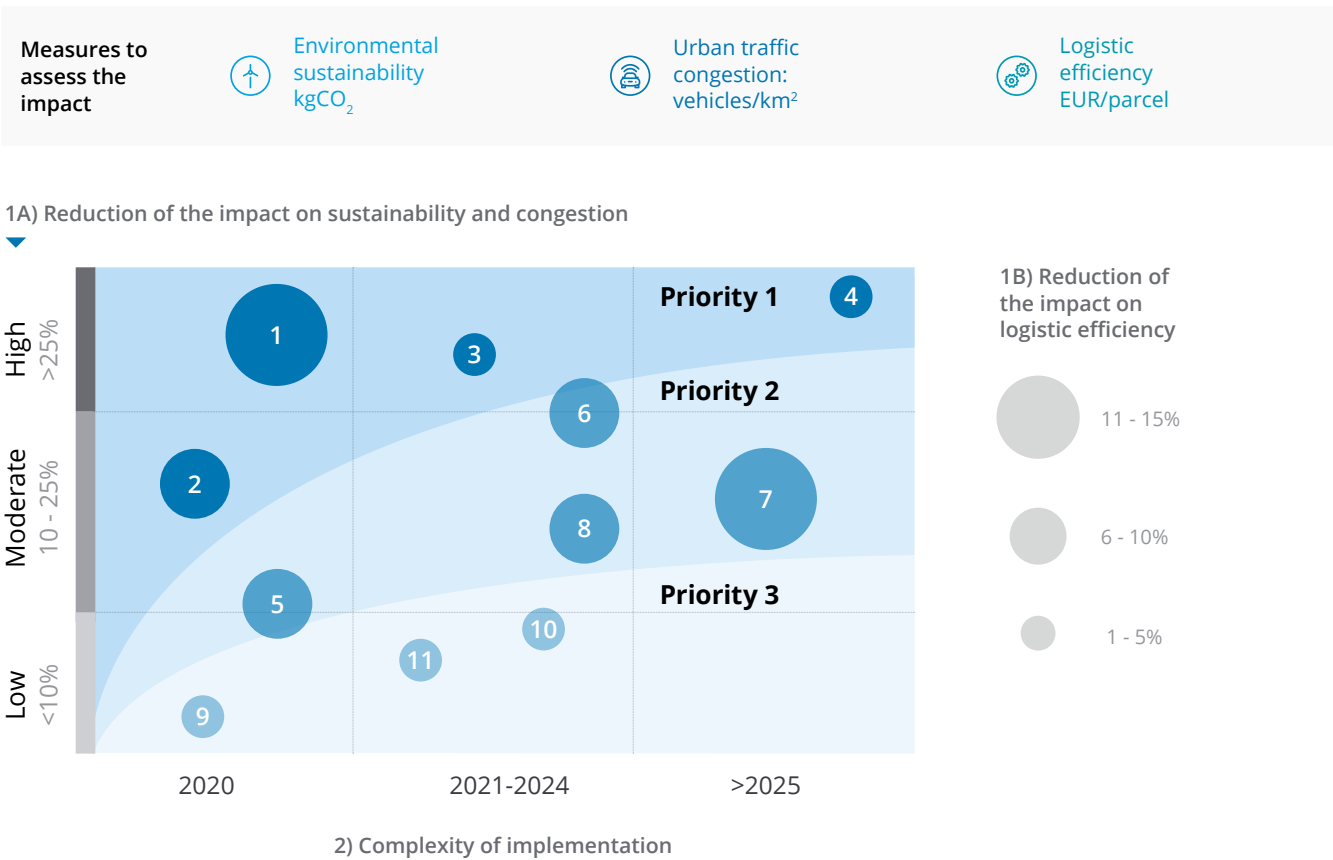
The models have been classified based on two areas:

- **Impact on the Last Mile challenges:** with the aim of assessing each model, the effect of each one on the different challenges has been weighted, taking into account the improvement of logistics efficiency, environmental sustainability and urban congestion in the same measure.
- **Implementation complexity:** the second parameter used was the ease/complexity of its implementation from a perspective of time, effort and the resources required for the development of the new model.

Each one of these challenges has been measured on the basis of a specific indicator:

- Environmental sustainability: kgCO₂ emitted per parcel delivered.
- Urban traffic congestion: delivery vehicles/km²
- Logistic efficiency: cost EUR/parcel

Table 17. New proposed models in Last Mile logistics



Source: Deloitte analysis

Urban hub solutions, the management of loading and unloading areas, the creation of a network of delivery points and the electrification of fleets are the most significant models.

Priority 1

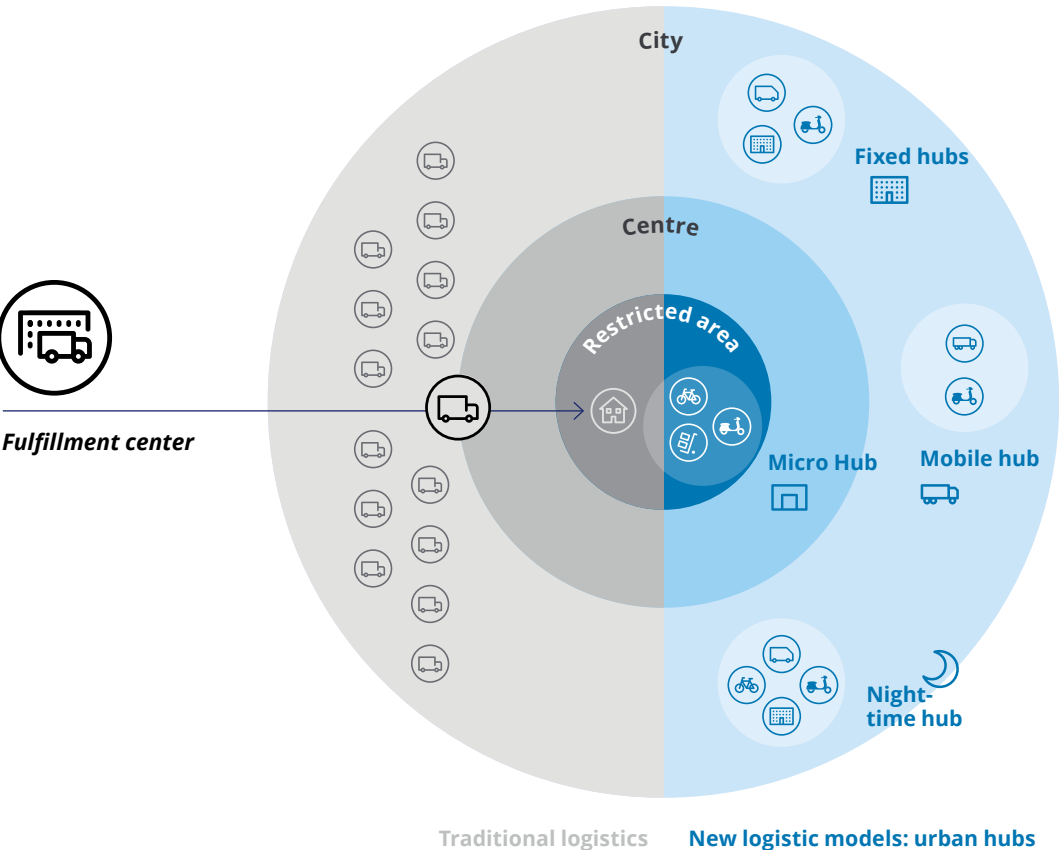
1. Urban hubs

This new logistics model is key and it will enable the traditional distribution model in large cities to be completely transformed. Currently, the delivery of e-commerce parcels is performed using large vehicles (mainly vans) that transport the goods from the fulfilment centres, located on the outskirts of the city, to the homes of consumers. This distribution causes a large number of vans to be present in different urban areas, even in the restricted areas of the city centre.

The urban hub model proposes the installation of different types of warehouses within the cities where the cross-docking (collection and classification) of the merchandise is carried out to send it, from these warehouses, to the delivery points. The main aim is to bring the goods closer to their destination, speeding up the supply process and satisfying the high levels of service requested by consumers. Also, the possibility of using more environmentally friendly and smaller delivery vehicles (motorcycles, electric bicycles, etc.) enables an improvement in levels of environmental sustainability and urban congestion.



Table 18. Traditional logistics and the urban hub model



Four different types of urban hubs have been identified in order to face the transformation of the traditional logistics model, which are based on different variables present in cities, such as population size and density, the existence of access and environmental restrictions and the volume of goods and the type of fleet needed for distribution:



Fixed hubs

Warehouses located at strategic points in the city, approximately 2 km from the city centre. This type of warehouse is necessary in large cities where there is a high volume of goods to be stored and transported.

Due to the greater proximity to the final delivery points, it is possible to include motorcycles in the delivery fleet to complement the traditional fleet of vans.

Size
(m²)

Distribution
coverage
(km²)

200 - 1500

6,4 - 11



Mobile hub

This is a large truck that serves as a mobile warehouse. Goods are transported via access routes into the city. The hub truck unloads the orders at strategic points, and motorcycles are used to deliver them in the narrowest and most congested areas.

n.a

n.a



Night-time hub

Car parks close to the city centre are used as warehouses. Cross-docking takes place here during the night so that the goods can be delivered in the early hours of the morning, taking advantage of the lower levels of traffic congestion.

The close proximity of these car parks to the final delivery points results in the possibility of combining delivery by van with the use of motorcycles and bicycles/electric scooters.

50-150

1.5 - 3.2



Micro-hub

They are small warehouses located within the city centre, bringing the goods as close as possible to the end customers in these areas where there are environmental access restrictions and significant urban traffic congestion.

To avoid large vehicles entering these city centres, deliveries of parcels from this type of hub are made by means of deliverers on foot or with the use of bicycles/electric scooters or motorcycles

200 - 1500

6,4 - 11

The main companies in Spain already use urban hubs, most of which are fixed hubs. Also, the start-up Geever has implemented this solution in Barcelona, with 40 micro-hubs in car parks and at strategic points in the city, which are filled with parcels during off-peak hours (midday and early morning). This start-up also performs same day cross-docking (collection and classification) and parcel delivery⁴¹.

41. Deloitte Research: see detail in Appendix I (Bibliography)

Table 19. Impact of urban hubs on the Last Mile challenges

Positive impact			
	Environmental sustainability	-24% KgCO ₂ /parcel	Use of sustainable vehicles adapted to the type of hub, reducing CO ₂ emissions and increasing environmental sustainability .
	Urban traffic congestion	-27% Vehicles/km ²	Use of vehicles of a smaller size, such as bicycles and motorcycles, reducing urban traffic congestion .
	Logistical efficiency	-13% €/parcel	Lower parcel delivery times as they are closer to the end consumer, increasing logistics efficiency .

The companies involved in Last Mile logistics must invest in different types of urban hubs in order to achieve improved levels of efficiency in deliveries.

2. Network of delivery points

The network of delivery points comprises two types of PUDOs (pick-up and drop-off points): access points (use of establishments and premises such as shops or petrol stations to deliver and pick up orders) and smart lockers.

Although the two options are conceptually similar, they have certain distinguishing features. For example, access points enable the delivery of larger products that do not fit in smart lockers, which are smaller.

Currently, **this model is seldom used in Spain; only 10% of deliveries are made to delivery points and only 4% to smart lockers⁴²**. Home delivery is the preferred formula used by Spaniards, which gives rise to high costs for e-commerce distributors. In addition, approximately 10-15% of deliveries fail⁴², which increases the total costs because of the need to repeat the deliveries.

Also, the smart locker option is not available to all competitors since they are owned by only some of them and they do not constitute a global network shared among the distributors. In actual fact, only 31% of online stores offer the possibility of delivery to PUDOs⁴².

Start-ups such as Citibox are an example of this solution. It has more than 7,000 parcel boxes and has set up a network of smart lockers in large cities such as Madrid and Barcelona⁴².

It will be necessary to make investments and to incentivise consumers (for example, through promotions or delivery price savings) to foster the use of a more extensive network of delivery points in Spain.

Table 20. Impact of the network of delivery points on the Last Mile challenges

Positive impact*			
	Environmental sustainability	-20% KgCO ₂ /parcel	Reduction in the number of kilometres covered for deliveries, which decreases CO ₂ emissions and improves environmental sustainability .
	Urban traffic congestion	-22% Vehicles/km ²	Existence of standard routes to delivery points, which reduces urban traffic congestion .
	Logistical efficiency	-9% €/parcel	Reduction in the time employed for deliveries, which decreases costs and increases levels of logistical efficiency .

*Impact when 35% of deliveries are to smart lockers and convenience points

The creation of cities with a cooperative model of delivery points will allow distributors and couriers to optimise delivery routes and reduce e-commerce delivery expenses.

42. Deloitte Research: see detail in Appendix I (Bibliography)

3. Loading/unloading zones

Urban freight distribution (UFD) loading and unloading zones are used on working days for the supply and delivery of goods mainly in the HORECA channel. This industry makes most of its stops in areas of high-density population and requires UFD zones to be able to unload goods without having a negative impact on traffic congestion in cities.

Most Spanish cities have an obvious shortage of such zones and the inefficiencies of their management are clear. In the HORECA sector alone, approximately 40% of stops are illegal, since they involve double-parking or exceed established time limits in loading and unloading zones⁴³.

Table 21. Current use of loading and unloading zones in Madrid's HORECA sector

Reception time

Hours required/establishment
Hours available/establishment

Source: Madrid City Council and Deloitte analysis




Taking into consideration the HORECA sector alone, in the case of Madrid more than double the current available capacity would be required in view of existing zones and establishments.

In view of the complexity of increasing the number of loading and unloading zones in cities, **the optimisation of the use of existing UFD zones is recommended through digitalisation and the creation of a platform for this purpose.** The municipal authorities would be responsible for promoting and creating such a platform.

The web platform or software application must be equipped with geolocation systems to make it possible to view the loading and unloading zones in real time. A system of sensors must also be installed in these zones to enable the ascertainment of the availability thereof at any time. This platform may be used by deliverers to plan their route in accordance with the availability of loading and unloading zones in order to avoid illegal stops and to reduce urban traffic congestion.

In addition, the platform or application will allow the deliverers to reserve available loading and unloading zones for a limited period of time, the aim being to ascertain the exact time at which the goods will be unloaded, which will reduce the overall delivery time and increase the level of service provided to the establishments, the professionals of which will have a more reliable idea of when they will have to deal with their distributors.

Table 22. Impact of the loading and unloading zone digital platform on the Last Mile challenges

Positive impact			Improvement in the management of journeys and stops, which reduces CO ₂ emissions and increases environmental sustainability . Reduction in double parking and loading and unloading zone occupancy times, which improves urban traffic congestion .
	Environmental sustainability	-17% KgCO ₂ /parcel	
	Urban traffic congestion	-30% Vehicles/km ²	
	Logistical efficiency	-5% €/parcel	

The public authorities must work with distributors to implement loading and unloading zone management platforms to enable the optimisation of their use, a reduction in traffic congestion and the environmental sustainability of cities.

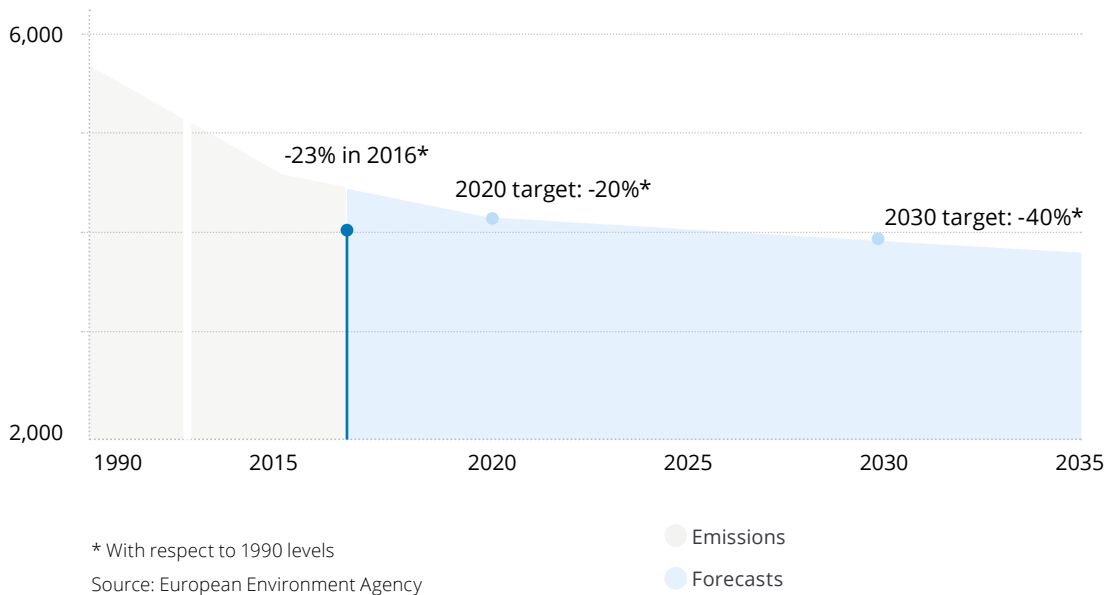
43. Deloitte Research: see detail in Appendix I (Bibliography)

4. Electrification of the vehicle fleet

In order to combat climate change, as part of the Paris Agreement on climate change EU leaders committed to a reduction of 20% in greenhouse gas emissions (GHG) by 2020 and of 40% by 2030, with respect to emissions in 1990. In 2016, GHG emissions had fallen by 23% and, with the application of existing measures, new forecasts indicate that emissions will be 26% lower in 2020.

Table 23. GHG emissions and forecasts in the EU (2016)

Millions of tonnes of CO₂ Eq



Goods transport accounts for 10% of global CO₂ emissions and 25% of total emissions in Spain⁴⁴. The urban pollution problem is exacerbated by the average age of the vehicle fleet, which is 12.42 years. In addition, 61.6% of passenger cars and 73.2% of trucks are more than 10 years old⁴⁵.

Specifically, in the city of Barcelona, the average age of the fleet of trucks and vans is 13 and 15 years, respectively. GHG emissions from these vehicles are two to three times higher than those from new vans and six to seven times higher than those from electric models⁴⁶.

In order to greatly reduce these pollution figures from goods transport, it is essential for the public authorities to draw up a plan to establish the use of electric vehicles for urban goods distribution.

Over the 2017-2018 period, there was a substantial increase in green vehicles (electric vehicles, hybrid vehicles, etc.). Approximately 75,000 green vehicles were registered in 2017 and in 2018 the figure went up to 121,000. Also, the forecast is for an increase in the total number of electric vehicles in the coming years together with a reduction in the use of conventional passenger cars.

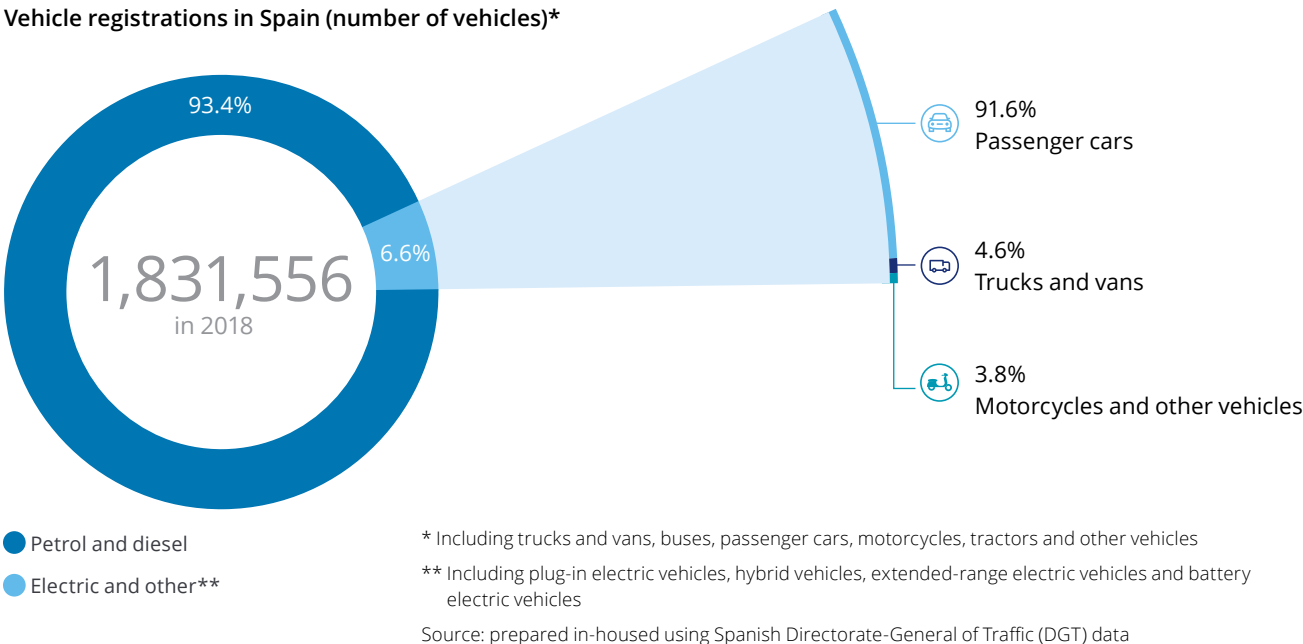
44. European Environment Agency

45. Deloitte Research: see detail in Appendix I (Bibliography)

46. Deloitte. Energy sustainable cities: urban energy transition 2030

Table 24. Vehicle registrations by type of vehicle (2017-2018)

Vehicle registrations in Spain (number of vehicles)*

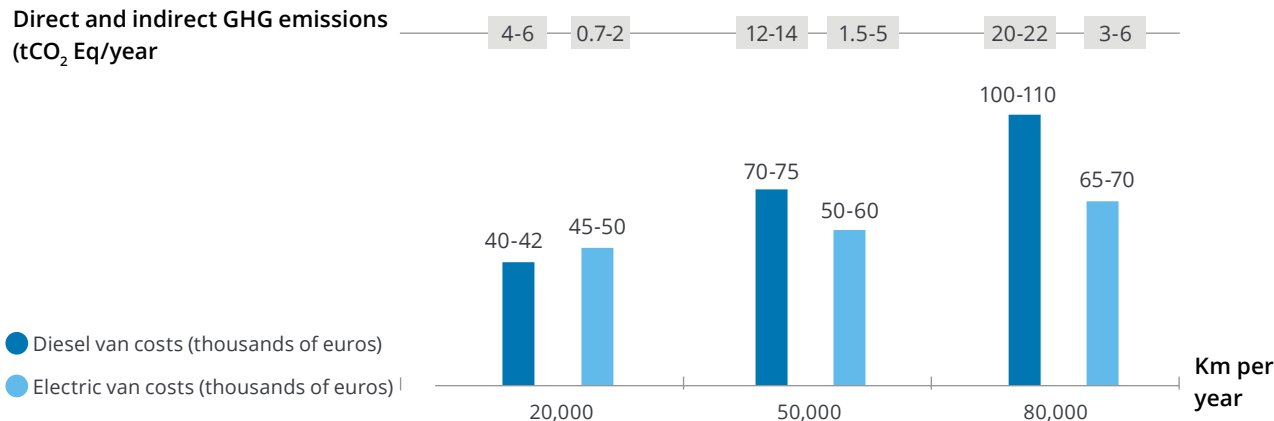


The use of green vehicles for goods transport is still at a very early stage. The percentage of green delivery vehicles is currently very low (4.6% of all green vehicles), although it is trending upwards.

Some companies such as FM Logistic have developed concentrated natural gas, hybrid and electric heavy vehicles, and other start-ups such as Instapack have promoted the use of vehicles of a smaller size such as bicycles and electric scooters.

For the purpose of the environmental transformation of the stock of delivery vehicles, it is essential for the authorities to facilitate the use of fleets that are as sustainable as possible, either by adapting traffic flows, through discriminatory taxation, or by installing charging points to promote electric vehicles. This study compared the cost and GHG emissions of electric vans used for last mile deliveries with those of delivery vans currently in use.

Table 25. Comparison between the total cost and emissions of electric vans and diesel vans by kilometres driven per year






Source: Monitor Deloitte Energy sustainable cities: urban energy transition 2030

The investment required to make the vehicle fleet sustainable generates a higher cost when kilometre usage is low. However, the more the electric vehicles are used, the more the reduction in marginal costs arising from fuel savings leads to a reduction

in total costs in comparison with diesel vans (-35% over 80,000 km). Moreover, **polluting gas emissions from the use of electric vans are reduced by more than 70% from the moment they are first driven.**

Table 26. Impact of the electrification of delivery vehicle fleets on the Last Mile challenges

Positive impact*			
	Environmental sustainability	-29% KgCO ₂ /parcel	Use of electric vehicles that reduce GHG emissions, which increases environmental sustainability.
	Urban traffic congestion	- Vehicles/km ²	Not applicable.
	Logistical efficiency	-2% €/parcel	Lower costs as a result of fuel savings, which improves logistical efficiency.

*Impact when 40% of current vans are replaced with electric vans

In order to comply with the regulations and reduce pollution levels, it is essential for the public authorities to assist companies in making the investments required to replace their fleets with electric vehicles.

Case study: Madrid

In order to demonstrate the impact of the solutions proposed, a decision was taken to **model the situation of parcel delivery from e-commerce in Madrid⁴⁷**, by comparing current Last Mile logistics with a combined solution of urban hubs, the use of

smart lockers (delivery point network) and partial electrification of the current delivery vehicle fleet. These three solutions were selected because they are “priority 1” and may be applied to the delivery of e-commerce parcels.

Table 27. Solutions modelled in the Madrid e-commerce case study

	HORECA	E-commerce
1 Urban hubs	⊗	✓
2 Network of delivery points (smart lockers)	⊗	✓
3 Loading/Unloading zones	✓	⊗
4 Electrification of vehicle fleets	✓	✓

- Modelled Priority 1 solutions

Last Mile logistics in Madrid currently work on the basis of a traditional framework, with large classification and delivery centres located on the outskirts of the city in municipalities such as Coslada, San Fernando de Henares, etc. These are high-capacity and high-volume fulfilment centres. Access is gained from these centres, always by van, to the various urban centres using routes of 125km per day/vehicle with long delivery periods.

The table below shows the current logistics setup in Madrid and its main figures:

Table 28. Current Last Mile logistics in Madrid



*Calculated out of a total of 600 km² in Madrid.

**This figure is an average that includes various costs (fuel, maintenance, depreciation, insurance, rent, personnel, digitalisation and other), which are wide-ranging and may vary in accordance with each specific case.

47. References to data and assumptions are detailed in Appendix II

Main data

	600 Surface area (km ²)		3.22 Million inhabitants
	1,568 Vans (units)		200,000 Kilometres covered
	124,500 Demand (parcels/day)		207 Density (parcel/km ²)
	Approx. 1,150 #smart lockers		<4% %use of lockers

All of which gives rise to the following indicators:

	Environmental sustainability 0.39 Kg CO ₂ /parcel
	Urban traffic congestion 2.61* Vehicles/km ²
	Logistical efficiency 2.40** €/parcel

Urban hubs

The urban hubs model aims to provide the centre of Madrid with the infrastructure required for local delivery, which would clearly reduce the aforementioned indicators. To this end, a **combination of solutions** will be used, which will depend on the nature of the delivery. First, Madrid has been divided into three geographical areas each with very different features:

	Metropolitan Outer Ring (beyond the M-30 ring road)	Within the M-30 ring road	Madrid Central
Area	516 km ²	79 km ²	5 km ²
Parcels / km ²	170	353	966

It is therefore, a question of finding **tailored solutions** for each of these zones, since each has its own demand, geographical structure and specific issues. The first task is to define the type of hub to establish in each of the zones in accordance with its capacity, scope and distribution coverage.

Madrid Central

Madrid Central has the highest concentration of parcels to be delivered in a very small area of just 5km², which is densely populated and has municipal traffic restrictions in place. The best solution is, therefore, the choice of **micro-hubs**, because they require less urban land and work with a sustainable fleet of vehicles: deliveries on foot, bicycles and, in some cases, motorcycles.

Within the M-30 ring road

The second geographical area is within the M-30 ring road (excluding Madrid Central), which also has a high population density, although the layout of the area allows for solutions of a larger scale and capacity. As a result, the proposal is for a distribution that combines the aforementioned micro-hubs in certain zones with night-time hubs and fixed hubs located in strategic neighbourhoods and areas.

Metropolitan Outer Ring (beyond the M-30)

The remaining part of Madrid's metropolitan area will operate with fixed hubs of a standard size. Each facility can cater for a delivery area of up to 10 km² and has a surface area ranging from 200 to 1,500 m² of urban land depending on the zone in which it is established.

Taking into consideration the aforementioned division and Madrid's distribution requirements, and in light of the nature of the various types of urban hubs presented, it is possible to define the size of those requirements.

Table 29: Sizing of urban hubs

	Madrid Central	Within the M-30	Metropolitan Outer Ring (beyond the M-30)	TOTAL
# Fixed hubs*	n.a.	4	74	78
# Night-time hubs**	n.a.	6	n.a.	6
# Micro hubs**	5	50	n.a.	55
TOTAL				139

* Fixed hubs: 400 m² on average. ** Night-time hubs and micro hubs: 150 m² on average

The installation of 139 urban hubs with different features in Madrid makes it possible to meet the city's demand for e-commerce parcel services and to achieve improved levels of efficiency as regards the various KPIs. However, it should be noted that there are two major factors required by the facilities: initial investment and availability of urban land.

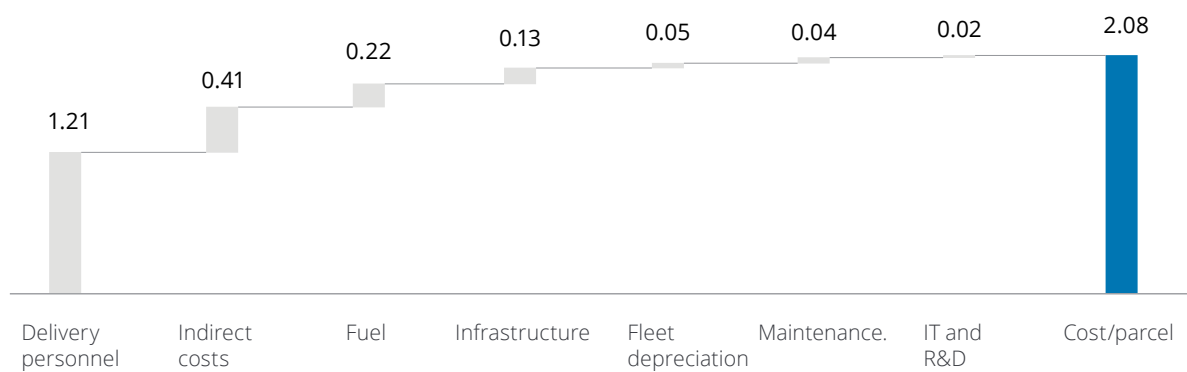
The proposed hubs model achieves a cost structure which is clearly more efficient as a result of the reduction in distances covered, which in turn affects productivity, fuel costs, maintenance, etc. The breakdown of the various cost items inherent to the new model is as follows:

Urban hubs (139 hubs)

 **77**
Investment (M €)

 **40,650**
Surface area of urban land (m²) = 4 football pitches

Table 30: Breakdown of the unit costs of the urban hubs model for Madrid (EUR)



The proposed urban hubs model in Madrid will give rise to savings of approximately

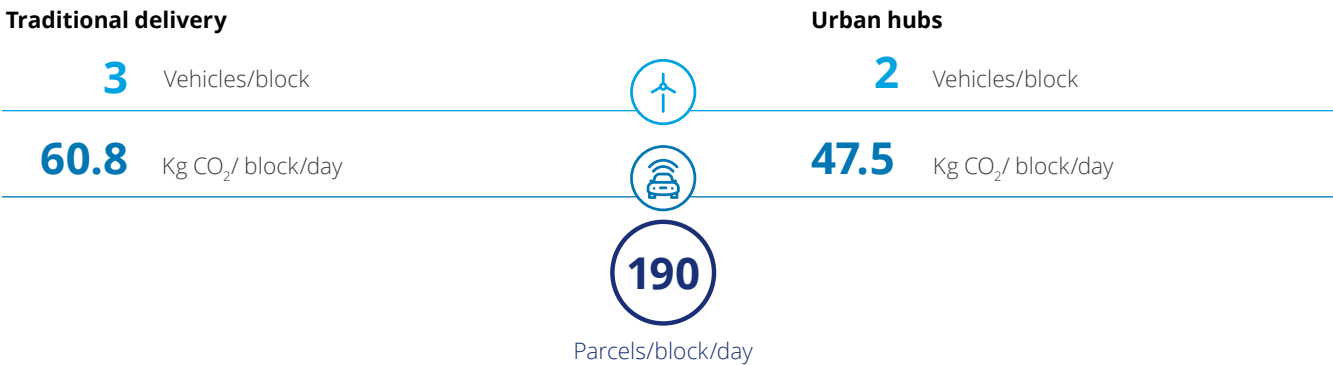
13% per parcel

Therefore, the suggested solution achieves delivery costs of EUR 2.08 per parcel, significantly lower than the EUR 2.40 per parcel using the current model⁴⁸. This leads to enhanced efficiency of 13% as well as an improvement in the profitability of operators, with savings totalling EUR 40,000 per day.

However, these are not the only benefits of the model; since the facilities are better located and smaller, there is a major impact on environmental sustainability and urban traffic congestion, which leads to meaningful improvements in relation to kg CO₂ emitted per parcel and number of vehicles per km² involved in the delivery.

48. This figure is an average that includes various costs (fuel, maintenance, depreciation, insurance, rent, personnel, digitalisation and other), which are wide-ranging and may vary in accordance with each specific case.

As an example, let's take a look at the advantages achieved in the specific case of the Las Tablas neighbourhood:



Smart lockers

Moreover, the increased use of smart lockers as end delivery points could enhance the impact on logistical efficiency of distributors by standardising delivery routes.

For example, the impact on the Last Mile challenges of achieving 35% usage of such lockers for the delivery of e-commerce parcels, compared to 4% currently, was calculated.

In order to reach the 35% usage figure for these lockers, their use must be promoted among consumers. This could be achieved by reducing the distance to be covered by a person to each of them. The approximate average distance to a smart locker in the municipality of Madrid is currently 700 metres, which is 8 minutes on foot. In order to incentivise the use of these delivery points, the optimum situation would be an average distance to them of no more than 300 metres, between 3 and 4 minutes on foot. To achieve this, it will be necessary to install 2,188 new lockers in the city of Madrid.

Electrification of the vehicle fleet

Lastly, the current e-commerce delivery model in Madrid could also be enhanced, mainly in terms of environmental sustainability, through the electrification of the vehicle fleet used for the deliveries. This study calculated the impact of replacing 40% of current delivery vans with electric vans, which would require an investment of approximately EUR 15.7 million.

The proposed scenario is the **combination of these three models** (urban hubs, smart lockers and vehicle fleet electrification) for e-commerce deliveries. The proposal would be for parcels in different areas of Madrid to be delivered from urban hubs using various means such as motorcycles, bicycles, deliveries on foot and a partially electrified fleet of vans (40%) along routes that take a larger quantity of these parcels to smart lockers (35% of deliveries). The impacts in this case would be as follows:

45-60%
reduction in
emissions

28-40%
improvement in urban
traffic congestion

20-25%
decrease in logistics
costs

Priority 2

5. External logistics provider

An external logistics provider is a distributor of goods specialised in this type of services and independent of the company, which receives purchase orders and processes the delivery of parcels.

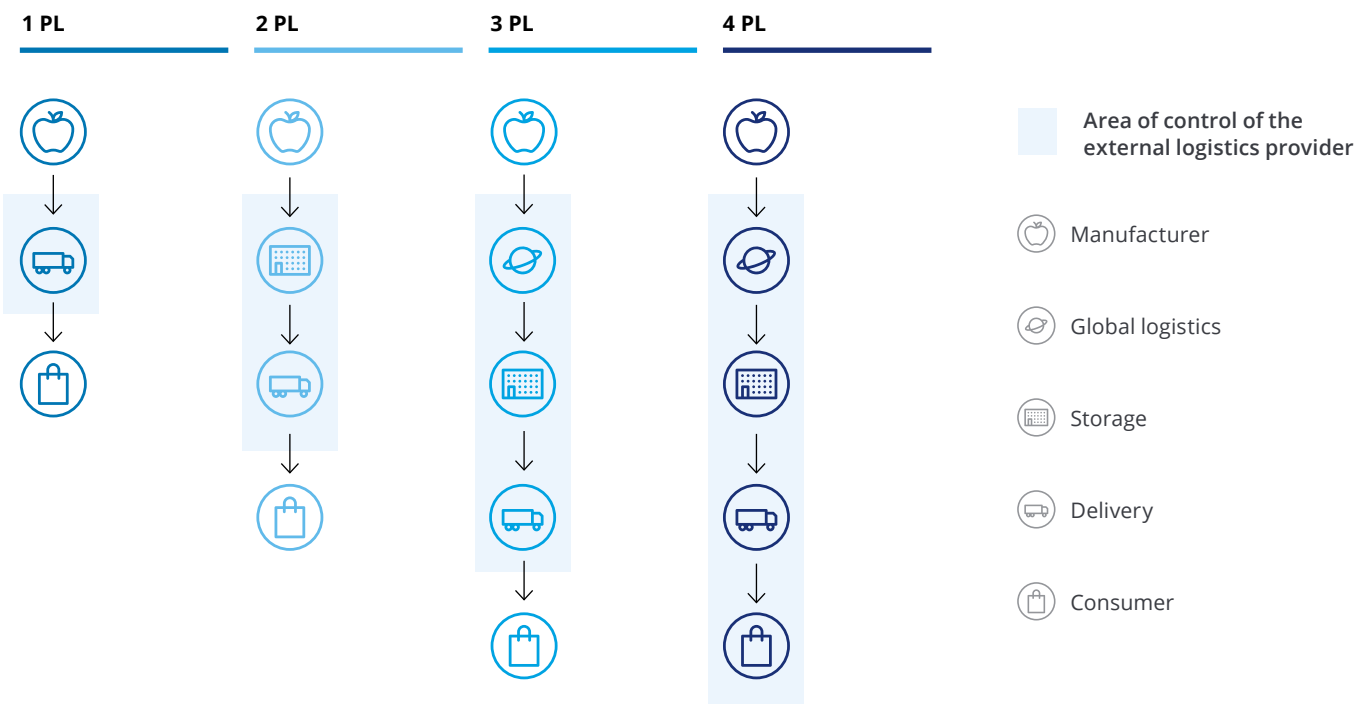
In recent years, more agents acting as external logistics providers (3PL-4PL) have entered the market, most of which are start-ups set up between 2015 and 2016 (e.g. Ontruck).

These new couriers are more digitalised and have technological platforms that connect stores with the most suitable deliverer. In addition, there are other start-ups whose goal is to optimise Last Mile transport logistics such as Deliveria (a platform connecting retailers with transport companies) and Nektria (use of predictive algorithms to improve and optimise delivery routes).

The emergence of this type of companies and their growing importance in Last Mile logistics has made it necessary for distributors and traditional couriers to commit to logistics models in which specialist distributors manage the delivery of goods to end consumers. This model will enable couriers that have unprofitable deliveries, due to the high service levels required and the increase in costs, to offer this service through companies more adapted to Last Mile logistics.

In relation to the HORECA sector, the "Sectors of activity" section of this study analysed the fragmentation of distribution; each establishment currently works with up to eight different distributors⁴⁹. This is the result of the large quantity of products and brands that have to be supplied to the establishments in the sector.

Table 29. Degree of externalisation of the logistics function



49. Deloitte Research: see detail in appendix I (Bibliography)

In order to reduce the high frequency of deliveries, the various manufacturers and distributors are recommended to operate the transport process jointly using an external distributor to carry out supply tasks. Depending on the brands and type of goods transported (drinks and beverages, liqueurs and wines, dried and fresh foods, meat and fish, bread and baked goods, etc.), each distributor will be assigned a specific route to each part of the city deliver the supplies, in order to reduce the overall times and costs of the distribution routes.

The optimisation of the distribution routes (98% of deliveries on time⁵⁰) and enhanced digitalisation and automation of the Last Mile logistics of these specialist companies will also enable an improvement in the experience of the end consumer through high levels of service.

Table 30. Impact of the external logistics provider on the Last Mile challenges

Positive impact			
	Environmental sustainability	-14% KgCO ₂ /parcel	Use of modernised and more environmentally friendly vehicle fleets, which creates a positive impact on environmental sustainability .
	Urban traffic congestion	-18% Vehicles/km ²	Improvement in the optimisation of the routes, which reduces levels of urban traffic congestion .
	Logistical efficiency	-9% €/parcel	Exploitation of external logistics providers' technologies, which increases logistical efficiency .

50. Deloitte Research: see detail in Appendix I (Bibliography)

6. Night-time distribution

The goal of the night-time distribution model is to take advantage of a reduction in the level of traffic congestion during the night and, therefore, in the associated costs.

This model involves major improvements in levels of environmental sustainability, urban traffic congestion and logistical efficiency⁵¹:




- Increase of up to 35% in the average speed of delivery vehicles due to the exploitation of reduced levels of traffic congestion on city streets at night.
- Numerous points of sale use special permits so they can exceed the maximum loads authorised during the night, which increases the load transported by each vehicle and reduces the number of journeys required, thereby decreasing CO₂ emissions by more than 20%.

- Reduction in delivery times and transport costs of up to 10% since no time is wasted in traffic jams.
- Increase in the capacity transported as a result of improved access to delivery points and elimination of approximately 90% of the delivery vehicle traffic during the rush hour.

In the HORECA channel for example, the need to implement this night-time distribution model is urgent, since it is necessary to reduce the impact on urban traffic congestion of the distribution and supply to establishments. For this purpose, public authorities should begin to regulate this activity in order ensure it is performed efficiently.



Table 31. Impact of night-time distribution on the Last Mile challenges

Positive impact			Use of fewer vehicles as a result of the increase in the speed and transportation capacity of the fleet, which increases environmental sustainability . Delivery at times with the least traffic improves levels of urban traffic congestion . Quicker deliveries that lead to cost savings and increase logistical efficiency .
	Environmental sustainability	-21% KgCO ₂ /parcel	
	Urban traffic congestion	-32% Vehicles/km ²	
	Logistical efficiency	-8% €/parcel	

51. Deloitte Research: see detail in Appendix I (Bibliography)

7. Urban consolidation centres

The digitalisation of logistics facilities in Spain is still at a very early stage. In fact, approximately 80% of warehouses are manual, only 15% are automated, and just 5% use advanced automation systems⁵². As a result of the foregoing it is necessary to transform the infrastructure of the Last Mile logistics network.




Urban consolidation centres are large multi-level warehouses that are highly automated and located on the outskirts of cities. Distributors and couriers use them cooperatively to centralise the large number of parcels that have to be delivered in cities.

E-commerce giants such as Amazon are marking a difference by using these intelligent urban consolidation centres (the

multi-client, three-story platform in Seattle, for example). In Spain, the Goodman group is developing facilities in Molins de Rei (Barcelona), with 10.5 metres clear height for each level and a very high load capacity (up to five tonnes per square metre⁵²).

The combination of these centres with hubs in city centres is the logical future of the infrastructure and will be required to achieve adequate efficiency levels and optimisation of Last Mile logistics, while enabling the exploitation of warehouse space to the maximum. To do this, it is essential for the companies to make investments and to work together on the implementation of these new logistics platforms.

Table 32. Impact of urban consolidation centres on the Last Mile challenges

Positive impact			Optimisation of the routing of deliveries to the centres of cities, which enhances environmental sustainability and reduces urban traffic congestion Major automation of logistics centres, which optimises the use of space in warehouses and increases logistics efficiency .
	Environmental sustainability	-20% KgCO ₂ /parcel	
	Urban traffic congestion	-18% Vehicles/km ²	
	Logistical efficiency	-12% €/parcel	

52. Deloitte Research: see detail in Appendix I (Bibliography)

8. Load pooling




The load pooling distribution model is based on the creation of a digital platform shared between couriers, which enables them to share existing delivery routes in cities as well as the excess capacity of their vehicle fleets. It is therefore possible to handle the loads of various competitors that have to take goods to the same area.

There are success stories in other industries relating to the use of shared assets. A good example is the passenger transport industry, which employs a wide variety of cooperative platforms (Bla Bla Car, Uber split fare, the Cabify option to share journeys, etc.) to share routes and reduce costs for each user. Another

example of cooperation occurs between airlines. Strategic alliances to provide a higher number of journeys with lower operational costs mean the three largest cooperative alliances (Oneworld, SkyTeam and Star Alliance) now account for more than 50% of all airline seats in the world⁵³.

The emergence of cooperative platforms in Last Mile logistics will enable the optimisation of the use of existing routes through these open data platforms, by increasing the average load capacity of each vehicle fleet and reducing the delivery costs and times to the end customer.

Table 33. Impact of load pooling on the Last Mile challenges

Positive impact			Use of fewer vehicles, which reduces urban traffic congestion and enhances levels of environmental sustainability . Use of the delivery routes of other distributors and increase in the load volumes transported for each vehicle, which improves levels of logistical efficiency .
	Environmental sustainability	-19% KgCO ₂ /parcel	
	Urban traffic congestion	-18% Vehicles/km ²	
	Logistical efficiency	-10% €/parcel	

53. Deloitte Research: see detail in Appendix I (Bibliography)

Priority 3

9. Mobility restrictions

The changing regulatory framework as regards restrictions on access to city centres highlights the need to design an open data platform that includes information in real time on possible restrictions.

This model is based on a software application composed of databases containing information on the situation and mobility restrictions in cities (traffic, restricted areas and vehicles with restricted access to particular areas). The distributors and couriers may access the application to obtain all these details of relevance to their delivery routes.

As a result, public authorities will have the desired support system to guarantee communication of new mobility regulations and to ensure they are applied the best way possible. For example, all the distributors can use this platform to ensure they are informed of the launch of initiatives such as Madrid Central and their consequences. This solution will enable distributors to avoid the costs of traffic fines and to optimise their routes by taking into account the restrictions in place when deliveries are made.

Table 34. Impact of mobility restrictions on the Last Mile challenges

Positive impact			
	Environmental sustainability	-10% KgCO ₂ /parcel	Improvement in the management of journeys made, which reduces CO ₂ emissions and increases environmental sustainability . Choice of the most convenient route at any given time in accordance with restrictions, to avoid traffic jams and reduce urban traffic congestion . Quicker delivery due to the optimisation of routes, which increases logistical efficiency .
	Urban traffic congestion	-14% Vehicles/km ²	
	Logistical efficiency	-5% €/parcel	

10. Public transport deliveries

Few companies currently consider public transport for the distribution of goods, because it is not very practical in the busiest areas. However, bus, underground and tram lines that are not busy clearly offer opportunities.

This system could be particularly useful for e-commerce, where deliverers could use railways and the underground for transportation and subsequently deposit parcels in smart lockers located in underground or railway stations.

This model would also enable access to delivery zones that are not accessible using heavy vehicles or to areas that are a long way from the starting point for delivery people, as well as reducing costs and emissions by avoiding the use of a fleet of own vehicles.

In Spain, although this model is still not used for Last Mile distribution, there are some public transport companies that offer this type of services for longer distances. One such example is ALSA, which has a parcel service for national routes. The Barcelona Nord bus station also offers this service, which can deliver to more than 180 towns and cities⁵⁴.

54. Deloitte Research: see detail in Appendix I (Bibliography)

Table 35. Impact of public transport deliveries on the Last Mile challenges

Positive impact			
	Environmental sustainability	-14%	Reduction in the use of vehicles that generate CO ₂ emissions, which increases levels of environmental sustainability .
	Urban traffic congestion	-14%	Reduction in entries of delivery vehicles into cities and restricted zones, which has a possible impact on urban traffic congestion .
	Logistical efficiency	-3%	Cost savings since own fleets are not used, which gives rise to an increase in logistical efficiency .
		KgCO ₂ /parcel	
		Vehicles/km ²	
		€/parcel	

11. Telemetry systems




In Spain in 2017, goods delivery vehicles were involved in more than 16%⁵⁵ of accidents with victims in urban areas, and vans alone accounted for almost 4,800 of these accidents⁵⁶.

This situation highlights the importance of a telemetry system as a measure to monitor and evaluate the driving of goods transport vehicles, in order to improve road safety and optimise the deliveries through the analysis of the data collected. As a result of the installation of one or more devices in the delivery vehicles,

data such as average speeds, use of brakes, pollution levels and time at the wheel are measured. The effective management of these data will enable improvements to efficiency when preparing the delivery routes of each operator.

Digital platforms at some start-ups currently enable the monitoring and optimisation of Last Mile deliveries through the use of predictive algorithms, as in the case of Nektria.

Table 36. Impact of telemetry systems on the Last Mile challenges

Positive impact			
	Environmental sustainability	-10%	Measurement of levels of pollution from driving, which enables improvements in environmental sustainability .
	Urban traffic congestion	-18%	Evaluation of driving techniques to optimise routes and avoid accidents, which in turn reduces urban traffic congestion .
	Logistical efficiency	-5%	Optimisation of routes, which increases logistical efficiency .
		KgCO ₂ /parcel	
		Vehicles/km ²	
		€/parcel	

The models and solutions presented in this study were designed conceptually on the basis of interviews with the participating companies, visits to distribution centres, fieldwork, own analyses, observations and measurements, process reviews, etc. The realisation, development and implementation of these models may give rise to changes in some of the approaches described herein, including the metrics and the potential outcomes forecast

55. Spanish Directorate-General of Traffic (DGT)

56. Spanish Ministry of Public Works. Annual report of the Observatory of Transport and Logistics in Spain (OTLE)

5. Conclusions and recommendations


Conclusions and recommendations

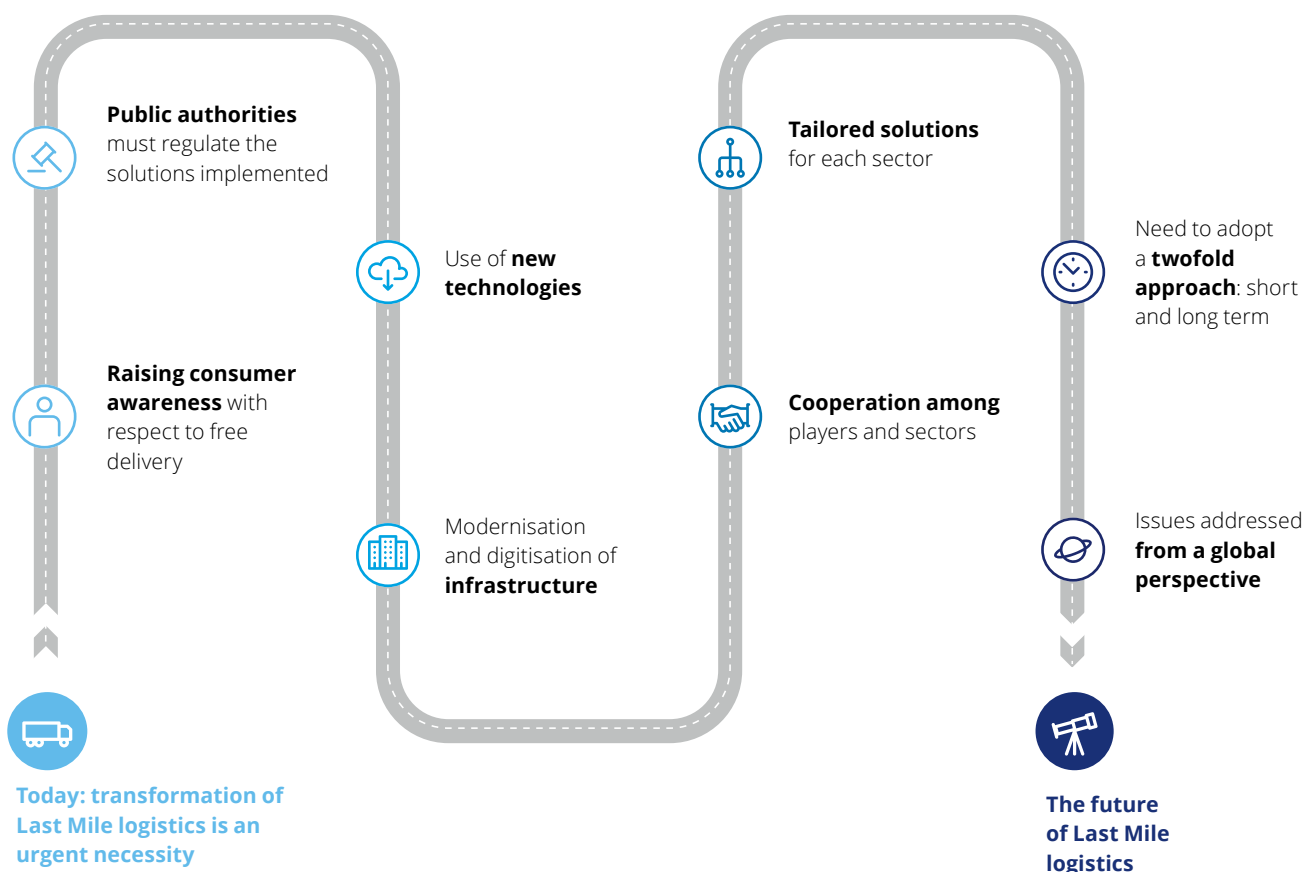
Nowadays, we are constantly bombarded with information on Last Mile distribution and its impact. On a daily basis we receive information about climate change, emissions due to transport, logistics giants such as Amazon and e-commerce campaigns like Black Friday. In view of this flood of disorganised information, this study has sought to give structure to the current situation of Last Mile logistics in order to gain a global vision of the sector, which involves not only logistic providers, but also other essential players that are often overlooked such as public authorities and start-ups.

We have also attempted to offer a much more extensive vision providing insight into other sectors besides e-commerce, as is the case with the HORECA sector, which suffers major inefficiencies that are rarely analysed and also require urgent solutions.

Another key focus of the study is specification and modelling of the theoretical-conceptual solution for Madrid, on the basis of the urban-hubs model, which would achieve results that clearly enhance logistical efficiency: -13% in cost per parcel, -27% in urban traffic congestion and -24% in environmental sustainability, measured as kg CO₂ per parcel. These outcomes could even be improved upon by combining the model with the implementation of an even larger number of smart lockers and the use of a fleet of electric vehicles.

With the aim that Last Mile distribution in Spain achieve the envisaged goals and be launched immediately by means of a gradual transition, it is advisable to follow a series of recommendations:

 **Urgent implementation of the Last Mile logistics transformation in Spain:** implementation requires the involvement of both the public authorities and the various sectors of activity. All the players involved must establish the change enablers to be able to implement the solutions that will readdress the inefficiencies observed in each of the sectors.





Raising consumer awareness with respect to free delivery: when customers order their parcels in most cases they are unaware of the number of stages or the high costs involved. Therefore, it is essential that the various sectors and players work to raise awareness of this issue. Otherwise, any step taken will be irrelevant because it will be applied in a sector operating at a loss with unsustainable margins.



Public authority regulation of the solutions implemented: work should commence to regulate all aspects of the solutions implemented, and thereby guarantee citizen's security, while allowing the roll out of policies that ensure an improvement in the levels of environmental sustainability and urban traffic congestion.



Use of new technologies: distributors run the risk of becoming obsolete if they fail to invest in new technologies. The development of geolocation services, improvements in the use of big data analytics and robotisation will characterise the Last Mile logistics of the future.



Modernisation and digitisation of infrastructure: most infrastructure is unable to cope with the growing demand and, its scant digitalisation, causes numerous inefficiencies that lead to an increase in costs and a reduction in the service levels provided to the consumer. That is why, both public authorities and distributors must invest to optimise the infrastructure which supports Last Mile logistics in Spain.



Cooperation among players and sectors: appropriate implementation of the solutions will not be possible if all the sectors and players that form part of the Spanish Last Mile ecosystem fail to cooperate with each other. Public authorities, manufacturers and distributors are all crucial elements of the alliances. The role of start-ups should also be noted, which have achieved a high level of market penetration thanks to the use of the latest cutting-edge technological trends to become key players when creating alliances between companies.



Tailoring of solutions for each sector: each sector must analyse its inefficiencies and apply the model that provides the best solution to the problems identified. Therefore, the HORECA sector will focus on leveraging models that improve the high level of fragmentation in the sector, such as through the use of external logistics providers, and the e-commerce sector must address challenges such as the sharp increases in demand through the use of models that improve efficiency, such as for example, urban hubs.



Need to adopt a twofold approach: some models may be implemented immediately such as for example the launch of urban hubs. Others, such as the electrification of delivery fleets, will need more time to come into operation. Therefore, adopting a twofold short- and long-term perspective is essential for the transition to ensure that the transformation commences immediately and the transition is gradual and smooth.



Issues addressed from a global perspective: appropriate transformation of Last Mile distribution must be undertaken from an inclusive viewpoint. If the solutions adopted are to have a positive impact on the levels of logistical efficiency, urban traffic congestion and environmental sustainability they need to be adopted on an across-the-board basis not just by certain players, otherwise the desired levels of improvement would not be achieved.

In conclusion, the transformation must be set in motion urgently and involve all the players and sectors, which need to work among themselves and develop tailored solutions, from both a short- and long-term perspective. Following this recommendation will ensure that Last Mile distribution in the future is much more efficient, more sustainable and creates less traffic congestion in cities, which will generate important benefits for all the players in the Last Mile ecosystem, from the consumer, through the companies operating in the sector, to the citizen.

Meet our experts



Scott Rosenberger

Partner of Strategy and Operations Consulting, global industry leader of the Transportation, Hospitality and Services sector

srosenberger@deloitte.com



Fernando Pasamón

Partner of Monitor Deloitte, Global leader of the Retail Consulting sector and leader of the Consumer industry group in Spain⁽¹⁾

fpasamon@deloitte.es



Jim Kilpatrick

Partner of Strategy and Operations Consulting, Global Leader of the Supply Chain / Logistics and Distribution practice

jimkilpatrick@deloitte.ca



Jorge Schoenenberger

Partner of Strategy and Operations Consulting, leader of the Transportation, Hospitality and Services sector in Spain

jschoenenberger@deloitte.es



Jordi LLidó

Partner of Corporate Finance, leader of the Manufacturing and Automotive sector in Spain

jllido@deloitte.es



Josep Palet

Partner of Strategy and Operations Consulting, Leader of the Governance sector and the Future of Mobility practice in Spain

jpalet@deloitte.es



Vicente Segura

Partner of Strategy and Operations Consulting, head of the Supply Chain practice and an expert in Transportation and Logistics sector

vsegura@deloitte.es



Fernando Antolín

Senior Manager of Strategy and Operations Consulting, Expert in Logistics, Distribution and Last Mile and in the Consumer Goods and Retail sector

fantonlin@deloitte.es



Alberto Amores

Partner of Monitor Deloitte, head of the Energy sector and the Decarbonisation and Energy Transition practice

aamores@monitordeloitte.es



Luis Soler

Partner of Strategy and Operations Consulting, head of the Operating Efficiency practice

lsoler@deloitte.es



Ana Fuster

Partner of Strategy and Operations Consulting, head of the Smart Cities practice

afuster@deloitte.es



Miguel Eiras

Global Smart City, Smart Nation & Local Government Leader

meantunes@deloitte.pt

1. Including the Retail, Consumer Goods, Transportation, Hospitality, Services, Automotive and Health sectors

Acknowledgements

This study was prepared with the voluntary participation of a group of professionals who are highly regarded in the industry. The purpose of their participation was to share and enrich the starting points of the study, so that they might contribute their views on the most relevant matters concerning Last Mile in Spain. In this context, the content, analysis, conclusions and recommendations contained in this report do not necessarily reflect the individual opinions of each of the participating experts:

David Sastre

Chief Customer Officer
Seur

Benjamín Calzón

Operational Excellence Officer
Seur

Miguel Borrás

Managing Director Spain & Portugal
DHL Express

Rafael Pérez del Monte

Quality, Engineering and Strategic
Programme Director Iberia
DHL Express

Roberto Ducay

CFO
Correos

Avelino Castro

General Manager
Correos Express

Antonio Fueyo

General Manager
Tipsa

Iván Martín

Spanish Operations Manager
DIA

Javier López de la Oliva

Head of Supply Chain
El Corte Inglés

Francesc Pi

Spanish Supply Chain Manager
Privalia & VeePee

Carles Rosàs

Deputy Chairman of Operations
Glovo

Alfonso Díaz del Río

Strategic Markets Manager
- Business development
Ferrovial

Santiago Olivares

Managing Partner of Infrastructure
and Logistics
Azora

José María Bonmatí

General Manager
AECOC

Francisco Aranda

Chairman
*UNO, Organización Empresarial de
Logística y Transporte*

Ramón García

Innovation and Project Manager
Centro Español de Logística (CEL)

Marta Losada

Manager
Catalonia Logistics

Xavier Orriols

Director of various companies
and expert in Consumer Goods
and Distribution sector

Jan de Tienda

Strategy and Data Manager
Paack

Eduard Coves

Business Development
Manager
Paack

Ángel Batalla

Founder and CEO
Last Mile Team

Sergi Fabregat

CEO
Shargo

Carles Sentís Ros

Co-founder and CEO
Parkunload

Montse Zamarra

Country Manager
Masteronaut

Alex Tortras

Co-founder and CEO
Kiwi Last Mile

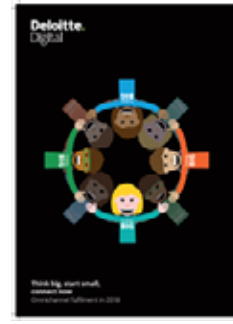
Other publications of interest



Last Mile Delivery
Consumer experience driven perspective and strategies
Deloitte US



The future of freight
How new technology and thinking can transform how goods are moved
Deloitte University Press



Think big, start small, connect now
Omnichannel Fulfillment 2018
Deloitte Digital Netherlands



Creating IoT ecosystems in transportation:
Logistics companies are looking to connect IoT technologies to traditional systems
Deloitte Insights



A sustainable energy model for Spain in 2050
Energy policy recommendations for the transition
Monitor Deloitte



A smart transition. Towards a sustainable energy model for Spain for 2050.
Energy efficiency and electrification
Monitor Deloitte



A decarbonised transport model for Spain in 2050.
Recommendations for the transition
Monitor Deloitte



Energy sustainable cities
Urban energy transition to 2030
Monitor Deloitte



Towards the decarbonisation of the economy:
The role of power grids in the energy transition
Monitor Deloitte

Appendix I - Bibliography

Deloitte Research includes:

- 50+ studies analysed at global level on various topics:
 - 30 Last Mile
 - 20 contamination and energy
 - 10 other issues of interest associated with Last Mile (e.g.: Technologies)
- 30+ interviews with executives at the principal players in the sector:
 - 7 start-ups / tech companies
 - 6 logistics operators
 - 4 retailers in distinct sectors
 - 3 business associations
 - 1 firm of architects specialising in urban planning
 - 1 real estate investment fund
- 40+ field visits (warehouses, logistics centres, distribution centres, etc.)
- 500+ observations and measurements
- 30+ in-house analyses
- 2 in-house modelling projects
- 300+ reports read on Last Mile published in relevant sources in the last two years

Other sources:

European Environment Agency

Alimarket (2018). Warehousing and Logistics for e-commerce: New operating procedures at the click of a button

Alimarket (2018). Logistics 4.0: A challenge representing an opportunity

Alimarket (2018). Software and big data for retail: On the path towards the digital store

Alimarket (2019). Consumption Logistics: Serving the most demanding consumer

Alimarket (2019). New solutions for the Last Mile: Speed but, above all, convenience and efficiency

Alimarket (2019). Logistics projects: New golden age BBVA Research. E-commerce billing

DBK Informa. Sectorial observatory (courier and parcel delivery industry)

DBK Informa. Sectorial observatory (food delivery) Deloitte (2016). HORECA distribution POV - Monitor Deloitte Deloitte Digital NL (2016). *Omnichannel Fulfilment*

Deloitte (2017). A decarbonised transport model for Spain in 2050

Deloitte (2019). Energy sustainable cities: urban energy transition 2030

Directorate-General of Traffic (DGT)

Spanish National Markets and Competition Commission (2017). Analysis of the postal and the courier and package delivery sectors.

Ministry of Public Works (2019). Annual report of the Observatory of Transport and Logistics in Spain (OTLE)

Spanish National Statistics Institute (INE) World Health Organisation (WHO)

Appendix II - Modelling data

Inputs/Input data

Socio-demographic data:

- Spanish population: 47,100,396 inhabitants¹
- Population in Madrid: 3,266,126 inhabitants²
- Metropolitan outer ring population (beyond the M-30 ring road): 2,392,806 inhabitants
- Inner ring population within the M-30 ring road (excluding Madrid Central): 727,194 inhabitants
- Madrid Central population: 130,000 inhabitants
- Barrio Las Tablas population: 36,000 inhabitants
- Madrid's total surface area: 600 km²
- Metropolitan outer ring surface area (beyond the M-30 ring road): 516 km²
- Inner ring within the M-30 surface area (excluding Madrid Central): 78.97 km²
- Total surface area of Madrid Central: 5 km²
- Total surface area of Las Tablas neighbourhood: 3.62 km²

Demand:

- e-commerce parcel demand in Spain: 1.5 million parcels³
- e-commerce parcel demand in Madrid: 20-35% above the overall demand in Spain

Infrastructure:

- Type of fleet in:
 1. Fixed hubs: 70% by van, 30% by motorcycle⁴
 2. Micro-hubs: 60% on foot, 20% by motorcycle 20% by bicycle⁴
 3. Night-time hubs: 70% by van, 20% by motorcycle, 10% by bicycle⁴
- Surface area required for:
 1. Fixed hubs: 200 - 1,500 m²
 2. Micro-hubs: 20 - 200 m²
 3. Night-time hubs: 50 - 200 m²
- Delivery surface area served by:
 1. Fixed hubs: 4 - 10.9 km²
 2. Micro-hubs: 0.27 - 1 km²
 3. Night-time hubs: 1.5 - 3.1 km²

Fleet:

- Delivery van productivity in Madrid: 80 - 125 parcels/day³
- Delivery van emissions: 180 - 250 g CO₂/km⁵

1. Spanish National Statistics Institute (INE)

2. All the population and surface area data for Madrid were obtained from information made available to the public by the Madrid City Council

3. Deloitte research

4. Deloitte in-house modelling hypothesis

5. Deloitte (2019). Energy sustainable cities: urban energy transition 2030

Significant drivers

- Total daily demand in Madrid: 124,500 parcels⁶
- Total daily demand per km² in Madrid: 207.45 parcel/km²
- Demand per person in Madrid: 9.57 parcels per year

Outputs/Outcomes⁷

Traditional parcel delivery

- Sustainability: 0.39 kg CO₂/parcel
- Congestion: 2.61 vehicles/km²
- Cost/parcel: 2.40 EUR/parcel

Urban hubs in Madrid

- Sustainability: 0.30 kg CO₂/parcel (-24%)
- Congestion: 1.90 vehicles/km² (-27%)
- Cost/parcel: 2.08 EUR/parcel (-13%)

Urban hubs in Las Tablas neighbourhood

- Sustainability: 0.36 kg CO₂/parcel (-27%)
- Congestion: 2 vehicles/km² (-33%)
- Cost/parcel: 2.15 EUR/parcel (-10%)

Smart lockers in Madrid

- Sustainability: 0.30 kg CO₂/parcel (-21%)
- Congestion: 1.16 vehicles/km² (-22%)
- Cost/parcel: 2.19 EUR/parcel (-9%)

Fleet electrification in Madrid

- Sustainability: 0.28 kg CO₂/parcel (-29%)
- Cost/parcel: 2.35 EUR/parcel (-2%)

6. Calculated based on total demand in Spain and the population, plus a 20% increase in demand

7. The vehicles/km² indicator refers to Last Mile parcel delivery vehicles



Deloitte refers to one or more of Deloitte Touche Tohmatsu Limited, a UK private company limited by guarantee ("DTTL"), its network of member firms, and their related entities. DTTL and each of its member firms are legally separate and independent entities. DTTL (also referred to as "Deloitte Global") does not provide services to clients. Please see <http://www.deloitte.com/about> for a more detailed description of DTTL and its member firms.

Deloitte provides audit, consulting, financial advisory, risk management, tax and related services to public and private clients spanning multiple industries. With a globally connected network of member firms in more than 150 countries and territories, Deloitte brings world-class capabilities and high-quality service to clients, delivering the insights they need to address their most complex challenges. Deloitte's more than 244,000 professionals are committed to making an impact that matters.

This communication contains general information only, and none of Deloitte Touche Tohmatsu Limited, its member firms, or their related entities (collectively, the "Deloitte Network") is, by means of this communication, rendering professional advice or services. Before making any decision or taking any action that may affect your finances or your business, you should consult a qualified professional adviser. No entity in the Deloitte Network shall be responsible for any loss whatsoever sustained by any person who relies on this communication.

© 2020 For further information, please contact Deloitte Consulting, S.L.U.

Designed and produced by the Department of Marketing & Brand, Madrid.