



Viewpoint

City logistics in Spain: Why it might never work

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ABSTRACT

Urban freight deliveries depend strongly on local regulations and policies to guarantee a tidy and efficient flow of goods towards commercial premises. However, the urban freight delivery system in Spain, which is even more complicated due to the urban morphology and driving behavior, also suffers from a combination of negative factors, including uneven regulations, lack of enforcement and obsolete policies. We present the picture of the current scenario and the typical regulation schemes, analyzing the reasons for failure of the system and the possible efforts, relatively cheap and easy to implement, that could be undertaken towards improvement.

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Introduction

European cities present a series of common characteristics that influence their mobility and commercial activities and impose a series of restrictions in the associated flow of freight deliveries. First, most of these cities have a radial structure, with a very high concentration of shopping areas, restaurants and other social attraction poles in the city center. This generates asymmetric flows of people going to work, shop, eat or visit tourist attractions, with similar flows of associated goods. However, the morphology of these city centers, inherited from the Middle Ages and, thus, containing narrow streets with no parking lots or back alleys, was not designed for these types of land uses, a situation that further increases the downtown parking problems found in virtually every urban center (Ligocki & Zonn, 1984). In addition, infrastructure investments in these cities over the last three or four decades have often been implemented with a general idea of sustainability in mind (Topp & Pharoah, 1994), including bike lanes, underground and tram systems, more efficient bus systems (Daganzo, 2010) and the enlargement of pedestrian areas, which has generally led to larger and stricter restrictions regarding freight deliveries. As a matter of fact, freight deliveries are normally perceived as a nuisance, to which city governments react with ignorance (Zunder & Ibáñez, 2004). The common stereotype is that of large, slow and polluting vehicles contributing significantly to already high congestion levels because they are forced to stop in dense city center areas to make deliveries, which often requires double parking or the use of sidewalks due to the lack of space devoted to logistic activities (Dablanc, 2007).

Nonetheless, these goods need to be delivered. Therefore, along with their general mobility policies geared towards sustainability, many European cities have tested or implemented city logistics measures (Russo & Comi, 2004). In the case of Spain, however, with the partial exception of Barcelona, while public and private passenger transport in Spanish cities continue to benefit from improvements in infrastructure and/or technology (e.g., traffic simulators, traffic counts, and real-time information), urban freight distribution continues to be hamstrung by procedures and regulations introduced half a century ago. We describe here the specific characteristics of the current urban freight scenario in Spain, from the perspectives of all the involved stakeholders. We focus particularly on the role played by the local authorities that are responsible for managing the system and establishing regulations and policies. We present the typical regulatory framework for Spanish cities as well as the mild attempts to introduce city logistics concepts, suggesting some action lines that might help to improve the situation.

Nevertheless, there may be no hope for the future of city logistics in Spain. Plans, initiatives and regulations will never work unless they are consistently respected and enforced, and the Spanish cultural environment, together with the local authorities' lack of initiative and willingness to truly face the problem head-on, often results in their ineffectiveness. In conclusion, we summarize the main characteristics of this enforcement issue, which may be decelerating or even paralyzing the development of city logistics in Spain.

The current scenario

A number of indicators can be used to create a general picture of urban deliveries in Spain. Typical figures show that there is one commercial establishment for every 50 inhabitants in Spanish cities, including shops, bars, cafes and restaurants. The locations of

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commercial premises are roughly distributed as follows: 40% in large municipalities, 40% in metropolitan areas, and 20% in small towns and rural zones (Ministry of Commerce and Tourism, 1999). Supported by regulations, small urban retail shops have managed to resist the introduction of shopping malls on their periphery, and the daily movement of all types of freight into the inner parts of the city remains necessary.

However, when it comes to in-depth analysis and regulation of delivery vehicles' flows and practices in Spanish cities, local authorities often tend to rely on intuition or, at most, on low-detail information. Not many attempts have been made to better rationalize or adapt city logistics policies to the real daily scenarios (Dabanc, 2008), possibly due to a lack of data in this regard. Very few studies have surveyed real-life activity to obtain relevant data for urban freight analysis (Allen & Browne, 2008), and only some Spanish cities have begun to see the need for such work. Furthermore, as a result of industrial secrecy and the strong competition in the sector, there is rarely any impetus on the side of transport companies to provide accurate information of this sort to public authorities.

The current tendency all over Spain is to increase the priority of public passenger transport as well as restrictions on passenger cars, while freight transport holds a somewhat intermediate position. The main stakeholder groups in urban freight distribution and urban mobility (e.g., carriers, receivers, residents, workers, and shoppers) have different interests with respect to the freight issue, and different political powers. Lacking the appropriate data and decision support systems and feeling the pressure to redesign mobility flows in cities to deal with growing populations and congestion, local authorities in Spain have to decide what direction to take with respect to the improvement of urban freight distribution. Unfortunately, the result is often inaction.

Carriers

While freight carriers operating in Spanish urban areas do plan their distribution operations, they often do so without introducing city logistics concepts. The road transport sector in Spain does not consider urban freight distribution specifically as a subsector of its industry, and there are no companies specializing in urban freight deliveries. Even though the Spanish logistics association has issued a set of recommendations for companies delivering in cities (AECOC, 2002), no recent distribution innovations have been induced by a *market pull*. Policy issues on the supply side are, for the most part, handled by each company independently. There are national associations (CETM, Fenadismer) with regional delegations as well as regional (e.g., Asemtraex in Extremadura, Fegatramer in Galicia, Anet in Navarra, and Asatrans in Andalusia) and local (e.g., Froet in Murcia, Transcalit in Barcelona, and AsetraVal in Valencia) associations that lobby for their common interests, but these associations have not put much effort into urban freight issues. For instance, there is no interest whatsoever in the introduction of co-operation schemes (Thoma, 1995), and we do not know of any privately initiated investment in shared resources introduced by independent transport firms to implement any nation-wide coordinated action for urban freight distribution. It seems that strategic advantages related to the direct relationships between the firms and their respective clients outweigh any possible advantages of increasing the load rate of pick up/delivery trips or reducing the number of required vehicles through cooperation, as stated in a personal interview by the President of the Asatrans association.

Very few of these transport operators' associations include urban freight distribution as one of their main objectives, and those that do act mostly at the local level, interacting directly with the corresponding local authorities, with little coordination between them. The few large companies in business throughout Spain

(e.g., SEUR, Ochoa, and Guipuzcoana) are most interested in the formulation of urban freight issues at the national level (Cobas, 2002). The rest of the companies are rather small, usually operating in only one or a few urban areas, and thus they concentrate on very specific issues related to loading/unloading in specific streets of specific cities. Several forums have been launched in the past in different Spanish cities with the participation of all the relevant stakeholders in urban mobility, sometimes including urban carriers, but with scarce practical results. There is usually a good relationship between the freight carriers' associations and the local authorities responsible for traffic and transport, who acknowledge that these associations represent the interest of the sector, but they do not give much consideration to their stated wishes. In addition, the interests of full-truckload and less-than-truckload carriers are usually different when addressing local administrations (Andersen, 2002).

Furthermore, logistic companies plan their investments and their operations according to business perspectives, which usually require decisions to be made very rapidly. However, any strategic move in the urban logistic environment requires the approval of the local authorities, which follow a very different rhythm. Spanish companies typically find that bureaucracy and political changes are heavy burdens on the shoulders of urban freight distribution. Processing construction work licenses (e.g., for expansion of premises), regulation modifications or just addressing simple mobility issues can take months or even years.

Residents, workers and shoppers

People spending their leisure time in city centers (e.g., living, working, and shopping) represent the largest stakeholder group, and they are presented here as a single group due to their similar interests, mainly related to accessibility. They oppose access restrictions and pricing policies (Schlag & Schade, 2000), and lobby for the reduction of congestion, the availability of parking spaces and the introduction of fast, comfortable and reliable public transport systems (particularly underground systems). From the residents' perspective, these issues affect the livability of the area and the value of the land (Díaz, 1997). While they appreciate commercial activity, they contradictorily regard freight transport as a nuisance that increases congestion and pollution and reduces traffic fluency and the number of on-street parking spaces. Their opinions are important given that they are the largest group in terms of voting power, which is often the deciding factor against the introduction of city logistics policies at the expense of passenger transport.

Receivers

Freight receivers, namely retail shop owners, represent the link between urban freight carriers and residents, workers or shoppers. Their activities rely upon the supply of goods, but their priorities regarding mobility focus on three main areas:

Achievement of full accessibility for the general public, who constitute potential customers, and promoting priority for private vehicles in the use of space in the city center

- Construction of new public parking lots, located as deep inside the center as allowed by the authorities.
- Enhancement of commercial areas in the city center, with deep controversy around whether the expansion of pedestrian areas is positive or negative for this commercial activity.

In general, the receivers are satisfied with the current urban freight situation, and the modern stock management policies (i.e., no stock and just-in-time frequent deliveries) can be implemented

without any resistance from the transportation side. Multiple providers are willing to accept such conditions at adjusted prices, and the fact that they operate in such a competitive environment (take, for instance, the description in Pivo, Carlson, Kitchen, & Billen, 2002) gives them little to no power to impose any conditions. Therefore, the problems facing urban freight distribution do not in any way constrain the activities of urban commercial, office or business sectors.

Local authorities

Local authorities have a responsibility to facilitate the economic activities of the city (Harris, 1994). There will always be an increasing demand on street capacities, so local authorities must arbitrate procedures to distribute it among the different users (Vega et al., 2006). As stated above, the lack of data represents a huge obstacle here. Although medium and large Spanish cities have some kind of traffic plan, traffic counts or traffic model, delivery vehicles are included only as part of the general traffic flow, without any consideration regarding the kinds of vehicles used, the types of goods delivered or the routes followed. While passenger traffic models are based on data provided by surveys, shippers and carriers are extremely reluctant to provide any information with respect to their logistic aspects, their route plans or their delivery practices.

Lacking this complex information, local authorities are only able to address urban freight issues in the short term, providing load zones when requested by receivers or discussing accessibility permits with carrier associations on a case-by-case basis, without any general knowledge concerning freight movement in the urban area (Robusté, 1999). This lack of accurate data, appropriate discussion forums and, therefore, innovative solutions (Benjelloun, Crainic, & Bigras, 2009) leave local authorities with the only option of increasing restrictions and hardening regulatory schemes in the name of urban sustainability. Thus, in efforts to regulate these aspects, Spain's existing traffic norms can only be considered in a simple, straightforward manner that is usually rather rigid and rudimentary. In addition, the available information has not been formally coordinated between different cities, at either the regional or the national level, and despite the works of the European network Bestufs (www.bestufs.net), we are not aware of the implementation of any coordination scheme for local policy measures at the European level.

Traffic, transport and building construction are among the main concerns of any city government, but shorter reaction times for modifying the norms are required to obtain flexible implementation of new measures and initiatives. Although these initiatives could easily be tested and modified and result in the growth of opportunities for local freight distributors, political and administrative delays mean further uncertainties in the outcome of such initiatives, and companies are not willing to risk their finances and their clients for a remote possibility. On the other hand, no formal instruments exist to enable departments other than those responsible for traffic to incorporate city logistics concepts into local policy and operational decisions. At this moment, many Spanish cities are engaged in renovating their strategic plans, which will have important effects on the assignation of space in these areas for multiple possible requirements and uses in the near future. Though transportation is a predominant concern in planning considerations, urban freight transport is only marginally considered (Logística, Transporte y Almacenaje, 2009).

It is curious, to say the least, that the general movement towards sustainability with respect to urban freight deliveries in Europe is geared towards restrictions that seek to enforce a certain form of "urban" sustainability (e.g., smaller vehicles, access restrictions, and time windows) over what could represent "environmental" sustainability (e.g., larger vehicles achieving economies of

scale and shorter routes). Further complicating the scenario is the general assumption that efficiency in operations and reduced environmental impacts often go together (Anderson, Allen, & Browne, 2005), an assumption that is contradicted by recent works that suggest overall pollution levels may increase due to load consolidation (Sathaye, Horvath, & Madanat, 2010a) or night-time deliveries (Sathaye, Harley, & Madanat, 2010b).

Usual policies

Urban traffic regulation is a strictly local concern in Spain, although the rules must be compatible with national or European aims in terms of, for example, pollution and noise. The only national and regional contribution to urban freight mobility is the provision, in almost all of the largest Spanish cities, of some sort of logistic park in their surroundings. These centers for freight transport (CTMs), as they are called, normally consist of large areas of public land, sometimes with intermodal facilities available, where space is leased for logistic companies to build warehouses and transshipment infrastructure. The CTMs thus play the double role of being nodes in the inter-urban transportation network and bases for urban distribution, and they have been very much promoted by national and regional governments in past years.

Apart from this, urban freight policies in Spain are limited to the corresponding chapters in local traffic ordinances, where a general regulatory framework is provided for carrier operations, loading and unloading. However, the lack of specifics and sound technical support generally reduce these ordinances to a set of generic declarations upon which unclear policies are based.

Traffic ordinances

The tradition in Spain is to consider urban freight distribution as a type of traffic that should be regulated with the same general rules applying to local traffic and transport, in general. Most Spanish urban traffic regulations were issued in the late sixties and early seventies and lasted for three decades, with some minor modifications and updates. Most of these traffic regulations were remade in the second part of the nineties, making them less than fifteen years old. Under the "loading/unloading" heading, there is usually an extensive article that contemplates aspects, such as the type of vehicles that are allowed in the various city zones, the time windows when freight vehicles may access those zones and the use of special load/unload parking spaces.

Traffic ordinances are very similar across Spain; they copy one another with few changes, specifically following the example of Madrid, whose ordinance was issued in 1998. Thus, Madrid's traffic ordinance has set the standard for this type of document, such that there is very little attention to the particularities of each urban area or to the introduction of innovative policies. These increases generate territorial incoherencies. Time windows, access restrictions, load zone schedules, and the like are different from one city to another, causing inefficiencies and planning difficulties for transport agencies operating on a national scale. It is also very common for an ordinance to neglect a specific policy, leaving the possibility open for local authorities to modify their handling of issues on a case-by-case basis. There exists no coordination between cities. Indeed, not even a common source of information exists whereby national or international carriers can be made aware of changes in existing policies.

There is, furthermore, a complete lack of innovative regulations in Spain. Because urban traffic is an especially sensitive matter, local governments often try to maintain the *status quo* rather than taking the political risk of introducing faulty innovations. Policy makers tend to adopt measures that have already been implemented elsewhere, customizing them according to intuition or

experience without technical perspective and often relying on trial and error. For example, in a personal interview, a local authority responsible for mobility established the introduction of an urban distribution center as a city priority in terms of freight distribution simply based on the fact that a nearby city was testing the same idea in a pilot project. The result is a set of policies that appear to be consistent among cities but that actually contain details, often without clear justifications, that make them substantially different. These policies are then reflected in local documents and diffused through local official bulletins, making them difficult to access from outside the city. This perhaps reinforces the need to count on local vehicles to deliver and makes it more difficult for a nationwide operator to deal with multiple cities. The only regulations present throughout the country, namely access restrictions, load zones, time windows, and noise restrictions (in some cities), follow this pattern to a great extent.

Access restrictions

Access restrictions establish concentric areas with restricted access that always depends on truck weight, normally banning vehicles above 3.5 Tm. from central business areas. There are also strict regulations, such as special permits, city truck routes and obligations to operate in the interior of premises, for trucks over 12 Tm, which are normally associated with construction work.

In theory, vehicle access restrictions in city centers should be based on two issues: pollution levels, to limit pollution in dense historical areas; and size, to prevent the blocking of narrow streets. Vehicle weight does not typically adversely affect circulation in central urban areas, as long as it is not so excessive that it can cause damage to roads, bridges and buildings. However, access restrictions in Spanish cities are only based on vehicle weight, presumably to facilitate police control of these vehicles. Though imposing a limitation on the weight of vehicles also limits their size (given the models normally available in the market), this appears to be less relevant to urban traffic than to the size of the vehicle.

All the main Spanish cities have weight-related access restrictions. Thus, this constitutes an example of a cut-and-pasted policy that is customized for unclear reasons. There is no apparent reason why, with similar historical city centers, weight allowances range from the very restrictive 3.5 tons of Badajoz to the 16 tons of Gijón and Santander. On the other hand, access regulations are also responsible for the accessibility of freight vehicles to pedestrian areas, and here the differences and the lack of coordination between cities are also significant. Some cities allow delivery vehicles to enter pedestrian areas at any time, others do not allow entrance at all, and still others require schedules particular to the city. As with access restrictions, the technical reasons behind these differences remain unclear.

Load zones

In Spain, all the cities have a provision of load zones close to the commercial areas, but drivers will favor double parking where possible, searching for the minimum possible distance between the parking spot and the final destination. This greatly reduces capacity in the most congested areas of the city, but there is not a clear estimation of the additional external costs generated.

For load/unload zones throughout the city, except for special cases, such as moving operations, truck parking is normally limited to a maximum of 30 min and then only as long as load/unload operations are being carried out. Also, for reasons related to freight delivery, some cities allow drivers to park in places (within a radius of 50 meters from the final destination) where parking is prohibited, as long as normal traffic flow is not interrupted. In the night

(23:00–7:00) they are allowed to park everywhere. General regulations for loading/unloading operations establish that they must be carried out as rapidly as possible, avoiding noise and traffic hassles and without storing goods on the curb. Parking spaces controlled by parking meters are also sometimes included in load zone regulations; in some cities, freight vehicles are exempt from payment in such areas, as long as the stay is shorter than 15 min and load/unload operations are being carried out. Local ordinances explicitly describe a long list of penalty situations, with fees ranging from 30 to 150 Euros and an average around 45 Euros.

Again, the above infrastructure seems far from optimal. In the first place, the location of load zones is often obsolete, and the opening and closing of businesses does not immediately correspond to changes in the inventory of load zones. But the most significant issue is that load zones always have a fixed schedule (usually 7:00–11:00 and 15:00–17:00) during which they can be used, and often this schedule does not correspond with the opening hours of the receiving shops (see Table 1).

Access time windows

Access time windows are not typical in small towns, but most large and mid-size Spanish cities have established morning and afternoon time windows for accessing the city center. City ordinances normally allow local authorities to establish the time interval in a flexible manner, and the typical configuration is to allow access to the city center once the morning rush hour is over, between 9:00 and 13:00, and again in the afternoon, between 16:00 and 19:00. Even though they seem to produce beneficial effects in terms of congestion and pollution (Yannis, Golias, & Antoniou, 2006), access time windows in Spanish city centers are not necessarily related to the schedules of load zones and, in some cases, do not match the opening hours of certain types of retailers, as shown in Table 1. Also, in cities with access time windows, these limitations are normally shown on street signs and are difficult to find elsewhere, which often means that delivery vehicles coming from outside the city only learn of such restriction details when they actually enter the city center. Consequently, carriers often disregard these time window restrictions, caught between their need to make the delivery and the risk of being ticketed. In some cities, the time windows in load zones are used instead of establishing specific time windows for access to the city center. Again, few efforts have been made in Spain to estimate increases in carrier operating costs caused by time windows. In fact, the only European effort along this line was carried out by Quak and De Koster (2009).

Noise regulations

In Spain, the enormous atomization and subsequent presence of many individual truckers or small trucker associations acting as subcontractors for large companies creates a scenario where it is

Table 1
Typical opening hours for different types of activity sectors in Spain.

Sector	Morning opening hours	Afternoon opening hours
Private companies	9:00–14:00	16:00–19:00
Banks and public administrations	8:00–15:00	–
Bars and cafes	8:00–23:00	
Restaurants	13:00–17:00	20:30–23:00
Retail shops	10:00–14:00	17:00–20:30
Supermarkets	9:00–15:00	17:00–21:00
Fresh food markets	8:30–15:00	–
Malls	10:00–22:00	

sometimes difficult to update vehicle fleets to the latest European regulations. Spanish cities, however, are in the process of updating their local policy frameworks with specific noise regulations, normally embedded in a general ordinance about noise and environment protection. These ordinances are now being adapted to meet national regulations, which in turn are extracted from European guidelines. Night distribution is banned, except for very specific cases (large retailers can benefit from exemptions in certain areas), in all major Spanish cities, without taking into account the existence of specific locations or practices that enable it without disturbing any residents.

City logistics in Spain

Taniguchi, Thompson, and Yamada (1999) defined City Logistics as “the process for totally optimising the logistics and transport activities by private companies in urban areas while considering the traffic environment, the traffic congestion and energy consumption within the framework of a market economy”. This concept includes the definition and application of innovative solutions (Emberger, 2004; Muñuzuri, Larrañeta, Onieva, & Cortés, 2005) to freight distribution, using the most advanced planning tools and technologies available, to facilitate urban mobility without generating negative economic consequences.

However, the scope of advanced urban freight solutions implemented in Spain is very limited. They are basically oriented towards infrastructure management and reorganization of space use in the city center, while the technical innovations introduced by carriers are limited to the use of vehicle loading platforms, GPS and routing systems. In contrast with the multiple actions carried out in other European countries, the existing examples of technology-intensive systems in Spain are limited to automatic access control, multiple use lanes, pilot tests of urban distribution centers and night deliveries to supermarket chains. These four cases, described below, appear promising but also present inconveniences when transferred from theory to practice. In each case, we show in italics what we believe could be done to help overcome those inconveniences.

Urban distribution centers

These are transshipment points usually located in parking lots close to the city center, where delivery vehicles unload their goods, which are then transferred to electric vehicles for final delivery to the shops (Crainic, Ricciardi, & Storch, 2004). In Spain, only Málaga has tested this type of initiative, obtaining results consistent with other countries that are interested in urban distribution centers (Browne, Sweet, Woodburn, & Allen, 2005). Most of the tests in these countries were funded with European research funds and proved economically unfeasible once the public funding had run out (Di Bugno, Guerra, Ambrosino, Boero, & Liberato, 2008). In addition, issues, such as the management of the final deliveries and the assumption of responsibility for the goods, were left unresolved. Finally, because the final delivery and, therefore, the contact with the receiver were established by a third party, carriers were forced to reveal their list of customers and felt they were losing presence with their customers.

In the Spanish case, the economic unfeasibility was higher due to the lack of access restrictions enforcement. In theory, access to the city center was forbidden, and all less-than-truckload deliveries had to be transshipped via the distribution center. In practice, however, carriers were still able to enter the city center and reach their final destination, thereby avoiding transshipment, and this was done even though the final delivery via electric vehicles was free of charge during the test project phase.

There are several municipal initiatives encouraging local authorities to allow carriers free use of public premises set aside as *mini-hubs* in parking areas and open zones in city centers during particular time windows under direct supervision of agents. These facilities would be smaller than urban distribution centers, and carriers are not forced to transship the goods but rather to stop the vehicle there when access time windows are closed and make deliver their goods to the final destinations by foot, using handcarts. This request originated with several carrier associations as a result of the increasing loading restrictions around city centers, but we are not aware that any of these initiatives have been put into operation.

Automatic access control

The use of automatic bollards is one of the best methods for cities to guarantee the enforcement of time windows and access policies. While they are rather expensive to install and do decelerate traffic flows, they seem to be the best way to control access to the city center. In Spain, the cities that tend to have a system of automatic bollards are cities that suffer from dense urban traffic, due to their large or medium size, but that also are very active in terms of sustainability and pedestrianization, such as Barcelona and Vitoria, or with very compact and intricate historical centers, such as Granada. Automatic bollards provide the benefits of pedestrianization without completely eliminating accessibility to the inner core of the city.

These systems can be more rapidly controlled by radio, but this forces each vehicle to carry an emitting device or a smart-card reader, the latter of which is easier and cheaper for the vehicle owner but can cause a reduction in traffic flow rates. In addition, such methods to enforce access restrictions to the city center can generate problems with out-of-town carriers trying access the city center for occasional deliveries, and system breakdowns can cause the full access system to collapse, blocking the city center entirely. As in many other cases, the only clear path toward solving these problems seems to be a combination of:

- *Harmonization*: Establishing the same type of access control in all cities, whether via police surveillance, automatic bollards or OCR systems.
- *Information*: providing carriers with a common source of data regarding access restrictions in different cities.
- *Enforcement*
- Establishing clear policies for ensuring that the application of regulations is monitored, guaranteed and evaluated.

Multiple use lanes

Barcelona, within the framework of the European project SMILE, implemented an innovative measure using information technologies to manage multiple use lanes. Depending on the time of the day, these lanes served as public parking spaces, load zones or bus lanes, and the corresponding information was displayed on screens. This system was based on the assumption that peak hours do not overlap for the different street users (resident parking, public transport and load/unload operations), but it also suffered from enforcement problems, since exceeding the allowed period, or double parking, was found to be rather common. Once more, the *enforcement* of correct parking practices needs to accompany the implementation of this type of measure; otherwise drivers maintain the perception that nothing has really changed.

The carrier's side

In an environment where all restrictions are imposed by the local authorities, carriers only have collaborative schemes

(Ljungberg & Gebresenbet, 2004) and night deliveries as promising tools to explore. Collaboration and joint deliveries, however, face total opposition on the carriers' side in Spain and have never been implemented or even tested in the country. Difficult planning, uncertainty and the need for additional transshipments represent obstacles for implementation, but the main drawbacks of this scheme are those already mentioned for urban distribution centers (e.g., revelation of customers to competitors, loss of contact with customers, and difficulty in establishing priorities).

Therefore, night deliveries remain the only option for circumnavigating access restrictions, time windows and peak hours. Despite the feasibility of such schemes (Holguín-Veras, 2008) and the benefits to some large retailers, this option has only recently been tested in Barcelona with a supermarket chain (Sanz, 2009). This system can only work with a very specific type of receiver, one who can afford to have night staff in charge of receiving the goods. Otherwise, night reception is strongly opposed by most retail receivers, as they are unwilling or financially unable to extend their opening hours and/or they do not trust reception lockers or have related security issues and lack of control over the goods received. Residents are also against this type of scheme, and their opposition is supported by urban noise regulations, creating a significant barrier to real implementation (including the need to investment in silent vehicles, silent loading facilities, additional security, and staff training) that will not be clearly compensated by the benefits of night operation. Clear, long-term regulations, establishing which cases will allow night distribution under what circumstances, are required for carriers to benefit from these slack periods.

What could be done?

Given the existing scenario described above, we believe there are still opportunities to explore. Cities are right to prioritize human mobility, especially in terms of public transport, over freight transport, but there are several options that could be beneficial to both and that should be analyzed. One of them is to decrease the demand by establishing appropriate off-street loading/unloading facilities (Pivo et al., 2002). Another is to act upon the supply of street capacity, which could be increased, for example, by its dynamic allocation to freight distribution in those places and intervals where other priority uses are slack. So far, the most exhaustive analysis of urban freight transport in Spain (Andersen, 2002) suggests a series of measures to seek optimization. These measures are classified as priority (larger vehicles, night deliveries and public-private coordination) and medium-term (standard vehicles, standard regulations, load/unload technology, traffic management technology, identification of logistic needs). All these measures, and possibly some others, would certainly improve the scenario for urban freight deliveries in Spain, but we believe that it is essential to concentrate on the first steps to facilitate the objective of introducing the city logistics culture to Spain by avoiding large investments and radical changes. Initiatives, such as extended night deliveries, face opposition from residents and small receivers, which could bring negative consequences if the outcomes are contrary to expectations.

Therefore, we propose a series of initiatives that are easy to implement and could set up the basis for future developments. Other actions related to infrastructure (or other) provisions requiring high investments that, while they might produce better and more solid results in the future, involve higher economic and social risks. Our conclusions suggest a path towards better management of existing infrastructures that focuses on evaluation, regulation and load zone policy.

Evaluation

Not all the possible city logistics measures (Muñuzuri et al., 2005) are directly applicable in all urban areas, and the first word will always belong to city managers and planners for political, economic and/or social reasons. Nevertheless, once these unfeasible solutions have been eliminated, cities must still rely on some kind of decision support system to determine the best solutions for specific urban areas and, from the political perspective, to quantify the decision-making process. That is why the first set of efforts should be directed towards the evaluation of city logistics policies. We distinguish three main steps to take here.

Data gathering and use of simulation tools to analyze the effect of implementation policies and differences from the base case scenario

In many cases, urban freight policies seek to achieve higher degrees of sustainability but actually end up creating more inefficiency in the overall transport system. The use of simulation tools should assist in gaining better insight with regard to the possible outcomes, but this requires further development of urban freight models (Muñuzuri, Cortés, Onieva, & Guadix, 2010; Routhier & Aubert, 1998; Sonntag & Tullius, 1998), integrating them in commercial packages, and collecting useful and accurate data to enter into the simulations. Municipality-driven surveys, logistics models, on-site vehicle counts and delivery practice reports represent costly but essential procedures to gather the appropriate primary data.

Set up the entire cost structure for all the stakeholders related to urban freight distribution

A thorough economic analysis of urban freight has not yet been completed (Marquez, Smith, & Eugenio, 2005). Cities and carriers are aware of the direct costs (e.g., operating costs, tickets, infrastructure and management) and a few of the indirect costs (e.g., pollution and noise), but there are other indirect costs that have never even been considered. Figliozzi (2010) estimates the indirect cost of congestion on freight delivery vehicles, and we have already mentioned the work of Quak and De Koster (2009), so why not estimate these externalities for Spanish cities? What is the external cost of double parking? What is the visual cost of having freight delivery vehicles circulating inside historical city centers? Furthermore, what is the social cost of allowing these vehicles inside pedestrian areas? All these questions should be answered before new restrictions and policies are implemented.

Estimate the perception of citizens

The third evaluation effort should be directed towards assessing the political cost of urban freight policies. Would the general public rather have more load zones and fewer parking spaces for cars or stick with the current situation (and its challenges)? Perhaps local authorities are struggling to solve a problem that none of the involved parties think exist. In addition, receivers should be brought into the analysis, promoting more sustainable delivery policies that do not interfere with peak hours or time window restrictions. The bottom line is that, if any economic benefits are generated by more efficient urban freight policies, they should be shared on equal terms between carriers, receivers and the local administration. Finally, if political reluctance is putting a stop to city logistics developments, the quantification of public interests might provide some support for certain types of initiatives.

Regulations

Urban freight regulations should be realistic, with clear objectives and procedures, but they should not be imposed without providing alternatives for freight distribution. Given the current

scenario in Spain, adaptation of the regulatory framework and coordination between all cities appears essential.

Adjust regulations to reality

This possibly implies relaxing some of the existing regulations, which are not being successfully applied in any case, due to related damage to the urban economy. Access restrictions, time windows or parking policies should be revised and adapted to the needs of each urban area, negotiated with carriers and then fully enforced. This requested adjustment relies strongly on the preceding evaluation measures, to have a clear understanding of how far regulations should go and why.

Local harmonization of regulations

One of the main examples of inefficient policy due to the lack of data is the lack of policies tailored to different types of freight transport. Full-truckload carriers (e.g., FTC, supermarket or beverage suppliers), less-than-truckload carriers (e.g., LTC and retailer shops) and courier services are operating in Spain within the same set of regulations, while their delivery practices and the schedules preferred by their customers are very different. While this has been happening for years, one of the main complaints regarding deliveries in urban areas by less-than-truckload carriers is that no steps have been taken to adapt regulations to this delivery type. FTC often require around one hour to make deliveries, parking in a given spot and then using a handcart to carry the goods to the supermarket or to all the bars in the street. LTC need around 15–20 min and will use load zones where available to make the delivery. Finally, couriers need no more than 1–5 min and will always park illegally in front of their destination, sometimes blocking the street entirely. Clearly, these different types of carriers require different types of regulations.

National/European harmonization of regulations

Taking noise or pollution regulations as an example, urban accessibility regulations should be standardized to create a common regulatory framework where all Spanish/European carriers operate on equal terms. Similar time windows, load zone policies, access restrictions or enforcement criteria throughout the same country are a long-time request of carriers, and these regulations should be harmonized unless there are clear and justified reasons for keeping them different in different cities. In any case, local governments in Spain should provide easier access to their regulations for city logistics. The existence of a web-based database, either public or privately owned and maintained, containing the policies in each city and the zones where they are applied, would be a great help to nationwide or international carriers. Furthermore, the ability of municipalities to enforce regulations would benefit from easily accessible, updated information to this database.

Load zone policy

The final set of efforts should be oriented towards improving the management of on-street load/unload facilities, since they are the only infrastructure currently available for freight distribution in Spanish city centers.

Distinguish types of streets in the city center

Parking regulations are usually the same for the whole city. Perhaps they should be different depending on the type of street (e.g., number of lanes, commercial density, and parking availability). Streets serving as main entry-exit points to the city center should not be treated as secondary streets, and some streets should be provided with a load zone, while double parking for brief delivery operations might be allowed in others. In addition, some streets without residential buildings might be suitable for night deliveries. The key is to analyze the needs of the transport sector, provide en-

ough infrastructure and regulatory capacity, and then enforce their correct use and application.

Load zone surveillance

The enforcement of load zones and rotations could well make use of new technologies (Giannopoulos, 2004). Unidentified vans or repair service vans use load zones in Spanish cities as parking spaces, occupying them for a whole day. Using license plate recognition devices should help the authorities to at least ensure that frequent rotations of vehicles are achieved in these zones. Again, this should be combined with enforcement policies to guarantee that freight vehicles are using available load zones instead of double parking in front of their final destinations.

Internet reservation of load zones

Another possible way to improve load zone management is the introduction of a system for optimizing load zone use by guaranteeing their exclusive availability for pre-specified freight delivery vehicles. This system would also guarantee adequate rotation of vehicles in the load zones, avoiding indefinite stays of delivery vehicles. The idea is to use a web-based application to reserve, in advance, space in a load zone (Stickel & Furmans, 2005). This type of system was tested successfully in Seville thanks to European research support funds (Muñuzuri, Larrañeta, Ibáñez, & Montero, 2006).

The issue of enforcement

Despite the possibilities offered by reversible, inexpensive measures, enforcement, or rather the political willingness to enforce certain mobility policies, is possibly the most critical aspect of introducing city logistics concepts in Spanish cities. The regulation framework under which urban mobility operates in Spain is seldom applied to its full extent, given the strong political implications of undermining the freedom of the involved stakeholders.

On the one hand, their own sustainability objectives and the negative perception of urban freight cause local authorities to restrict the movements of delivery vehicles and their double parking. However, this tendency is theoretical and media-oriented, as local authorities are simultaneously very aware of the needs of commercial activity in the city and of the limitations of the freight delivery system. Attempts to make regulations stricter, or to even strictly enforce existing ones, often result in strike threats by the transportation sector and protests by receivers.

But on the other hand, private passenger transport, which is the main competitor of freight vehicles for the use of the scarce space available in the city center, is also rarely affected by the application of regulations. The obsession of shop owners to guarantee accessibility for buyers in their cars, and the fact that many businesses and institutions are located in the city center and attract significant flows of administrative workers and customers, inhibit the authorities from decidedly eliminating illegal parking in the area. Opponents to double parking restrictions respond with strong social contestation and accusations that the motivation is merely to collect more ticket money.

In terms of urban freight distribution and urban mobility in general, Spain suffers from a natural tendency to break rules (Gras et al., 2006), and local authorities appear to accept this situation. The political costs mentioned above usually lead to an atmosphere of “laissez faire” that generates an atmosphere of incertitude. Local authorities do have the tools to enforce regulations, but it is up to individual policemen to decide when, how and to what extent they are applied. Thus, when local governments announce strong policies for the adaptation of urban traffic to existing regulations in an attempt to reduce congestion and double parking, the public

interpret it as wishful thinking. At the end of the day, the police are aware, for example, that forcing carriers to meet every regulation may put too much pressure on a sector that has low benefit margins and that is essential for the economic development of the city, so illegalities often go without punishment. Some consequences of this situation are the following:

- Load zones can very often be seen occupied by passenger vehicles during the load/unload time windows, a problem that is aggravated when these cars sometimes belong to the very owners of the shops where goods are to be delivered, inhibiting carriers from calling the police.
- As a consequence, double parking is a general practice in streets with more than one lane (see Fig. 1), and illegal parking spots (on the sidewalk, on pedestrian crossings, sometimes blocking streets) are often used in the narrow single-lane streets of city centers. This occurs even when load zones are available, as drivers prefer to park illegally in front of the final destination instead of in the distant, corresponding load zone. Over 70% of load/unload parking in Spanish cities is illegal (Vega, Díaz, Domínguez, & Calvo, 2006).
- Given that access and load zone time windows often do not correspond with retailers' opening hours, a change in these time windows has been a long-time request of carriers. However, as of yet no significant modifications have been introduced. The result is that carriers often have to disregard time window restrictions, caught between the need to make the delivery and the risk of getting a ticket. Despite access time windows, it is common to see delivery vehicles operating in Spanish city centers within the banned periods.

Thus, the current loading/parking conditions in Spain can be properly qualified as a *soft anarchy*. In fact, the request of carriers for more available load zones does not seem to be as strong as it should be. They may well prefer the existing soft anarchy that enables them to double park in front of their final destinations. It is easy to understand how the alternative, parking in a perfectly legal load zone a hundred meters away, might appear much less attractive.

Furthermore, there is the morally righteous position of freight vehicle drivers based on the pretext that they are *working*, while

the rest of the street users – except for taxis – appear to be leisure-based. This scenario, of course, is common for all types of mobility, as double parking and ignoring parking meters or time windows are also commonplace behaviors for passenger cars, behaviors that persist due to the lack of punishment by the authorities.

Conclusions

Urban freight policies in Spain are not often the result of detailed analyses and evaluations. This is reflected in the fact that similar types of regulations are common throughout different cities regardless of their particular characteristics as well as the existence of different schedules for time windows and load zones and failures in recognizing that different types of urban distribution require different types of regulations. Despite their common regulation frameworks, however, cities do not share information, knowledge or cooperation, and there is a significant lack of national or regional bodies dealing with city logistics. Nevertheless, there is but one aspect where city center residents and workers, local authorities, freight carriers and receivers agree: the need to improve the efficiency of the freight delivery system in Spanish cities, especially in those areas with narrow streets, high commercial density and tourist attractiveness. This is because frictions involved in changing urban transport policies have caused the paralysis of these regulatory frameworks, while the desire for strengthened restrictions, increases in pedestrian areas, and improved sustainability has increased.

We have proposed a series of measures that could help Spanish cities to better understand, manage and regulate freight transport in their historical centers. But these measures should not be considered as stand-alone recommendations. They should be embedded in a more profound traffic plan, where the issue of inapplicable regulations, which are all too often softened by the lack of enforcement, is eliminated for freight carriers as well as passenger cars, and where local administrations are provided with tools, guidelines and clear objectives to help them in their decision making. The definition of city logistics (meaning that, when delivering freight to city centers, sustainability must not run against



Fig. 1. Double parking of delivery vehicles in a congested street of the Seville city center.

efficiency and economic development) should be the cornerstone of this process. Most of the initiatives we have proposed in the “What could be done?” section are also applicable to other European countries, where there is more awareness of the urban freight issue but where the lack of data, of harmonized regulations and of innovative measures also limits the development of city logistics. However, the situation in Spain, unlike in Northern Europe or other countries, relies strongly on the issue of enforcement.

Clearly, none of the proposed measures is likely to work unless the issue of enforcement is solved, both for passenger mobility and freight delivery regulations. Investment and implementation do not make any sense when local administrations try to keep everyone quiet by doing nothing while simultaneously promoting politically popular sustainability and congestion policies in the media. The strong political costs and negative reactions inherent in Spanish culture put strong pressure on local authorities when it comes to enforcing certain policies, and the situation remains unchanged. Some of the measures described here are oriented towards relieving some of this pressure by enabling local authorities to count on reliable data in their decision-making processes. Nonetheless, the first step must always be the decision to take the risk to try and change the embedded behavior patterns of car and truck drivers in dense, booming, almost chaotic Spanish urban areas.

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