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ORGANISATIONAL AND POLITICAL APPROACH OF MODERN CITY LOGISTICS

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Abstract:
Nowadays, the subject of city (or urban) logistics occupies an important place in research in the field of management, both in strategic management and in supply chain management. This is due to a continuous increase of deliveries of products in the urban space, which results from the metropolisation of modern economies. The consequence of this is the saturation of the infrastructures and the environmental damage that considerably harm the residents' quality of life. Several local authorities have taken over the issue of city logistics management and do not intend to let companies freely organise the delivery of their products in town, in a chaotic and uncoordinated manner. In addition to the exercise of a regulatory and fiscal power aiming at changing behaviours, local authorities wish to force city logistics stakeholders to find more efficient solutions as part of a pooled organisation of flows. The objective of the paper is to identify the different stakeholders of city logistics, then to indicate the nature of the intervention of local authorities, notably regarding the creation of freight stations, to better coordinate supply chain operations. The main conclusion is that only an approach combining public and private action will genuinely guarantee the implementation of sustainable city logistics.

Keywords: City logistics, Freight stations, Local authorities, Logistics sprawl, Stakeholders, Supply chain management.

1. INTRODUCTION

Logistics is an essential function for the smooth operations of economic activities, services and the satisfaction of needs of individuals (Christopher, 2016). At the macro-economic level, it is located between production (upstream) and consumption (downstream); it supports these activities, and constitutes a key challenge at the economic, social and environmental levels, for the public stakeholders as well as the private stakeholders. At the national level, logistics is now known as a determining factor of a country's competitiveness. According to CAT-Logistique, in France, it represents 8 to 10% of the GNP, a turnover of 200 billion euros, and 1.8 million jobs, that is to say 10% of the private sector employment. The logistical costs represent an average of 10% of companies' turnover, with however a significant difference between the business areas. These costs are closely tied to the variables impacting logistical resources (oil price, interest rates, labour cost), as well as the performance of supply chains, and the control of information flow that enable the improvement of their management to make the right product available, in the right place, at the right time and at the best price.

If the analysis of logistical operations has experienced a strong development for the past forty years, the issue of urban deliveries as a link of global supply chains has drawn the attention only since the beginning of the 1990s, especially under the influence of the seminal works of Janssen & Oldenburger (1991), Ferrándiz (1994), Nemoto (1997), Van Duin (1997), Antun *et al.* (1998) and Löffler (1999). It is true that the issues regarding city logistics have become major, at the functional and environmental levels. Modern cities gather approximately 55% of inhabitants and consumers in the majority of developed and/or emerging countries, and an important part of sales activities and services. The increase is not expected to stop in the future according to the projections of the United Nations. To work in an efficient manner, a city, like the human body, should be fuelled with a variety of logistical flows; it must also dispose of the waste its activities generate, otherwise its functioning is endangered in the medium term.

The aim of the paper is to adopt a vision of city logistics that is both organisational and political. Indeed, if the city places itself in connection with several stakeholders, we must underline that a coordinated action requires a convergence of viewpoints, rather than an implementation of individual policies, incompatible with one another. In this respect, there is an important research gap to the extent that, as noted by Tadić *et al.* (2015, p. 326), "*decisions are made without consulting all stakeholders and considering the consequences for the entire system of the city logistics*". In other words, managing urban logistics operations in a more innovative, efficient, and productive manner demands reflection mixing the private action of companies and the public action of local authorities. A number of initiatives in Europe are heading in this direction, in particular in Germany, the Netherlands and France. They symbolise an important renewal in ways of thinking the city of tomorrow on more sustainable bases. This requires to clearly identify main stakes and suggest concrete modes of regulatory and land planning measures to improve the urban delivery of goods, for example in terms of restrictions on vehicles, time slots or establishment of freight facilities[1].

2. CITY LOGISTICS: THE DIVERSITY OF STAKEHOLDERS

Following Taniguchi (2014, p. 311), we will define city logistics in the following manner: "*The process for totally optimizing 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*". The issues linked to city logistics have progressively emerged, in conjunction with the social and urban changes. If the concentration of urban populations increases each year, it is not necessarily correlated with the presence of economic activities in urban zones, and in particular in the city centre. Indeed, the financial strain often pushes some economic activities to leave cities for its periphery, and those that persist are led to reflect on their storing arrangements. When space is rare, sales will be the privileged activity, rather than storage; this leads to implementing just-in-time supply systems, and multiply transports. This phenomenon is further emphasised by the evolution of consumer demand, who have access to a variety of distribution channels, physical and digital, and to whom companies offer a range of products, as large as possible, to durably attract

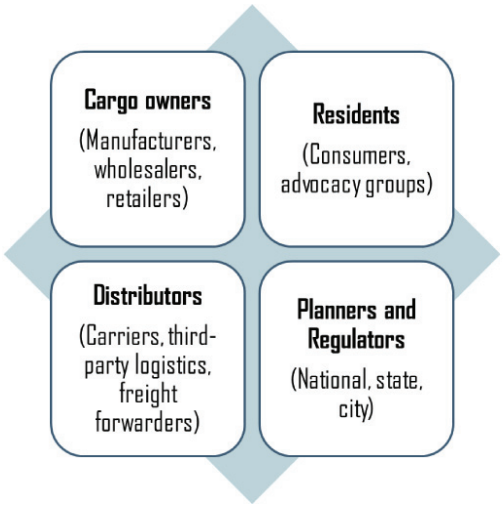
[1] The authors thank the *Confédération Française du Commerce de Gros et International* (CGI), the French Professional Association of Wholesalers and Intermediaries, for its financial support, and two anonymous reviewers for their comments on a first draft of the paper.

clients. Innovation in business relationships, for example with the establishment of click & collect delivery systems, emphasises the pressure on city logistics, and even more on city centres.

2.1. Public/private stakeholders

The most efficient way of integrating the urban dimension is now at the core of development policies of several stakeholders, whether public or private. Taylor (2005) synthesises four categories of operating stakeholders: cargo owners, distributors, planners and regulators, and residents (see Figure 1). In the category of distributors, wholesalers actively come together to meet the expectations of their professional clients in town, and in particular in the city centre (Sirjean *et al.*, 2017). However, they are challenged by TPL service providers, whose experience regarding pooling is acknowledged since the 1970s (Chanut & Paché, 2012). In unanimously strategic urban zones, given the concentration of the demand it represents, the constraints linked to the history, geography and regulation are numerous and the capacity to make the products circulate in the best possible conditions become essential for the dynamism of companies, as well as the cities themselves. That is why urban logistics is considered today as a key element both for public stakeholders (city planner and regulators) and private stakeholders (professionals in charge of product flow management aimed at customers).

Figure 1: Main stakeholders of city logistics (adapted from Taylor, 2005).



Two groups of stakeholders eventually stand out: actors directly involved in the new layout (primary stakeholders); and actors representing interest groups (additional stakeholders). City logistics integrates conventional members of the distribution channel, constituting a first group of stakeholders: (1) *flow leaders*, mainly manufacturers, large retailers, wholesalers and e-tailers; (2) *flow and/or infrastructure managers*, that is to say traditional logistical service suppliers, as well as passenger transport operators; and (3) *flow regulators*, that is to say local authorities, having a more political role in the management of products in the urban space. In addition to the direct players of the first group, we need to introduce a second group of additional stakeholders; it also has a power of influence, in the sense of Milgrom & Roberts (1988), in other words an ability to steer the city logistics management in a particular direction. There are different types of professional associations, directly representing the members' interests. For example, in France, the *Confédération Française du Commerce de Gros et International*, CGI (French Professional Association of Wholesalers and Intermediaries), professional organisation representing the wholesaling business, keeps its members informed regarding the major economic challenges linked to intermediation and sponsored in 2017 a study on the dynamic role that can be played by wholesalers in the implementation of sustainable city logistics (Sirjean & Boudouin, 2017). The second group of additional stakeholders also integrates resident associations, representing, on the other side of the supply chain, the users of the urban space and the recipients of deliveries.

2.2. A supply chain perspective

Over a long period, the flow of products in supply chains was considered as a simple outcome of the economic, social and industrial organization (Ellram, 1991). Now, the observers of the operation

across territories agree on the central role of spatial planning, whatever the geographic scale taken in consideration. This is notably the case for urban entities as, evidently, the quality of the deliveries completed by private stakeholders impact the life of the inhabitants (through the costs and reliability of their servicing), productivity of services (often dependent on a multitude of products). The major role of products in city life is found in a more general manner in all that comes under urban governance as this latter must rationalize flows with the ambition of reducing their negative consequences, offer the space necessary to companies, and implement a regulation on deliveries and collection of products. Thus, we can say that the dynamic of flow of products is a good indicator of the vitality of urban areas as part of a global supply chain.

Indeed, urban logistics cannot be disconnected from what is happening upstream, in the manufacturers' warehouses, or downstream, in the customers' home. The overall performance of a supply chain is always synonymous of fluidity and adaptability. It can only be fully reached if there is a link between the different logistical stages enabling the marketing of products, and the presence of a sustainable collaboration between all the supply chain members (Christopher, 2016). This applies to the two large activities present in the organisation of flows: (1) static logistical operations (packaging, order preparation, storage); and (2) transport of products (transit, handling, return of unsold merchandise). In other words, an efficient city logistics needs to be planned by integrating all the key components that accumulate from the production activity to the provisioning of products. The notion of product flow has here a broader meaning, as opposed to flow of people. The variety of products and stakeholders involved covers a broad range, integrating food supplies for shops, restaurants (private or in companies), school and hospital kitchens, delivery on construction sites, pharmaceutical products for pharmacies, etc. It results in a great variety of flows and organisational practices that need to be taken into account for the possible answers to different problems raised concerning city logistics.

3. CITY LOGISTICS: THE NECESSARY CONVERGENCE OF VIEWPOINTS

For a long time, the flow of products was considered as a simple outcome of the economic and social organisation. The observers of the operation of territories now agree to acknowledge its dynamic role in the planning, whatever the geographical scale taken into account (Masson & Petiot, 2013; Raimbault *et al.*, 2013; Silva & Ferreira, 2016). It is the case in particular for urban areas as, clearly, the quality of the deliveries made by the wholesalers and TPL service providers impact the lives of the inhabitants (through their essential procurement), the development of retailing (through the costs and the reliability of the servicing), and the productivity of the services (often dependent on a multitude of products). The major role of products in the development of cities is seen more broadly in all that falls under urban policies. Indeed, urban governance has the duty of rationalising flows with the ambition to reduce their negative consequences, to maintain the activities that justify the notion of "living together", to offer the necessary zones to companies, and to implement a regulation on the delivery and collection of products. Indeed, the ability to exchange in the right conditions has become a key element of productivity and attractivity of the city. In brief, the dynamics of product flow is a good indicator of the vitality of urban areas.

3.1. The logistics sprawl dilemma

With this general framework set, we must admit that paradoxically there is a more or less marked rejection of logistical activities outside of cities, still called phenomenon of logistics sprawl (Dablanc & Andriankaja, 2011; Aljohani & Thompson, 2016; Todesco *et al.*, 2016; Woudsma *et al.*, 2016). Formerly placed in urban areas, the points of contact between the urban and interurban areas (sites on which are made the consolidation and breakdown of products by delivery rounds) increasingly move away from the centres. The same applies to the storage locations participating in the regular servicing of dense zones while the frequency of delivery (or pick-up) like time constraints advocate for a positioning at the nearest of the barycentre of the zones to supply. The logistics sprawl is due to two main reasons:

- The difficulties experienced by cargo owners and distributors to find some land space in the city that can host them in accordance with their economic and technical imperatives (Cidell, 2010). Indeed, through its usually gigantic size, a platform destined to urban deliveries will generate strong constraints regarding the sizing, accessibility of vehicles and acquisition cost.

– The refusal of populations who see equipment being installed close to their homes destined for activities that are considered as synonymous of environmental damage, essentially as a result of visual and phonic disturbances (Bahoken & Raimbault, 2012). These standpoints are, for that matter, often relayed by planners, which results in city planning documents that strongly hinder settling possibilities.

Consequently, the plans in effect to serve cities must take into account the logistics sprawl and specific constraints of each urban area. Several plans, in particular those that rely on parcel delivery services, are based on a consolidation on the periphery followed by a deconsolidation through small vehicles. It results in a multiplication of delivery vehicles in the cities with overloaded access roads. For example, to replace one 17-ton vehicle, ten 3.5-ton vehicles will be needed. These adverse effects are identical for the shipment of waste (Zhang *et al.*, 2011), even if it is possible to consolidate the flows in order to use the same vehicles coming in and leaving the city. Other plans, in particular those of wholesalers and TPL service providers, will associate the relative proximity of a storage area and product handling, and the organisation of delivery rounds by small or large vehicles according to the cases (Sirjean *et al.*, 2017). The consolidation and deconsolidation generally goes hand in hand with value creating activities (advice, service, quality control, packaging, etc.), that is positive for urban dynamics.

3.2. Towards an eco-friendly solution

If the economic (overcost of activities placed in dense zones) and environmental (increase of CO_2 emissions) impacts accelerate the phenomenon of logistics sprawl, it is useful to question how to re-establish buildings sheltering logistical functions at the nearest of customers. This is a vital condition to improve the management of the last mile, including by facilitating the use of clean vehicles to decrease environmental impacts. Therefore, Faccio & Gamberi (2015) underline that one of the main stakes of tomorrow's urban logistics is to combine several transport means, rather than consider that a complete eco-friendly solution is the only viable solution. A variety of actions is possible. Some actions can be authoritative and result from an extremely assertive urban zoning: reception zones are established and professionals are forced to settle in dedicated zones. Other actions can be based on a strict regulation of use of the streets; for example, the traffic can be forbidden during certain hours in some places and, for some types of vehicles, mechanically leading professionals towards local transport hubs which location was defined by local planners.

Private stakeholders, and in particular wholesalers, also taking into account the environmental impacts in their organizational choices, come together today with economic targets. Companies committed to citizen initiatives, while remaining actors who need to make profits: their survival depending on it. They are aware that the environment increasingly interferes in the competition and some wholesalers develop clearly aggressive tools in that area (use of "clean" vehicles, management of packaging, display of carbon footprint). The tightening of rules defining the acceptable levels of air, or noise, pollution campaigns in favor of the creation of systems enabling a better environmental coordination of urban flows. Of course, the sustainable practices cannot be analyzed without taking into consideration the costs, in a context where the time value is constantly present. As Lindholm & Blinge (2014, p. 126) indicate, "*there is a need for a combination of cost efficient incentives, agreements, taxes and regulations to create a sustainable freight transport system with preserved competitiveness*". The extreme diversity of products and types of wholesalers lead to a variety of cases dependent on urban realities (infrastructures, levels of traffic congestion, regulation) (Sirjean & Boudouin, 2017).

4. CITY LOGISTICS: TWO TYPES OF INTERVENTIONS

The effective organisation of city logistics requires as a priority that the issue of product movement be granted its full value by local planners and regulators. As pointed out by Durand (2017), the success of the structures dedicated to city logistics depends on a *dual governance* associating the private and the public domain. For decades, local planners and regulators only addressed the issue of movement of people, in particular in order to avoid recurring congestions of road infrastructures. Yet, the movement of people are not the only flows that need to be managed: economic exchanges implying products have a major role in the urban system as they are responsible for approximately a third of the failures observed in the transports in terms of traffic jams (Libeskind, 2015). In urban zones, there are only two types of possible interventions to improve logistics performance.

4.1. The main options

The *first intervention* consists in acting on the management of roads, that is to say define what is forbidden in terms of traffic and parking. Table 1 specifies a certain number of examples in Europe regarding regulatory and land planning measures to improve urban delivery of goods (Arthur D. Little, 2015). This mainly includes a regulation at three levels: (1) hours when servicing the city or parts of the city is possible; (2) halting conditions of delivery vehicles and removal of products; and (3) accepted delivery means regarding the size, engine power and associated equipment. All regulation must be analysed with care in view of its consequences. It must imperatively go hand in hand with a dialogue between stakeholders, information regarding measures taken and strict control of the behaviours observed. That is why cargo owners and distributors must be active participants in work groups implemented before the rules are set.

Table 1: Examples of regulatory and land planning measures to improve urban delivery of goods (Arthur D. Little, 2015)

Restrictions on vehicles	– Access restrictions to selected small areas and/or roads for transportation vehicles based on emissions (low emission zone), weight, size and/or age of the vehicle	**Berlin:** Low emission zone since 2008
Time slots	– Opening/shutting of certain areas using specific time slots for specific types of trucks	**Paris:** Time slots per type of truck in Paris city centre
Exclusivity zones	– Exclusivity for a single or limited number of transportation companies within certain areas – Can be limited to some truck sizes and/or time slots	**London:** Exclusivity zone for DHL around LHR
Creating specific zones for logistics	– Clustering of logistical zones in urban land planning	**Bologna:** Interporto Bologna freight village

The *second intervention* consists in creating or encouraging the creation of consolidation and deconsolidation equipment destined to optimise the delivery of products in town. These logistical infrastructures can take a number of forms in terms of objective and scaling. They are developed either by the public sector or by the private sector, or by cooperation between the two as part of a public-private partnership (Browne *et al.*, 2004; Lindholm & Browne, 2013; Gonzalez-Feliu *et al.*, 2014). Logistical infrastructures enable, on the one hand, to group and ungroup the shippings in places in which the accessibility is consistent with the volumes, more or less important, to process, and on the other hand, deploy from these places the most adapted means to service targeted urban zones. Table 2 summarises the advantages and disadvantages linked to the execution of freight facilities in the urban logistics context.

Table 2: Freight facilities in a urban logistics context (UN-Habitat, 2013)

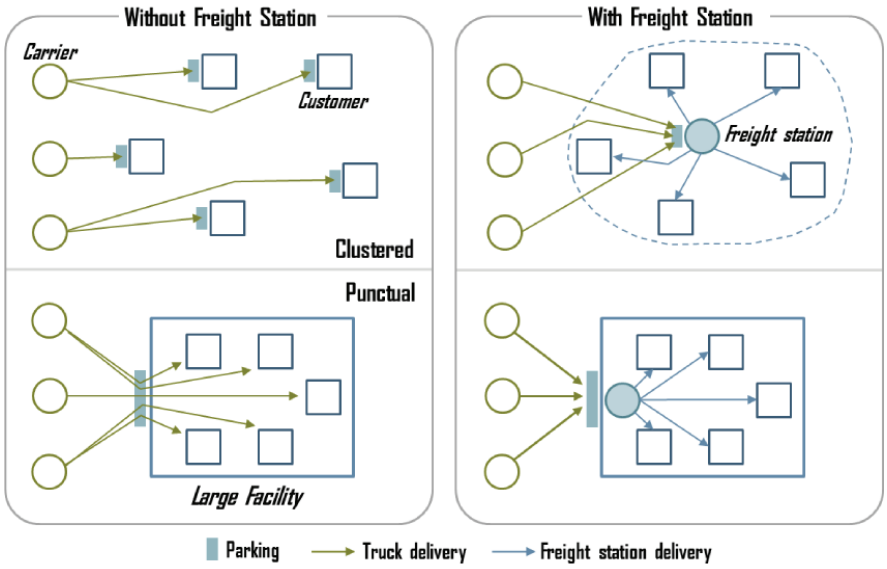
Strategy	Advantages	Drawbacks
Urban freight distribution centres	– Better usage of delivery assets – Less traffic congestion	– Additionnal costs and potential delays due to consolidation – May not well service consignee delivery requirements (e.g. time)
Local freight stations	– Less delivery parking – Single consolidation and deconsolidation location	– Deliveries from freight station to consignee – Management costs for the freight station
Designated delivery parking areas	– Better access to consignees – Less disruptive deliveries	– Fewer spaces for passenger vehicles

4.2. Freight station stakes

Obviously, these two types of interventions, that are regulation and creation of equipment, are not exclusive from one another; it is even close to vital to combine them to ensure their efficiency. Moreover, Lebeau *et al.* (2017) indicate that if local authorities support the creation of urban

consolidation centres, this does not mean that they give up on regulating the flows through a powerful regulatory interventionism. As an example of tools that can ease the delivery of wholesalers and TPL service providers in dense zones, below we show two, in principle, interesting operations. They fit in the freight station model presented in Figure 2. On the left-hand side of the figure, each carrier manages its own deliveries to a cluster of customers (retailers, an office tower, a large residential tower, etc.). It results in the multiplication of vehicles and an accrued risk of traffic. On the right-hand side of the figure, on the contrary, the carriers have the opportunity to consolidate several deliveries in one truck trip, and they only need to supply the freight station. Each freight station has facilities enabling the preparation of delivery rounds at the nearest of the customers.

Figure 2: The central role of freight station (© Jean-Paul Rodrigue, Hofstra University, 2017)



The creation of a freight station appears inevitable to face the progressive ban on the circulation of diesel vehicles in town. Indeed, it is essential to create transhipment points in which products can be transferred from diesel vehicles towards electric and less polluting transportation means (Browne *et al.*, 2011; Diziain *et al.*, 2014). Furthermore, freight stations help follow traffic regulation, as it is the case in Barcelona. The city is facing excessive air and noise pollution, which led it to establish a new mobility plan. It consists in creating several superblocks ("*superilles*") formed by linking existing blocks. Delivery vehicles are forced to circulate exclusively on large arteries defined by these superblocks, and can only enter the adjacent lanes if they need to service companies located there. The interior of superblocks has been redesigned with a speed of circulation limited to 10 km/h. The aim is to create up to 10 superblocks in the coming years, which will make the deliveries more difficult but will strongly improve its environment and security. This experience is not unique. It confirms that the environmental concerns and the will to optimise the logistical efficiency are major challenges for several large cities. This will result in an increase of the number of freight stations, becoming a standard rather than an expectation. From this point of view, the negative observation of Tadić *et al.* (2015) regarding the absence of a genuine urban logistics policy seems strict *vis-à-vis* the initiatives multiplying in several countries.

5. CONCLUDING REMARKS

For several years now, retail activities have experienced a rapid evolution. It was mainly affected by a strong comeback of convenience stores in city centres and the quick development of e-business. This evolution resulted in a disruption with a secular trend having lead mass retailing to localise its supermarkets and hypermarkets in peri-urban areas, and play on extreme bundling of supply flows, notably through full trucks. On the contrary, new emerging models favour capillary network reasoning given the fragmented nature of the products' final destination. This introduces the extremely complex issues of product flow within the city, in a societal context, that now places the development of a sustainable city as a priority favouring the quality of air and, more generally, the quality of life of its residents. One of the most significant changes is without doubt the will of local authorities, as

regulators, to plan the execution of collective structures of product transhipment to reduce the congestion of urban infrastructures. This theme is of great interest for researchers in marketing and retailing. The impact of the retail delivery service indeed could be significant, for example by imposing the use of freight stations to all distributors eventually leading to a standardisation of the level of delivery service. This agrees with Mishra's (2000) already old plea for an interdisciplinary approach of retail service delivery, in this case, by associating a marketing view and a logistical view.

5.1. Balancing between logistical performance and sustainable development

One of the major questions is relative to the link between the options preferred by local authorities regarding regional governance and value-creating strategies carried out by other stakeholders, in particular cargo owners and distributors. Indeed, the difficulties result in the fact that this governance should be mixed, combining the public and private-sector action: "*Public authorities can (...) be instrumental in bringing together all stakeholders to establish a shared diagnosis of the existing situation, identifying the potential for progress, and devising a strategy aimed at upgrading the country's logistics performance*" (Savy, 2016, p. 414). For local regulators and planners, the idea here is to know how to optimally balance between the necessary logistical performance, notably to continue making the region appealing, and the environmental needs for sustainable development. It is unsure that such arbitration can be done easily, as the aims may prove contradictory, for example between the bundling of flows, at the root of economies of scale, and the necessary proximity for a genuinely eco-friendly capillary logistics. Real estate investments regarding freight station is unquestionably a mean to rationalise flows, optimise the loading and unloading of vehicles and organise the delivery of customers outside of peak hours. Reflecting on urban logistics is a way of taking interest in spatial development policies, but it is uncertain that companies pursuing their own objectives of profitability easily accept to conform to it.

5.2. Research avenues

The current evolutions regarding urban logistics open up research avenues of the utmost importance, in public management, in strategic management and in supply chain management. Two themes that seem very important to further investigate the area with empirical works. The first theme is the cooperation between competing companies as soon as local authorities increasingly demand a pooling of logistical resources to supply stores and e-consumers located in the city centre. The second theme is the existence, or absence, of a model of urban logistics sufficiently universal to be replicated at a lower cost from an urban area to another:

- The fact that competing companies, for example large retailers present in a city centre, accept to cooperate at the level of logistical activities will cause very serious managerial problems, especially if one of the large retailers has a competitive advantage on that level (management of delivery rounds, control of logistical costs, etc.). It is difficult to imagine that it would easily accept to share its expertise and skills with competitors that are less skilled logistically. Consequently, the intervention of local authorities must take into account obstacles to cooperation, and discuss the collective benefits of a pooled city logistics with each private stakeholder.

- Even if each city centre has its own topography, resulting from its history and/or geography, it would be dangerous to consider that it is necessary to systematically reinvent city logistics. On the contrary, in an organisational learning perspective, it is vital to identify the invariants of an efficient urban logistics, whatever the city it applies to. From these invariants, it will then be possible to proceed to marginal adjustments on a limited number of dimensions. The emphasis of a *universal model of urban logistics* certainly constitutes a huge breakthrough for knowledge and for strategic action by avoiding starting from scratch for each reorganisation project of product circulation in the city centre.

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