

DISTRIBUTION IN LARGE URBAN CENTERS: MOBILITY DISABILITIES GENERATING COMPLEX LOGISTICS

DISTRIBUIÇÃO EM GRANDES CENTROS URBANOS: DEFICIÊNCIAS DE MOBILIDADE GERANDO COMPLEXIDADE LOGÍSTICA

Kenyth Alves de Freitas,

Email: kenyth.freitas@gmail.com

Doutorando em Administração de Empresas na Fundação Getúlio Vargas (EAESP), na linha de Gestão de Operações e Sustentabilidade. Bacharel em Ciências Econômicas (2013) e Mestre em Administração (2015), ambos pela Universidade Federal de Minas Gerais, Brasil.

Ricardo Silveira Martins

Email: ricardomartins.ufmg@gmail.com

Professor da Universidade Federal de Minas Gerais (UFMG), Coordenador do Programa de Pós-Graduação (Mestrado e Doutorado) em Administração do Centro de Pós-Graduação e Pesquisa em Administração (Cepead), Brasil.

Manuscript first received/Recebido em: 26/12/2017 Manuscript accepted/Aprovado em: 10/04/2018

ABSTRACT

Urban population growth in developing countries has transformed mobility in large urban centers more dramatic. In this way, the routine of companies and citizens suggest that restrictions of urban mobility seem to affect the traditional business distribution in large cities. Therefore, this research proposes to analyze how the literature has dealt with the impact of deficiencies in urban mobility on logistic capacities. It was possible to verify that the deficiencies of urban mobility have led to economic activities dispersion by the environment, which implies in an increase of small vehicles fleet and, consequently, resulting in the worse in mobility of goods and people in these cities.

Keywords: Urban mobility. Logistical Complexity. Urban Logistics. Distribution.

RESUMO

O crescimento da população urbana tornou mais dramática a mobilidade nos grandes centros urbanos nos países em desenvolvimento. Desta forma, os cotidianos das empresas e das cidades se entrelaçam e sugerem que as restrições de mobilidade urbana parecem afetar a distribuição tradicional dos negócios nas grandes cidades. Portanto, essa pesquisa propõe analisar como a literatura tem tratado o impacto das deficiências em mobilidade urbana nas capacidades logísticas das organizações. Foi possível verificar que as deficiências de mobilidade urbana conduzem à dispersão das atividades econômicas pelo ambiente, o que implica aumento da frota de pequenos veículos e, conseqüentemente, reforço ainda mais na piora da mobilidade de bens e pessoas nessas cidades.

Palavras-chave: Mobilidade urbana. Complexidade logística. Logística urbana. Distribuição.

1 INTRODUCTION

Whereas cities are growing in an accelerated rhythm, the demand for transportation of goods and services increases (Cherrett et. al, 2012), which highlights the issues of infrastructure investments and lack of urban planning. According to Viera and Fransoo (2015), the collaboration deficiency between logistic operators and clients, concurrently with restrictive legislation, complicates even more the urban distribution environment.

Therefore, companies have more difficulties to compose the supplies of their clients located in large centers (Lima Júnior, 2011). In accordance with Woxenius (2012), restrictive measures tend to augment urban traffic, since the operators' alternative is to migrate to fleet composed by smaller vehicles. Concomitantly, citizens take longer to dislocate from their homes to obtain the consumption items and often feel supplies difficulty through rising costs and stock out situations (Nuzzolo & Comi, 2014).

The aforementioned conditions occur at the same time in which a recent business model based on the reduction of inventories and deadline prevails. This environment further reinforces the need for development of logistics in these organizations. In order to ensure their own viability in the market, large companies were compelled to develop their logistic capacities internally and, in particular, in the relationship with other supply network members (Zinn, 2012). The

outcome was the logistic processes evolution and enhancement of strategic importance of logistic in the organizations (Zinn, 2012; Lima, 2003; Lambert; Stock & Vantine, 1998).

In large centers, the mobility of people and goods tends to be a more complex process due to the superior quantities of both journeys numbers and distance to small cities and/or towns. In this manner, logistic dynamics comprehension of companies installed in this environment could lead to significant managerial contributions to the establishment and elucidate definitions of operational parameters for both the retailers and their suppliers as well as for agents interaction in urban planning.

This study aim to respond the following question: *How the growth of large urban centers impact on the logistic efficiency of organizations?* For this, a theoretical literature review was used about the subject. One of the main advantages of this methodology is the capability to relate different approaches in the same study, resulting in an original work (Gil, 2002).

2 URBAN MOBILITY

Logistic activities development throughout history has had a military character. During military campaigns, it was strategic to supply troops with several resources, such as medicines, food, weapons and equipments. Concomitantly, the withdrawl of wounded, dead and prisoners from the battlefield was carried out with these plans. This has resulted in the formation of a complex logistic system that comprised military strategies (Tixier & Mathe, 1983).

Although military organizations already comprehend the logistic planning value, the utilization of these methods were still performed in a timid manner, restricted to transport and inventory activities. From the second half of the twentieth century, a series of trends that implied the need to deepen development of logistic activities were identified. Among these tendencies, the following can be listed: intensification process of organizations globalization, information technologies improvement and emergence of newm consumer demands (Ballantyne, Lindholm & Whiteing, 2013; Zinn, 2012; Ballou, 1993).

Markets diversification search has led companies to act internationally, expanding their borders between countries. Corporations have begun to establish relationships with partners' suppliers and international clients. An intensification process of globalization has elevated

environmental complexity, considering that companies operations needed to be expanded to a global scale. This meant creating a structure capable of producing, storing, transporting and maintaining the service level efficiently worldwide. Therefore, it was necessary for businesses to boost their logistic capabilities development, enhancing the coordination with their partners (Vilela, Alves, Ferreira, Freitas & Souza Junior 2016; Zinn, 2012; Ballou, 1993).

Simultaneously, keeping supplies at minor stock levels has become challenging due to growing urbanization deficits (Lindholm & Behrends, 2012). According to Dablanc (2007), urbanization occurred in a disorderly manner, resulting in a investment lackness in public roads, parking areas and goods deliveries. On the word of Arvidsson, Woxenius & Lammgard (2014), this scenario was accompanied by transit legislation modifications, which has brought about widespread inefficiency of transportation system and, therefore, magnified costs.

Urbanization process intensified in the twentieth century, impacting on both corporations' strategies and population routine. In 1950, approximately 30% of the global population lived in cities. In 2007, for the first time in history, urban population surpassed rural population in the world. As pointed out by United Nations projection (2014), about 54% of world citizens resided in cities in 2014. Nonetheless, predictions indicate that more than two-thirds of mankind will be residing in urban areas by 2050 (*United Nations*, 2014; Brown, 2003). It is expected that 89 countries will exceed the mark of more than 80% of the population living in cities.

Other worrying factor is the growth, in size and quantity, of metropolises in developing countries. According to Taubenböck et al. (2012), the largest urban agglomerations stand out from other cities due to their populational growth, attractive economy, sócio-cultural influence, environmental and political guidance, and geographical complexity. Thus, these represent dynamic urban centers with complex organization, demanding nobler planning.

In 1990, there were 10 cities that extrapolated 10 million inhabitants, which were called megacities. This number had jumped to 28 in 2014 and is projected to reach 41 in 2030. In accordance with United Nations (2014), the developing countries share in the megacities quantity will rise from the current 70% to about 90% in 2030 approximately. For that same year, the UN estimates that there will be 558 metropolises with more than 1 million

inhabitants. Developing countries will uniquely house two-thirds of these cities (United Nations, 2014 and Gohn, 2003).

A brief analysis of urbanization indicators in the world major regions reveals countries of consolidated urbanization and low growth as well as countries where urbanization process is in full steam. Asian countries are the main responsible for increasing global urbanization, as shown in Figure 2 (Euromonitor, 2005). In India and China alone, it is estimated that seven and six, respectively, of their cities have become megacities (United Nations, 2014).

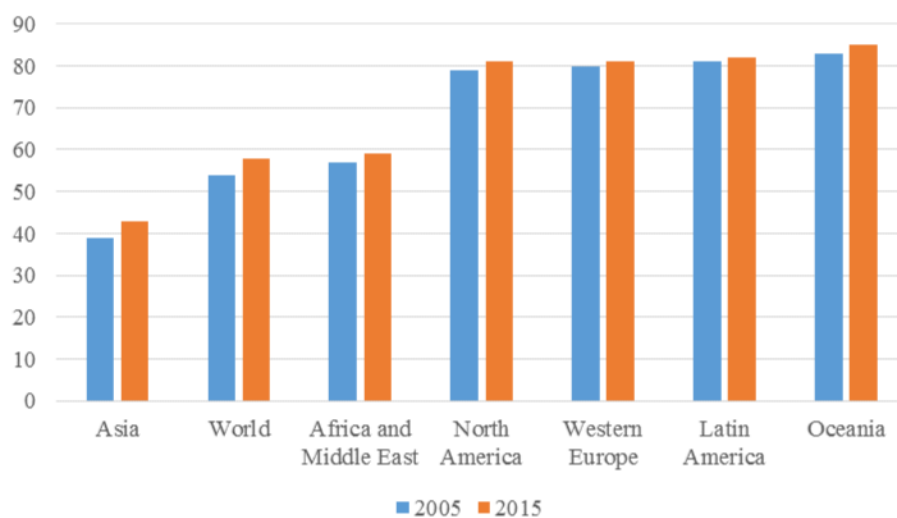


Figure 2. Urban Growth of major world regions between 2005 and 2015.

Source: EUROMONITOR. *The Shift to Towns & Out Again: Urbanisation and Ruralisation Patterns to 2015*, 2015.

According to the *Transport and Environment Reporting Mechanism [TERM]* (2000), the urban centers growth occurred in the same proportion that economic activities and dynamism, supported by transport development and improvement. Globalization process and liberation of markets augmented the distances between the raw material producers, the industries and the final client, resulting in both enhanced merchandises volume and longer displacement distances (Zinn, 2012). This rapid urbanization process conducted to a real crisis of urban mobility (Bergman & Rabi, 2005).

The Ministry of Cities (2004) elucidated that urban mobility should be understood as the interaction of urban management instruments subordinated to principles of environmental sustainability and social inclusion. For this institution, urban mobility could be understood as

[...] An attribute associated with citizens and goods, corresponding to different responses given by individuals and economic agents to their

displacement needs, considering the dimensions of urban space and the complexity of the activities developed in it (Ministério das Cidades, 2004, p. 13).

Urban mobility improvement cannot be achieved by increasing environmental pollution nor by excluding a particular group from the transport system.

Vasconcellos (2001) pointed out that the urban mobility concept should be related to a broad concept of accessibility, understood as:

[...] the mobility to meet the displacement needs, that is, the mobility that enables the person to reach the desired destinations. The word “mobility” should consider the circulation system provision (roads and vehicles) and the urban structure as independent elements (p. 27).

For the author, the main objective of transport facilities is to increase mobility. However, this view should not be blurred by a simple increasing in displacement quantities. Since a large number of displacements do not necessarily represent greater living conditions for population, the term “mobility” in its traditional meaning should not be treated separately from the accessibility concept (Vasconcellos, 2001).

Vasconcellos (2001) affirmed that the concept of mobility is more qualitative rather than simply a quantitative term, since mobility is related to the movement capability of people, groups and assets. This ability is defined by transportation facilities offer, activities location, physical and financial aspects of population, city growth speed and by the expansion and scope of communication systems.

Mobility plays an essential role in urban dynamics. Human settlement itself was shaped by two powerful phenomena, the urbanization and cities decentralization. The latter, also denominated “city scattering” occurs primarily due to two reasons: financial purpose and the search for more appropriate lifestyle patterns. The first refers to properties valuation in the central areas due to greater pursuit for these enterprises. Migration of the underprivileged to peripheral areas is the outcome, where the properties present inferior costs. In contrast, the second reason refers to a pursuit for areas that offer greater quality of life for population, i.e. lower pollution, noise and populational density (Brown, 2003).

According to Forrester (1975), the formation of cities is made from dynamic forces. Urban centers exert several attractive forces on both population and the enterprises. Thus, whether one of them diminishes, other may increase and/or new could be created. For the author, the

solution of cities issues is intertwined with urban planning, responsible for the definition of inhabitants' quantity, amount of residences and economic activities, among other characteristics. The result is the choice of the city's ideal urban type (commercial, industrial, touristic, among others) based on the advantages and drawbacks of urban area.

Urban agglomeration center emphasizes the vitality of a city, measured by economic, social and cultural strength. Silva and Cleps (2011) pointed out that a city center could be defined as an economically viable location to house commercial regions, providing a wide variety of professions, businesses and access to goods and services. Nonetheless, city growth and the consequente populational increase in peripheral áreas are creating the most serious urban mobility crisis in history.

Large urban centers induce a larger number of journeys, with displacements also greater than small centers. Consistent with Woxenius (2012), large traffic jam, unsafe roads and poor urban infrastructure are the main reasons for not performing the shortest feasible route. Moreover, the use of smaller vehicles fleet results in the need for greater number of displacements (Vieira & Fransoo, 2015).

This reality occurs resulted from geographical dispersion of population in these cities over a larger área. This comes about basically due to two reasons: massive utilization of cars and population augment in peripheral areas. In developing countries cities, this phenomenon is even more intense. These urban centers grew after automobile creation, so transportation alternatives were not included in urban planning.

Private vehicles are the main means of personal transport in most countries (*World Business Council for Sustainable Development* [WBCSD], 2001). This raises another concern for police makers: the pressures for sustainability. Along with Geels (2012), the motorized transportation based on fossil fuels are not sustainable regarding economical, social, and environmental aspects". These transports are responsible for 40% of total greenhouse gas emissions (Glaeser & Kahn, 2010).

This situation demands urban planning measures that guarantee the following benefits to urban agentes:

- Reducing urban mobility impacts on the life quality of the city's population (Geels, 2012);

- Efficiency improvement of services provided by logistics operators, by reducing congestion and access difficulties (Glaeser & Kahn, 2010; Vieira & Fransoo, 2015);
- Flow continuity of goods and services between companies and consumers, guaranteeing the stability and growth of economic activities. (Bergman & Rabi, 2005).

In this context of pressures emergence on mobility, it is indispensable to review public policies for cities. The model of mass road transport needs to be replaced by an integrated transport model that aims to restrict traffic growth, reduce social impacts and apply more environmentally friendly sustainable technologies (Glaeser & Kahn, 2010; Vieira & Fransoo, 2015; TERM, 2000).

Brown (2003) argues that cities that are more dependent on car utilization have greater issues of congestion and mobility difficulties than cities offering other displacement options (Moeinaddini, Asadi-Shekari & Shah, 2015; Vieira & Fransoo, 2015). Traffic jam arises because there is insufficient capacity for the current demand, resulted from misunderstanding associated with urban planning or lack thereof.

3 DISCUSSION AND RESULTS

3.1 Lack of urban planning as urban deficiencies causes

For Hesse (1995), the planning of urban loads movement faces difficulties, which result in even more impacts of this service in the city's routine. As a result, the citizens' tolerance in relation to the load vehicle is nearby zero. Trucks movement affects physical and social environments of cities, generating noise pollution, pollutants emission and vibrations (Lima Júnior, 2003). Demir, Huang, Scholts & Woensel (2015) added in their study a recent concern about the increase in greenhouse gases emissions associated with the growth of urban delivery fleet.

The planning absence of Brazilian cities was identified in studies as the main cause of urban mobility issues (Lima Júnior, 2011). As stated by the author, cities were not prepared to accommodate such a large population nor provide logistic services. This problem does not only affect Brazilian cities. As Dablanc (2007) mentioned, European cities have serious problems in adjusting internal urban structure to the displacement of goods and people.

This relationship is even more incompatible for emergent economy regions. Cities with significantly large population are greater sources of logistics challenges than other cities.

For instance, Mumbai city in India presents an average density of 30.000 people per square kilometre (Blance & Fransoo, 2014). Coupled with precarious planning, this situation leads to a chaotic environment for companies located in these areas.

According to Gatti Júnior (2011), the mobility deterioration has led large Brazilian cities to adopt restrictive traffic measures. Although these measures are essential, they generate new impacts on urban traffic. Consistant with this author, the restriction of heavy vehicles in Sao Paulo city increased the use of smaller cars by approximately 20%. This alteration in the circulating fleet has also resulted in augmented costs, productivitydecrease and efficiency levels reduction.

The outcomes of cargo fleet restriction in the city of Sao Paulo illustrate the urban transportation complexity. Measures that substantially restrict the large vehicles fleet lead to enhanced product costs, limit the goods supply, increase the absence of inverory lackness, and generate more pollution (Pelletier, Jabali & Laporte, 2016; Ehmke, Campbell & Thomas, 2016; Quak & Koster, 2008). In this manner, these pressures generate noticeable pressures on companies that influence in process reorganization.

3.2 Urban dynamics generating pressures in companies and logistical complexity

Corrêa (1989) affirmed that urban agentes action lead to the constant and complex process of cities' spatial reorganization. By incorporating new areas into urban space, increasing land utilization in certain city's regions, deteriorating some spaces and revitalization of others, creation of infrastructure that benefits certain areas and the modifications of economic and social agents of some city's areas (Blanco & Fransoo, 2014).

Urban área trades offer identity to urban space, as Salgueiro (1996) argued:

Trade is still an important urbanistic instrument due to its contribution to urban landscape. The stores are fundamental reference points in orientation and territorial use because of the differentiation they introduce in the built commerces. The concentration of establishments of a specific type identifies an area, and portrays the region as one image associated with that territory, as a landscape of identification (p. 32).

Urban expansion creates the conditions for the emergence of new retails formats, which enable new centralities appearance in the same urban agglomeration. The expansion of Income and consumption as well as the appreciation of consumers' convenience transform the peripheral areas into viable locations for the installation of certain commercial enterprises.

Cities' original centers change their character and start to incorporate the administrative sector of public and private institutions, the most sophisticated retails and leisure-oriented enterprises (Silva & Cleps, 2011; Taniguchi, Thompson & Yamada, 2013).

Consequently, the neighborhoods began to welcome the retails, such as branch stores of central departments and small commodity trades. The purpose of these ventures was to meet basic demands of local residents' basic products. However, the population growth and income increase have transformed this type of retail into more dynamic places, starting to offer a greater variety of goods and services (Pintaudi, 1981).

This dispersion is characterized by meeting the customers' new habits, who seek greater convenience and have insufficient time to purchase products of continuous use. Among the enterprises that tend to be dispersed are bakeries, supermarkets, drugstores, restaurants, shops specialized in certain food products types, such as butchers and small markets among other retail formats.

Logistics operators need to restructure the physical distribution to come across this demand with more delivery points scattered throughout the city (Figure 3). Concomitantly with the growth and dispersion of the delivery points, the orders become more fractioned due to establishments smaller sites located in cities outskirts (Zinn, 2012; Quispel, 2002; Czerniak, Lahsene & Chatterjee, 2000; Ogden, 1992). These results in an enhancement in load fleet destined to urban distribution.

As the recent delivery spots are spread throughout the urban area in regions of less dynamic infrastructure, it becomes necessary to create a smaller vehicles fleet that have the capacity to access stores located in narrow streets. Another concern are the government regulations, which restrict the times of goods delivery and the access of large vehicles to city center (Taniguchi, Thompson & Yamada, 2013; Zinn, 2012; Quispel, 2002; Czerniak, Lahsene & Chatterjee, 2000; Ogden, 1992).

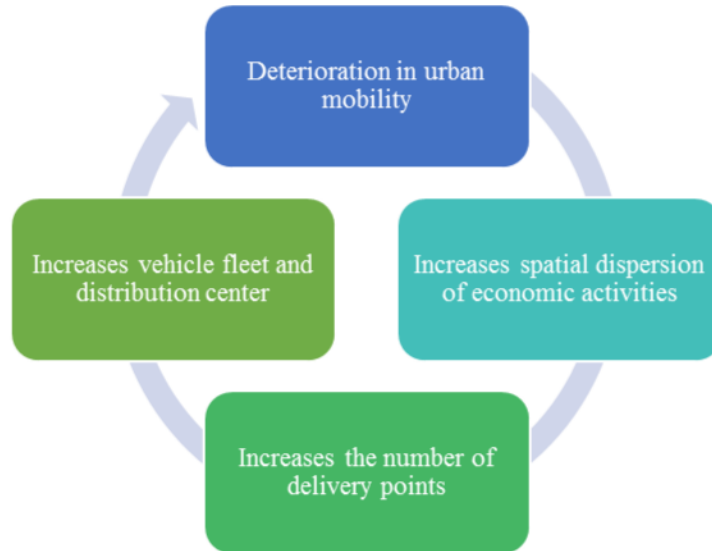


Figure 3. Urban mobility deficiencies generating a “vicious cycle” for the logistics

Source: Elaborated by the authors

Aiming to replenish small enterprises inventories in an agile manner, companies need to implement new distribution centers. In addition, it becomes necessary the creation of a smaller vehicles fleet, which have the capacity to access stores located in narrow streets. Another issue is the government regulations, which restrict schedules delivery and large vehicles access to city centers (Zinn, 2012; Quispel, 2002; Czerniak, Lahsene & Chatterjee, 2000; Ogden, 1992). As stated by Taniguchi, Thompson & Yamada (2013), urban distribution plays a role inside of an extremely complex environment and, therefore, should be aware to its effects on others stakeholders.

Moreover, companies need to create an innovative distribution structure to meet this new scenario, with orders presenting smaller lots scattered throughout the city. Intending to achieve this innovative formula, several implementations are needed, such as advanced distribution centers and expansion of smaller vehicles fleet. These would assist at maintaining the movement of goods and avoiding ruptures and stockout (Zinn, 2012). The final result would be an increase in inventories of manufacturers and wholesalers as well as a larger number of road vehicles (Danielis et al., 2013).

4 CONCLUSIONS

These urban mobility challenges are resulted from the lack of planning of Brazilian large cities and insufficient resources for the implementation of great impact projects. These challenges conduct to a more elevated complexity and rising costs of urban loads distribution, through economic activities dispersion along the urban area of these metropolises. Small

vehicles fleet structuration and new distribution centers creation augment logistical costs and further impact on these cities traffic jam.

Therefore, researches in this area become fundamental to companies, public sector and society. The creation of an efficient and productive urban transport system, which has less impact on urban mobility efficiency, depends on the joint initiative of public and private sectors. When this cooperative action does not occur properly, urban mobility itself is impaired, affecting the lifestyle of all urban agents.

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