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Are Brazilian cities ready to develop an efficient urban freight mobility plan?

As cidades brasileiras estão preparadas para desenvolver um plano eficiente de mobilidade urbana de carga?

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Abstract

According to the Urban Mobility National Policy (UMNP), Brazilian cities with more than 20,000 inhabitants are obligated to elaborate Urban Mobility Plans (UMPs). The literature shows a lack of national research on urban freight planning and a need for better understanding issues on cargo transportation for authorities, especially regarding decision-making on policies and on urban freight transportation planning. City Logistics solutions can be considered on UMPs to reduce the problematic urban freight transport. Therefore, a survey was applied to investigate the resources available within cities to draw UMPs, the solutions for cargo movement in Brazilian cities, and the perceptions of public managers about freight transportation. The results show that "restrictions" are the solutions most adopted by Brazilian authorities, including the representative sample for cities within the São Paulo State with more than 250,000 inhabitants. The conclusions point out that Brazilian cities are not prepared to develop an efficient urban freight plan, as public managers seem to be unconscious about urban logistics demands within their cities or have neglected aspects regarding urban freight within the UMNP.

Keywords: Urban Mobility Plan. Urban logistics. Urban freight transport. Brazilian cities. Survey.

Resumo

Conforme o Plano Nacional de Mobilidade Urbana (PNMU), as cidades brasileiras com mais de 20 mil habitantes são obrigadas a elaborar Planos de Mobilidade Urbana (PlanMob). A literatura mostra falta de pesquisas nacionais sobre planejamento e políticas de frete urbano e de um melhor entendimento para as autoridades sobre transporte de cargas, especialmente para a tomada de decisão sobre políticas e planejamento do

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transporte urbano de carga. Soluções para Logística Urbana podem ser consideradas nos PlanMobs para reduzir o problemático transporte urbano de cargas. Dessa forma, um levantamento de dados foi realizado para investigar os recursos disponíveis para as cidades planejarem o PlanMob, as soluções para a movimentação de cargas presentes nas cidades brasileiras e as percepções de gestores públicos sobre o transporte de carga em suas cidades. Os resultados mostram que as soluções mais adotadas pelas autoridades brasileiras são as restrições, incluindo uma amostra representativa das cidades do estado de São Paulo com mais de 250 mil habitantes. As conclusões apontam que as cidades brasileiras não estão preparadas para desenvolver um plano eficiente de transporte de carga urbano, porque os gestores públicos parecem estar inconscientes sobre demandas da logística urbana em suas cidades ou os gestores têm negligenciado aspectos de carga urbana dentro do PNMU.

Palavras-chave: *Plano de Mobilidade Urbana. Logística urbana. Transporte urbano de carga. Cidades brasileiras.* Survey.

Introduction

Urban Mobility National Policy (UMNP) was established in Brazil by Law 12587, which regulates the accessibility and mobility of people and cargo within Brazilian cities (Brasil, 2012). According to the Law, cities with more than 20,000 inhabitants must adopt an Urban Mobility Plan (UMP) to manage passengers' transport and cargo operations. UMP is also a mobility management tool for city managers, as it regulates resources and financial planning, public land use and stakeholders' participation (Silva et al., 2008). Regarding freight transport, a UMP must consider transport operations, congestion poles, public and private parking and restricted areas and time zones (Abreu, 2015).

However, according to the Ministério das Cidades (Brasil, 2013), from 1,650 cities expected to have a UMP (Lima & Galindo, 2013) only 174 declared to have one. This low percentage (10.5%) suggests the cities are not prepared to elaborate their UMP, not even some large cities of the São Paulo State where solutions have been evaluated for decades. Urban freight transport seems to be only superficially considered or not considered at all into UMPs (Dias, 2017).

The objective of this paper is to analyze the perception of public managers towards UMP elaboration and the use of urban logistics variables at UMP. A survey was carried out to understand if cities with more than 20,000 inhabitants are prepared for UMP planning regarding urban freight transportation. Additionally, we analyze if urban logistics solutions are considered in urban freight transportation by municipalities, especially in large cities in the São Paulo State; and we evaluate the viewpoint of public managers towards urban freight transportation. The contribution of this paper is to explore the situation of UMNP in Brazil and assess the interest of public managers and authorities to modify the current state of urban freight transportation within the UMPs.

The structure of this paper is as follows: the first section is the introduction; followed by a literature review and next, the methodology is described. We follow by presenting the results, and finally, we discuss the results based on the theoretical framework and we conclude respecting the limitations of the study.

Urban logistics

The concept of urban logistics (or city logistics) can be described as a full optimization process for transport and other logistics activities in urban areas, using advanced information systems (Taniguchi & Thompson, 2015), considering the conflicts among urban agents (Lindholm, 2013). To Oliveira (2014) the urban logistics aims to reduce the inefficiency in transport through innovative solutions, reducing problems and improving quality in urban freight distribution. Muñuzuri et al. (2005) state that the main goal for urban logistics is to reduce conflicts between the logistics companies and other stakeholders involved in urban mobility.

Quak (2009) and Muñuzuri et al. (2005) mention three different stakeholders in urban logistics: government, professionals, and impacted people. Agencies and authorities represent the government, whose objective towards urban logistics should be to increase the quality of life, maintain an attractive urban area and attract commerce and visitors to it

(Ballantyne et al., 2013). Professionals are every company involved directly with deliveries, such as freight companies or retailers (Yanqiang, 2014) and the impacted people are the residents, general public, tourists, etc., who are not directly involved with the urban goods movement but are affected by them (Quak, 2009). Passos et al. (2012) state that a great variety of stakeholders should be considered to have success in urban transportation policies. However, according to Vieira et al. (2015), the lack of collaboration between the different stakeholders and the policies seems to be the weakness of the urban freight distribution, as stakeholders have different interests and each one treats their problems separately. A great resistance is observed among retailers when questioned about their deliveries, especially if costs are involved, which may suggest a lack of knowledge about the solution benefits or strong resistance to changes (Oliveira & Oliveira, 2016).

Taniguchi & Thompson (2015) relate three important elements to improve urban logistics practices: (1) technology innovations, which allow data to be collected precisely, and can improve the data analysis with more efficient software; (2) changes in managers mentality to make transportation more environmentally friendly and greener, which is a helpful way for the company to be accepted as a good partner to create a better society; and (3) the public-private coordination in policy decisions, which many stakeholders are involved and the decisions can generate undesirable effects to some of them.

Urban logistics focus on specific problems, such as delays caused by congestion, lack of appropriate parking spaces, low interaction among users of urban infrastructure, environmental conditions, traffic accidents, etc. (Muñuzuri et al., 2005; Cherrett et al., 2012; Dablanc, 2007; Vieira et al., 2015; Demir et al., 2015). Awasthi & Proth (2006) reinforce that freight vehicles can cause negative effects due to an ineffective infrastructure, high quantity of deliveries, lack of appropriate parking lots for loading and unloading, the size of the vehicles, maneuver capacity, accessibility reduction to other road users, and the occurrence of accidents. Moreover, the complexity of urban logistics is increased by the dynamic inventory management, e-commerce, environmental conscience evolution and a growing urbanization (Wolpert & Reuter, 2012; Dablanc & Rakotonarivo, 2010).

Although the cities are different in size, economy, cultural and political structures, the transportation sector perform an important role in each one of them. Behrends & Lindholm (2012) consider planning the most important part of an urban freight transportation system to achieve sustainable and efficient urban transport. Public managers are responsible for planning, organizing, controlling and improving policies (Taniguchi et al., 2014; Dablanc, 2007). However, the transportation planning process has a high degree of uncertainty caused by (1) the great number of potential policy clusters, (2) the execution method and (3) the user response for each policy cluster (Quak, 2011). Ballantyne et al. (2013) add a fourth factor to these uncertainties: (4) the stakeholder's response for each policy cluster. External factors can also be an uncertainty for a transportation planning process because local authorities generally cannot influence elements such as cultural traditions, national laws, and political structure. According to Cherrett et al. (2012), there is a lack of data on urban freight transport, which can limit the vision of the public decision makers. Any modification in an urban area demands political will, good cooperation between the local departments and cultural acceptance. As urban freight transport is not prioritized, the planning processes are time-consuming, and efforts are rarely spent with it (Behrends & Lindholm, 2012).

Solutions for urban logistics

Lindholm (2013) divides the urban logistics solutions into three groups: infrastructure, restrictions, and consolidation. *Infrastructure* is expensive and hard to change but solutions optimize the existent infrastructure. Tunnels, public transportation infrastructure, loading and unloading areas, cycle paths and sidewalks are examples of infrastructure solutions (Lindholm, 2013). As another example of an infrastructure solution, hub areas are exclusive parking spaces for cargo vehicles with the objective to reduce double parking and congestion within urban areas (Quak, 2015). Muñuzuri et al. (2005) point out that a well located hub area allows the deliveries to be made on foot, using a handcart or with some alternative vehicle. Parking areas for cargo vehicles are often seen as a waste of space for other stakeholders (Lindholm, 2013). Route and access

control reorganize the traffic in areas with limited or restricted access to freight transport, by signaling, using automatic bollards or means of police control (Muñuzuri et al., 2005).

Restrictions are limitations of areas or periods for some types of vehicles and can be implemented by local authorities. Route and access control are not well accepted by carriers, as it increases the delivery time, the route, the fuel consumption, and therefore, the costs (Quak, 2015). Oliveira & Oliveira (2016) also reinforce that restrictions imply an increase in the number of vehicles and delivery time. Muñuzuri et al. (2005) explain that access time windows are time intervals which cargo vehicles are allowed to enter certain regions of the city. This is one of the most common policies to manage urban freight access. The objective of access time windows is to avoid conflicts between freight carriers and residents (Muñuzuri et al., 2005). Signaling for cargo vehicles is one of the most common solutions found in Brazil (Brasil, 2015). The objective of signaling is to inform the freight conductors about street restrictions, time restrictions, weight restrictions, height restrictions, and so on. With cheap maintenance, this policy requires surveillance for restricted areas and is well accepted by some stakeholders (Lindholm, 2013). Off-Hour Delivery (OHD) restricts cargo vehicles in urban centers during the day, allowing their traffic during the night (Oliveira, 2014). In Belo Horizonte, retailers and carriers did not consider OHD an efficient solution, while the population and local managers approve this practice (Oliveira & Oliveira, 2016). National Academies of Sciences, Engineering, and Medicine (NASEM, 2015) in New York found different results, where carriers prefer delivering at night, due to the heavy traffic during the day. Road Pricing is an access regulation, which affects every type of vehicle, not only the urban freight transports, charging different values for each type of vehicle (Toralles & Paulitsch, 2010). The main idea of a road pricing is to distribute the traffic volume over time to reduce congestion, but it is not well received by citizens (Lindholm, 2013; Quak, 2015). Abreu (2015) highlights that road pricing is an unpopular measure, with low approval rates. Urban truck lanes are lanes in which only trucks are allowed to access in urban areas (UEMI & Solutions, 2015). This policy could reduce traffic delays, mostly caused by freight transport and big vehicles (Muñuzuri et al., 2005).

Lindholm (2013) describes *freight consolidation* as cargo to be grouped at one point of the city, instead of each vehicle delivering at different places. An Urban Distribution Centre (UDC) brings the idea of segregate movement and distribution within and outside the city (Van Rooijen & Quak, 2014). UDC goals are mainly environmental, but social and safety factors are other urban logistics purposes as well. According to Van Duin & Quak (2007), organization, subsidies, the number of users, vehicle types and location are key factors for success or failure of an UDC. Lindholm (2013) points out that the successful UDC's are located at a commercial center or at only one place. Even with improvements and benefits perceived by public managers, carriers, and other stakeholders, Abreu (2015) states that there is no UDC implemented in Brazil. Pick-up points are described as secure locations where the customers can pick up their packages bought by the Internet at a convenient time (UEMI & Solutions, 2015). This solution consolidates the packages and reduces the number of freight vehicles in urban areas, which benefits urban traffic and the environment.

Methodology

Survey and data collection

The methodology used in this research is based on a survey sent to the local authorities responsible for UMP's elaboration in each city. The UMP is compulsory to be developed by Law 12587/2012 in which an urban freight plan must be established. Based on literature review, the survey (Appendix A) addresses the following research question: "*Are Brazilian cities ready to develop an efficient urban freight mobility plan?*". This survey was developed according to planning phase described by Forza (2002) and it is divided into three blocks. The first block addresses six binary scale variables on issues related to municipalities' information resources to UMP elaboration. The second block inquires about the use of solutions for urban logistics by means of ten binary variables, while the third block evaluates the respondent perception on urban logistics by means of seven scale variables. In general, the aim of the survey is to investigate how municipalities deal with urban freight transport within the UMP and to answer the proposed question, the solutions for urban logistics are investigated, as

well as the perception of the managers about urban logistics. A pilot survey was validated by a professional responsible for elaborating UMPs with 32 years of experience. The data collection was carried out by e-mail, between August 2016 and March 2017.

Population and sample

The National Politics of Urban Mobility from Brazil states that every city with more than 20,000 inhabitants must have a UMP. This constraint generated a population of 1,650 cities from Brazil (Lima & Galindo, 2013). For a 6% sampling error and a 95% confidence interval, the sample should be composed of 230 cities. There were 260 surveys sent, and 70 were answered, i.e. 30.4% of the ideal sample responses. We grouped the respondents by population class, as shown in Figure 1.

According to the Brazilian Ministry of Cities, a survey carried out in 2016 revealed that 174 cities had developed their UMPs. From these cities, 69 are from the São Paulo state, and ten of them have a population of more than 250,000 inhabitants. From the ten cities that have the UMP, located in the São Paulo state and have more than 250,000 inhabitants, eight answered the survey. Although the sample corresponds to only 30.4% of the possible responses, within the São Paulo state the sample is representative for cities with more than 250,000 inhabitants.

About 75% of respondents were directors, advisors, architects or coordinators, and more than a half of them have more than 15 years of experience, which reveals a high management profile in the area. From the 70 respondents, 70% are cities from the Brazilian Southeast region, 15.7% from the south region, 7.1% from the center-west region, 4.3% from the northeast region and 2.9% from the North region. Stratifying the 70 cities by their population, 67.1% of the respondent cities have more than 100,000 inhabitants.

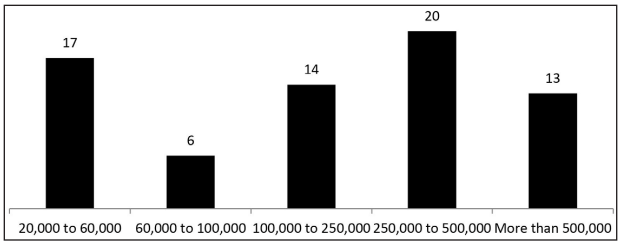

Figure 1 - Total respondents by population class (inhabitants)
The classification adopted by the Brazilian Ministry of Cities (Brasil, 2015). Source: Own elaboration.

Data analysis

The data were analyzed by means of central tendency measures, dispersion and quartiles with the objective to resume, describe and comprehend the survey answers, therefore characterizing how the Brazilian cities deal with their UMPs. A Spearman correlation was performed to point out any correlation between the perceptions of the respondents. To proceed with the necessary calculations, Microsoft Excel, version 2013 was used.

Initially, the data were purged to exclude any survey fill errors, and a Cronbach alpha was calculated to confirm that the respondents were aware during all questions.

Different analyses were carried out, including characterizing the respondent cities, the respondents experience profile, resources used in planning urban logistics solutions and respondents' perception about logistics and the UMP.

Results

Resources

To check the *status of the UMP's in cities*, the variable used was named PLANSTAT, and the results show that 38 cities have the UMP approved, and another nine cities are awaiting approval, which means that 47 cities have the UMP. There are 15 cities (21.4%) that do not have effectively (intend to have or do not have) a UMP, and eight cities marked the "Developing" option.

The *agency responsible for elaborating and reviewing the UMP* (RSPAGCY) reveals that Planning and Traffic/Transport/Urban Mobility are the agencies frequently responsible for the elaboration/reviewing of the mobility plans with 25 (35.7%) respondents for each agency.

The variable TPPLELB points out if there are *trained people to elaborate and review a UMP in the responsible agency*. It is a binary question, which shows that 71.4% of the cities declare they do not have people trained to elaborate or review an urban freight mobility plan. These results are compatible

with those stated by the literature, about the lack of competence of local authorities regarding urban freight transport planning (Dablanc, 2007; Zioni, 2009; Lindholm, 2012; Behrends & Lindholm, 2012; Silva & Marins, 2014; Lindholm & Blinge, 2014; Kawamura, 2015). Stratifying for inhabitants numbers (Figure 2), it is possible to observe that cities with a bigger population tend to have more trained people for elaborating and reviewing a UMP, but even for cities with more than 500,000 inhabitants, the percentage does not reach 50%. Although the respondents have a high management profile and are experienced, TPPLELB shows that most of them do not have any background in urban freight transport.

About 57% of the cities *consult or discuss mobility with the stakeholders* during the planning phase or discuss the outcomes (CNSSTKH), being more present in cities where the population is between 60,000 and 100,000 inhabitants. Those cities, which reported they do not have any consultation or discussion with stakeholders, corroborate the results found by Dablanc (2007). However, regarding *data collection* (DTCOLL) the 60,000 to 100,000 inhabitant, cities do not have any respondent with systematic data collection on cargo movement. Only 28.5% of the total respondents have *data collection*, mainly in cities with more than 500,000 inhabitants (Figure 2). Taniguchi & Thompson (2015) consider the data collection an important element, which can be used to understand and boost logistics in urban areas.

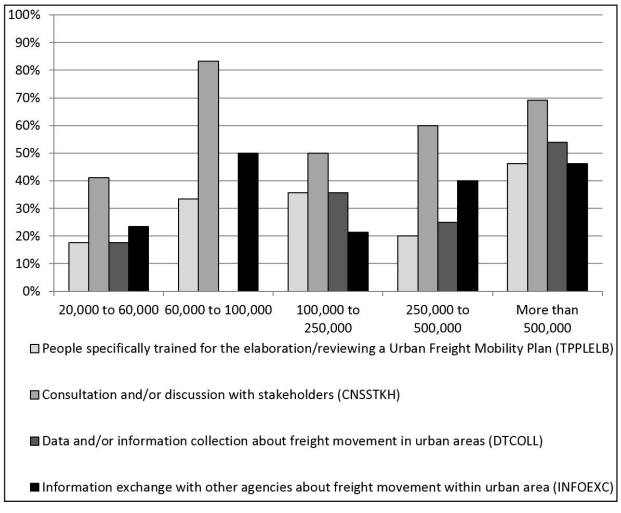

Figure 2 - Resources by population class (inhabitants)
Source: Own elaboration.

Related to the *information exchange*, the variable INFOEXC reveals that 65.7% of the respondents pointed out that there is no information exchange about freight movement with other agencies. Figure 2 shows that INFOEXC behavior is similar to CNSSTKH in cities between 60,000 and 100,000 inhabitants, where this variable is more present, followed by cities with more than 500,000 inhabitants. Land-use is one example where the collaboration between agencies could bring benefits for the city. Freight urban transport is influenced by the land-use, but it is rarely considered during the planning phase (Behrends & Lindholm, 2012).

The eight cities from the São Paulo state with more than 250,000 inhabitants declared that the UMP could be a reference to other cities. In most of these cities, the agency responsible for elaborating/reviewing the UMP is Planning or Traffic/Transport/Urban Mobility. Six respondents reported that there is no one trained specifically to elaborate/review an urban freight plan in the responsible agency. Three cities do not consult or discuss mobility with stakeholders, and in these cities, the agency responsible for the UMP does not exchange information with other agencies about cargo movement. Five cities from the São Paulo state with more than 250,000 inhabitants do not have a systematic data collection about freight transport.

Urban logistics solutions

Cargo vehicle restrictions were the most frequent solutions adopted by cities. This result converges to Bontempo et al. (2014) results, which states that Brazilian authorities frequently adopt restrictive solutions for urban freight transport. A comparison of the solutions is presented in Figure 3, grouped by the size of the population.

Time or area limitation for heavy vehicles (LIMITVHC) is the fourth most cited solution within urban areas. This solution is more frequent in cities with a population between 250,000 and 500,000 inhabitants (85%), and 52.9% of cities with 20,000 to 60,000 inhabitants have this solution implemented. The low percentage for smaller cities is compatible with their area and population, which suggests that smaller cities have less freight transport and therefore have fewer problems with heavy vehicles.

PRKCVHC considers *parking areas for cargo vehicles within the urban area*, and is the second most

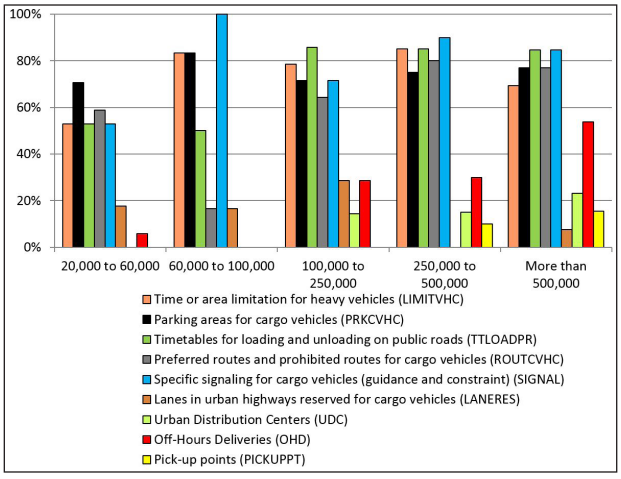

Figure 3 - Solutions by population class (inhabitants)
Source: Own elaboration.

mentioned solution among the respondents, with a 74.3% rate. Despite the cities with a population between 60,000 to 100,000, a growing pattern can be noticed for this solution from cities with 20,000 to 60,000 inhabitants to cities with more than 500,000 inhabitants, which implies that the bigger the area of a city, the more parking areas are necessary.

The use of *timetables for loading and unloading on public roads* (TTLOADPR), together with PRKCVHC as the second most adopted solution, is different from other variables analyzed, due to having about 50% of adoption for cities with a population between 20,000 to 100,000, and 85% for cities with more than 100,000 inhabitants. These results could be explained due to this solution having an easy implementation process and low cost.

Preferred and prohibited routes for cargo vehicles (ROUTCVHC) are the fifth solution most mentioned among the respondents (65.7%). The rate is higher for cities with a greater population. In this case, 80% of the cities with more than 250,000 inhabitants use this solution; while cities with a population above 250,000 have a 50% rate.

The variable SIGNAL, which refers to *specific signaling for cargo vehicles*, is the solution most adopted by the respondent cities (54 of the 70 cities, corresponding to a 77.1% rate). It is worth mentioning that 100% of the cities between 60,000 to 100,000 inhabitants declare to have specific signaling to cargo vehicles. The results confirm the literature (Brasil, 2015), as the cheapest solution to adopt, that does not require many resources and much planning (Lindholm, 2013).

Reserved lanes for cargo vehicles in urban roads (LANERES) have a low rate of adoption among the cities; just 12.9% of the respondents have a specific lane reserved for freight transport. Transporters and logistic companies are benefited with this solution as it reduces the transport delay. As it is not well accepted by the population and it is not a well-known solution, most Brazilian cities do not use it.

UDC's are not common in Brazil, as the results show that only 8 of the 70 respondents (11.4%) have a UDC. This solution presents a growing pattern, from 14.3% of cities with a population between 100,000 and 250,000 inhabitants to 23.1% for cities with more than 500,000 inhabitants. Despite the literature stating that there is not any UDC in Brazil (Oliveira & Oliveira, 2016), the results show that eight cities affirm to use this solution. This may occur due to a lack of knowledge about UDC concept by the respondents since all UDC are private and not implemented by municipalities.

Although OHD (*off-hour delivery*) is not adopted by cities with 60,000 to 100,000 inhabitants, this solution suggests a growing tendency, from a 5.9% rate for cities with 20,000 to 60,000 inhabitants to 53.8% for cities with more than 500,000 inhabitants. This result implies that in larger cities, the traffic is heavier, so it is preferred to deliver at night, with lighter traffic.

Pick up points (PICKUPPT) were only mentioned by four respondents (5.7%), all of them with more than 250,000 inhabitants. This solution is feasible for cities where e-commerce delivery is high and could be implemented by private companies. In general, this solution reduces the number of trucks moving in the city due to the consolidation of deliveries to pick-up points.

Road pricing (ROADPR) was not mentioned by any respondent. This fact confirms the literature, that road pricing is not well accepted by a population and has low rates of approval (Lindholm, 2013; Quak, 2015; Abreu, 2015). Truck lanes were also not mentioned, although bus lines have been implemented by some municipalities and could be shared with trucks in routes which are not congested.

Every respondent municipality from the São Paulo state with more than 250,000 inhabitants, and which declared having a UMP, state that they have a time-based restriction for solutions LIMITVHC, TTLOADPR, ROUTCVHC, and SIGNAL. Five cities declared having parking areas for freight vehicles, three cities have

OHD, and just São José do Rio Preto has a UDC. None of them has a truck lane, road pricing, and pick-up points have been used by few cities (Rio de Janeiro and tested in Brasilia and Curitiba).

Perceptions

Table 1 shows the mean, standard deviation, median, mode, first quartile and third quartile statistics for those variables related to the perceptions of the public managers. The results show that for every perception, the mean and the median were given at least a score of 5, which points out that most of the perceptions have an agreement for the respondents. The standard deviation was relatively low, indicating that the sample is homogeneous.

The median for variable *passenger car traffic is more important than cargo transport* (PCIMPFT) was 6, which implies that at least half of the respondents assume that passenger transport is slightly more important than freight transport. At least half of the respondents declare that they do not have *knowledge about the best solution for urban freight transport* (KNOWBEST) and in their opinion, the *UMP is not sufficient to adopt good solutions for cargo transport* (UMPSUFGP).

Even though the managers answered that the *UMP should have an urban freight plan* (UMPFUT), mostly because the *urban freight transportation can cause problems at the cities* (FUTPROB), they also agreed that the *public transport for the population is more important than the urban freight transport* (PPTIMPFT). PCIMPFT, KNOWBEST, and UMPSUFGP were the variables with the lowest mode (5).

A Spearman correlation was calculated to point out some correlation between the results of the perception of urban freight transport. The highest correlation showed by Table 2, is seen for UMPSUFGP

Table 1 - Statistics of the perceptions of respondents

Variable	Mean	σ	Median	Mode	1st Quartile	3rd Quartile
Urban freight is a point of interest for local managers	7.8	2.4	8	10	6	10
Freight Urban Transport can cause problems in our city	8.7	1.8	9	10	8	10
Passengers public transport is more important than cargo transport	8.1	1.9	8	10	7	10
Passenger car traffic is more important than cargo transport	6	1.9	6	5	5	7
Knowledge about the best freight urban transport practices	5.5	2.3	5	5	4	7
UMP should have a freight urban plan	8.5	2	10	10	8	10
UMP is sufficient for adoption of good practices of cargo transport	6.3	2.4	7	5	5	8

Source: Own elaboration.

Table 2 - Correlation between perceptions

	UFINT	FUTPROB	PPTIMPFT	PCIMPFT	KNOWBEST	UMPFUT	UMPSUFGP
UFINT	1	-	-	-	-	-	-
FUTPROB	0.138	1	-	-	-	-	-
PPTIMPFT	0.109	0.179	1	-	-	-	-
PCIMPFT	-0.008	-0.120	0.345**	1	-	-	-
KNOWBEST	0.340**	-0.036	0.125	0.153	1	-	-
UMPFUT	0.265*	0.218	0.458**	0.073	0.195	1	-
UMPSUFGP	0.208	0.030	0.234	0.318**	0.524**	0.274*	1

* Significant correlation at 0.01 level (2-tailed); ** Significant correlation at 0.05 level (2-tailed). Source: Own elaboration.

and KNOWBEST, what implies that the more the respondents know about best freight urban solutions, the more they agree that the UMP is sufficient to adopt best freight urban solutions. A similar result is seen for PPTIMPFT and PCIMPFT that the public transportation is more important than freight transportation and that automobiles transportation is more important than freight transportation.

Opposite results can be seen for UMPFUT and PPTIMPFT. The correlation shows that those who agree that the public transportation is more important than freight transportation also agree that the UMP should include an urban freight plan. This behavior is confirmed by the strong correlation between PCIMPFT and UMPSUFGP. As Behrends & Lindholm (2012) state, the urban freight transport is not a priority, even more when compared with public transportation.

Analyzing the eight cities from the São Paulo state with more than 250,000 inhabitants that declared to have the UMP, the respondents agree that urban freight transport causes problems, and most of them also agree that urban freight transport is a point of interest for public managers.

Discussion and conclusion

Despite the years of experience reported by the respondents, the survey did not specify if their experience is in urban freight transport, urban mobility, public policies, or in any other related area. This implies that the respondent might not be the right person to deal with urban freight transport or to answer the survey, or neglect the urban freight transport within the city. The perceptions of the respondent may be affected by the area in which he/she is a specialist. Some respondents declared having UDC`s in their cities, but the literature states that there is no UDC in Brazil (Oliveira & Oliveira, 2016). This divergence probably occurs due to a misunderstanding of the concept of UDC by the respondents. Maybe they considered DC (distribution center) in urban areas as a synonym of UDC. Moreover, most of them stated that they "do not have any knowledge about the best solution for urban freight transport" and "the solutions known are insufficient for cargo transport", this means that the respondents have limited knowledge about solutions to urban freight transport. It was confirmed by the correlation analysis, in which more knowledge about UMP implies to adopt the best solutions. Maybe they adopt the easiest solutions or obsolete regulatory policy (Dablanc, 2007) which does not require much effort to be implemented. We can say that there is a lack of systemic vision in planning the freight distribution system (Crainic et al., 2004).

Looking at the distribution of the answers to resources available for elaborating and reviewing a UMP, it is possible to see how unprepared the Brazilian cities are for this process. Most of these cities do not consult or discuss mobility with stakeholders (for example, the case of cities with the population between 60,000 and 100,000 inhabitants), do not have data collection, which is a primary condition to know the local reality about urban freight transport and to enable its planning, and there is no training for people who deal with it. The scenario is not different for São Paulo cities with more than 250,000 inhabitants which reported to have the UMP. Regarding the resources to elaborate and review a UMP, considering the low representative of the 60,000 to 100,000 inhabitants cities, it is possible to attest that, proportionally to the population, the bigger cities have more resources available than the smaller ones. Consequently, these findings also contribute to having a poor UMP and increase the lack of collaboration among the stakeholders.

Although urban freight transport is not a priority for public managers, this does not mean that the UMP is entirely inefficient. It is possible that urban freight transport is poorly addressed in a UMP, but on the other hand, the passengers' mobility can have good acceptance by stakeholders. Thus, the results confirm that despite public transport being more important than freight transportation, it is necessary to include an urban freight plan at UMP.

Also, the results suggest that the manager is aware of the resulting problems of freight transport, but do not have people to deal with it; do not have data to analyze and knowledge to get to a feasible solution for their city; do not share information of freight transport with other agencies to discuss or even consider a different point of view; and do not prioritize the freight transport. Therefore, or the freight transport is not an urgent matter for the authorities or the managers do not see a solution for the problems, or even the respondents are unconscious about freight urban transport importance within their cities, or the respondents do not have knowledge of the importance of urban freight transport.

The assumption above can explain why restrictions are the solutions most adopted by Brazilian cities. Restrictions are cheaper solutions (Dablanc, 2007), with low investment and low maintenance; there are examples implemented by reference cities in Brazil, such as São Paulo and Belo Horizonte (Abreu, 2015; Oliveira & Oliveira, 2016); and can be easily revoked if it does not work as expected. It is important to highlight, although the low number of smaller cities do not implement some restrictions, for example, "time or area limitation for heavy vehicles", these cities can plan for the future; therefore, they should consider these restrictions in their UMP. For instance, to plan the use of timetables for loading and unloading, and parking areas for cargo vehicles can contribute to avoiding traffic congestion in the future (Zambuzi, 2015).

Summing up, answering the research question initially established, we conclude that Brazilian cities are not prepared to develop an efficient urban freight mobility plan. Even though public managers consider urban freight transport a problem, few measures have been done to change this scenario, especially those related to the restrictions (easier to implement and without discussion among the main stakeholders). We state that the results can be used as an overview of UMP's situation in Brazilian cities. The findings in this paper could change managers' mentality as stated by Taniguchi & Thompson (2015), i.e. make the authorities responsible for UMP's aware of the actual situation and take measures to develop more efficient urban freight plans with stakeholders' participation.

Lessons learned

(1) There is a lack of background to develop Urban Freight Plan by the public managers. Public authorities should invest in training people, data collection process, communication with stakeholders and between agencies to elaborate UMPs properly";

(2) The mobility of people is much more important than urban freight mobility;

(3) City logistics solutions focus on restrictive measures. It seems to be copied by cities, which neglect the urban freight transport problem and leave this issue to the private sector. And, other solutions that require investments are not a priority;

(4) As cities become bigger, some solutions get the focus (e.g., parking area, off-hours deliveries, and time window) and the cities have a wider range of solutions.

Limitations and future studies

Even though the research provides suitable statistical results, we must recognize some limitations. The sample of 70 responses is small and non-representative. However, eight cities out of ten from the biggest cities from the São Paulo state, with a UMP, answered the survey and may be an example for other small cities. The background of the respondents was not a question, and can also be a limitation for understanding technical questions from the survey.

For future research, we suggest increasing the sample or focus on medium and large cities which act as role models for other cities. This could refine the point of view of the public managers and give a better overview of how the main Brazilian cities are dealing with urban freight transport. Another opportunity is to compare the results with quantitative data, such as per capita income, population, and density, etc., which can show specific behavior to each class of the city.

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Appendix A - Survey

Variable	Question
Information resources	**If the municipalities have information resources for: (Binary scale: Yes/No)**
PLANSTAT	Does your city have a Municipal Mobility Plan (PlanMob), Federal Law 12587, 3rd January 2012?
RSPAGCY	Does your city have an agency for the elaboration/reviewing the Municipal Mobility Plan (PlanMob)?
TPPLELB	There are, in the responsible agency, people specifically trained for the elaboration/reviewing a Freight Urban Mobility Plan?
CNSSTKH	The agency responsible for the Urban Mobility Plan (PlanMob) have any form of consultation and, or, discussion with stakeholders (shippers, transporters, universities, residents, public managers) involved directly or indirectly with freight movement in urban areas?
DTCOLL	Has the city any form of data and/or information collection about freight movement in urban areas?
INFOEXC	There is information exchange with other agencies about freight movement within the urban area?
Solutions for Urban Logistics	**If the municipalities adopt the following solutions for urban logistics. (Binary scale: Yes/No)**
LIMITVHC	Time or area limitation for heavy vehicles
PRKCVHC	Parking areas for cargo vehicles
TTLOADPR	Timetables for loading and unloading on public roads
ROUTCVHC	Preferred routes and prohibited routes for cargo vehicles
SIGNAL	Specific signaling for cargo vehicles (guidance and constraint)
LANERES	Lanes in urban highways reserved for cargo vehicles
UDC	Urban Distribution Centers (UDC)
ROADPR	Road Pricing
OHD	Off-Hours Deliveries
PICKUPPT	Pick-up points
Perceptions about urban logistics	**The following items are related to urban freight logistics. Please, leave your opinion in terms of the level of agreement. Scale, 0 (totally disagree); 10 (totally agree)**
UFINT	Urban freight is a point of interest for local managers
FUTPROB	Freight Urban Transport can cause problems in our city
PPTIMPFT	Passengers public transport is more important than freight transport
PCIMPFT	Passenger car traffic is more important than freight transport
KNOWBEST	Knowledge about the best freight urban transport practices
UMPFUT	Urban Mobility Plan should have an urban freight plan
UMPSUFGP	Urban Mobility Plan is sufficient for adoption of good practices of freight transport