



## Innovative strategies in the planning of sustainable urban mobility

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### Abstract

This study aims to identify in the scientific literature works related to innovative strategies in the planning of sustainable urban mobility. We sought relevant scientific productions in the Web of Science™ and Scopus databases. After the analysis, and based on the literature review hereby developed, there is still no common ground on the concept of sustainable urban mobility, but it is true that if nothing is done in time, the quality of life in urban city spaces will be unsustainable. Challenges to achieving sustainable mobility are complex, as they involve changes in thinking, innovation strategies, using and planning of urban logistics.

**Keywords:** Innovative strategies; Strategic planning; Sustainable urban mobility.

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### Introduction

Urban logistics is present in citizens' daily life all over the country since it also deals with the displacement of goods and people in the cities, with the flow of several means of transportation, and with the interaction and the integration with private and

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public organizations. Thus, this study will focus on urban logistics and sustainable mobility, which is present in urban spaces.

Nowadays, the issue about population growth, about urban settlement with no adequate planning, dangerous traffic jams and environmental and social unsustainability has fostered concerns about the search for a new city model, one that can get several denominations, such as intelligent mobility and intelligent city (GARAU et al., 2016).

Such concerns are based on the relationship of the contemporary societies' needs and on the urban changes' evolutions. This relationship needs to be included in the urban mobility's planning construction, with innovation strategies, adding and integrating several technological tools in order to improve the taking of decisions.

In the past few decades, the concept of mobility went through a natural process of evolution and, according to Silva and Macedo (2008), in the end of the 1970's it was understood as the delivery of transportation services. Then, the transportation planners' central point was to adjust the infrastructure with the demand of transportation of passengers or goods.

There is currently the concept of intelligent mobility, which comprises two moments: the first one focuses on information technology as a way to improve urban transportation planning; the second one incorporates people and consumers as important actors in this process (GARAU et al., 2016). Both integrated moments, such as technology and consumers, contribute to the improvement of the intelligent mobility.

The method adopted in this study was that of literature review. According to Merriam (1998), literature review can help the researcher in the search for the restless state of art in a specific topic.

The present study aims at identifying innovative strategies in the planning of sustainable urban mobility and is divided into three sections: strategic planning, innovation, urban logistics and sustainable urban mobility, with regards to rethinking policies and an adequate planning which optimizes this relationship.

## Methodology

The method adopted in this research was that of literature review in national and international scientific works, aiming at identifying innovative strategies in the planning of sustainable urban mobility by reviewing scientific productions published in relevant journals and inserted into major databases' main collection, such as Scopus and Web of Science, by its relevance and coverage as meta-searchers.

Thus, the search in the above-mentioned databases was controlled and, in relation to the selection criteria, the following English words were searched for by title along with the Boolean operator "AND": "innovation strategies", "strategic planning", "sustainable urban mobility" and "urban logistics". The queries were performed from October 2017 to January 2018. The articles related to the topic were selected and analyzed in order to meet the research's objective hereby presented.

## THEORETICAL REFERENCES

### Strategic Planning

Strategic planning is important for both public and private business management, due to market competitiveness and consumers and users' demand; lack of plan-

ning, lack of an articulated management along with each place's needs and particularities are now seen as unacceptable.

According to Mintzberg (1994), the strategic planning, as it is normally disseminated, jeopardizes the strategic thinking, for the author believes that the best strategies come from the managers' views and not from airtight plans. From his point of view, the strategic planning is all about analysis, and strategic thinking is all about synthesis.

Upon building up strategy, Prahalad and Hamel (1990) believe the organizations must aim at their essential skills. Identifying these skills and using them strategically provide the organization with business maintenance and development in the market.

Kaplan and Norton (1993) discuss that the strategic planning must be flexible and adapt to organizational learning and market in real time, allying short and long-term strategies.

Entrepreneurial planning, according to Freeman, acknowledges that the stakeholders may impose limits to the company's actions. Thus, the management should understand the needs of the interested parties, so as to define the limits of the operation.

Its central discussion consists of the managers deliberating the stakeholders to design the organizational strategic planning, for they can have a strong business influence and/or disturbance. Besides, it is important to develop a real and concrete comprehension from the parties interested and which are specific to the organization and to the circumstances it is found in.

Such conceptions presented by renowned specialists in planning help achieve the comprehension and the application of these concepts in the public sphere when it comes to management strategies' development and implementation of the sustainable urban mobility.

## **Innovation**

When it comes to innovation strategies, according to Schumpeter (1997), they are linked to the advent of a new technology, to the technological advancements which favor commercial transactions, to the entrepreneurial development, and to the generation of wealth. All this process breaks up with the status quo and triggers a new productive pattern.

Utterback (1997, p. 77) defines innovation as an invention that reached the introduction phase in the market when it comes to a new product. If the invention refers to a new process, the innovation will take place during its first use phase. In this case, the invention is an original solution for need or desire. Tálamo (2002) also formulates a similar definition, considering that innovation is something comprehensive that goes beyond novelty or invention. As for Brown (2010), innovation is not necessarily a synonym to novelty or technology, that is, there is a difference between what is really innovative and what constitutes a temporary novelty. When a product is innovative, it impacts people's lives.

Siguaw, Simpson and Enz (2006) highlight that the innovation domain is defined as a multi-dimensional structure, knowledge and comprehension of a frame for innovation, and the consequences in leading it into an organizational context. This way, inno-

vation can be defined as guidance, knowledge, and structure composed of philosophical learning, guided by a strategy, and which defines the organizational strategies and the specific actions when it comes to an innovation which allows competencies and processes.

For the Global Entrepreneurship Monitor (GEM, p. 144), innovation works as the competitiveness engine and the nations' development. Innovating in products and services, innovating in processes, innovating in management technologies and in business models lead the organizations to become more and more competitive in the national and international markets.

Table 1 identifies doctoral thesis works which used the innovation topic as a prevailing thought for the development of researches related to the theme.

Table 1: Doctoral theses with the innovation theme

Author (Year)	Title	Institution
DELAI (2014)	Sustainable innovation management evolutionary stages: longitudinal multi-case study in industrial companies.	USP
BAGNO (2014)	Innovation as a new organizational function: evidence and characterization from large industrial companies in Brazil.	USP
MORALLES (2013)	Social-economic development, transportation infrastructure and innovation: a spatial econometric study on the spillover effects in Brazilian states.	USP

**Source:** Research data, 2017.

From the works by Delai (2014), Bagnó (2015) and Moralles (2013) it is possible to see the importance that the studies developed about the approach on innovation present as a contribution to science upon relating topics connected to transportation, mobility and sustainability. Therefore, innovation is present in the conception of scenarios about the understanding of urban mobility applied to the cities' sustainable context. It can even be applied to other areas, such as services.

According to Gallouj and Savona (2009), innovation in services arises from a process of interaction and collective learning among the members of a certain organization. Such process can happen through a structured way, planned through a culture which encourages new ideas, or spontaneously.

In this context, innovation in services can be processed the following way, according to Sundbo and Gallouj (1998): product innovation, process innovation, managerial or organizational innovation, and market innovation. These four possibilities outline the coverage of its implementation and tangibility.

In the meantime, it is important that the strategic planning and the innovation strategies are present in the sustainable urban logistics, aiming at better paths and leading the public and the private management and the stakeholders' considerations.

## Urban Logistics

In the last century, vehicles played a leading role in urban logistics as symbols of development and status, both for the transportation of goods and of people. From the conception by Marx et al. (2015), upon transporting people, the automobile favored the agility, comfort, convenience, more independence, among others. Upon transporting

goods, automobiles brought in more swiftness, access to several places, market expansion, and more profitability, among others.

Problems from this model of mobility also came along, such as pollution, traffic jams, accidents and traffic casualties, noise disturbances, social exclusion, global warming, among others. Thus, in the current century, although automobiles are still very useful and the most popular mean of transportation in the world, several countries see them as an environmental villain (MARX et al., 2015).

In this context, the logistics developed by a city can be defined as the process of optimization of the urban logistics activities, taking into account the social, environmental, economic, financial and energy impacts of the urban freight movement and/or “the process to fully optimize the activities of logistics and transportation by the private companies with the support of advanced systems of information in urban areas, considering the mean of transportation, the traffic jams, the safety and the energy saving actions in the market economy context (NOWICKA, 2014).

Taniguchi (2012) identified three main objectives in the city logistics: (I) improve the quality of life; (II) improve the flow of people and freight; (III) protect the environment. Reaching these objectives involves commitment from many interested parties which have different expectations in relation to the city logistics.

The urban logistics objective is the global optimization of the urban logistics system, considering costs and benefits of a certain plan of action for the public and private sectors, encompassing planning, implementation and the efficient flow control and storage of related goods and information, on an urban scale (Mukai et al., 2007).

Table 2 presents the automobile business’ opportunities and threats according to the sustainable urban mobility paradigm from the conception of Marx et al. (2015).

Table 2 – Automobile business’ threats and opportunities in the SUM paradigm.

Threats	Opportunities
<ul style="list-style-type: none"> <li>▪ Market decline for passengers’ automobiles (especially in developed countries).</li> <li>▪ Car is considered an environmental villain.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Ecological cars connected to multi-mode transportation schemes.</li> <li>▪ A growing bus market.</li> <li>▪ Information and Communications Technology (ICT) integration / communication.</li> </ul>

**Source:** MARX *et al.*, p. 1094.

As seen in Table 2, groups which deal with automobile businesses can’t discard this scenario, for specialists point out the individual saloon car as a major villain in the urban chaos.

From another perspective in the urban logistics’ operations, and according to Muñuzuri et al. (2005), the transportation of goods is still not seen in a priority way, although it is relevant to economy. For the authors, the transportation of goods on an interurban level gets more attention due to the analysis of the costs involved in the supply chain system.

However, each system of transportation has some great complexity and a chain of interrelations of organizations, infrastructure, vehicles, people, laws, different ruling

ways, patterns for land use, technologies and others that apply such complexity (RICHARDSON, 2005).

Gershenson (2013) supports this understanding and highlights that the cities are not complex systems per se, since their components are constantly interacting and evolving, and this influences urban logistics, urban planning and, therefore, the future of the city.

In the urban logistics scope, Alho and Silva (2015), based on Macário (2013), point out the relevance of mapping logistic profiles in urban areas, aiming at improving the policies of goods' flow in these areas. They suggest three dimensions: social and designed environment; characteristics of the transported goods; characteristics of the recipients. From the establishment of these homogeneous groups, the authors try to optimize the urban traffic and minimize the negative impacts.

Still on city logistics, Maggi and Vallino (2016) see it as a process which aims at optimizing the logistics and the transportation of people and goods in urban areas. Such process must map and look for solutions to traffic problems, such as traffic jam, decreasing the number of vehicles on the streets, fuel consumption, and pollution, among others.

City logistics interacts with several stakeholders' considerations and deals with complex systems of urban mobility, which encompass the transportation of goods and of people. This complex system's performance is influenced and has influences from the choices and from the behavior of the parties interested (MAGGLI; VALLINO, 2016).

According to Table 2, which refers to urban mobility from the conception of Maggi and Vallino (2016), the distinct stakeholders' categories play different roles in the use of the urban space that are tied to the considerations and the needs of each category and which can be inconsistent.

Table 2 – Considerations of the stakeholders involved (Macário, Galelo, & Martins, 2008).

<b>Stakeholders</b>	<b>Considerations</b>
Residents	Products and services Negative environmental impact
Traders / Retailers Authorities and public service	Competitiveness and profitability Accessibility Administration and legislation Negative environmental impact Market growth
Suppliers	Profitability
Carriers	Traffic jam Efficacy coefficient

**Source:** MAGGI; VALLINO, 2016, p. 51.

Such difference is due to a number of considerations, for each category prioritizes a certain aspect and a certain interest. The residents wish to have a quicker access to products and services, less traffic jams, less pollution, noise, and less road stress. The traders search for more profitability, less time spent in traffic jams, less access restrictions in certain places and at certain times, less logistics cost upon transporting goods and people. As for the public administrators, they apply rules as

restrictions aiming at adjusting the interests from the parties involved, thus fostering market growth, increasing revenue, reducing environmental impact, and improving accessibility, among others.

Still according to the same authors, the urban transportation system assembles the complex system's characteristics, for they interact with stakeholders with different interests. Thus, it is necessary to reach a high level of interaction between the parties involved, aiming at adjusting and minimizing traffic bottleneck.

Based on this complexity, Muñuzuri et al. (2005) developed different specific solutions aimed at public administrators, according to Table 3.

Table 3 – Classification of the urban transportation solutions applied by local administration

<b>Local administration solutions for the transportation of goods in urban areas</b>		
<b>Public infrastructure</b>	Points of reference	City terminal Suburb logistics center Improvement in the terminals' logistics The use of railway or naval terminals The use of public parking
	Modal change	The use of train or a shuttle train underground system
<b>Land use management</b>	Parking	Load zone provision Planning of parking space Route areas The use of other reserved spots
	Construction regulations	Load / unload interfaces The use of private parking lots Mini storehouse
<b>Access conditions</b>	Spatial restrictions	Access according to weight and volume Access to pedestrian area Street block subsidy Restricting the downtown area to private traffic Tariffs Roads
	Time restrictions	Adequate turnover in loading zones Night good deliveries Night deliveries Double parking Short time restriction Time slot access
<b>Traffic management</b>	Regulations' scope	Carrier classification Freight area classification Regulation harmonization Streets' classification
	Under development	Online loading area reservations

**Source:** MUÑUZURI *et al.*, 2005, p. 17.

This way, in Table 3, Muñuzuri *et al.* (2005) catalogue solutions aimed at local urban planners for the transportation of goods in an urban area. These public administrators would face the challenge to align combined solutions which simultaneously optimize the distribution of goods throughout the city and favor the stakeholders' standardization of need and expectations

### **Sustainable Urban Mobility**

When the discussion is on sustainable urban mobility, it is necessary to consider the stakeholders' needs and preferences, and this group encompasses the users, the

automobile industry, the public managers especially, and those responsible for urban planning, among others. Marx et al. (2015) ponder about four points that are relevant to the development of a model of sustainable urban mobility: urban planning; the development of multi-modal shifts; search management and energy efficiency.

It is known that there is no defined solution which pleases everyone or meets their desires, but the model of sustainable urban mobility shows a coherent and last-longing path which favors a relationship and a coexistence that is less harmful than the current one (MARX et al., 2015).

On urban mobility, Machado (2010, p. 52) mentions the European Union's understanding, which states how important and urgent it is to rethink the current model by optimizing and using other types of transportation, "organizing the inter-modality between different means of collective transportation (train, electric, subway, bus, taxi) and individual transportation (automobile, motorized, bicycle, on-foot travel)", envisioning the triple bottom line balance.

In the context of transportation, and based on Gudmundsson and Höjer (1996), Silva and Macedo (2008, p. 351) present principles that comprise the concept of sustainable development and are tied to means of transportation, such as "the protection of natural resources in pre-established limits, levels and models; the maintenance of productive resources for future generations; the improvement of individuals' lives; the guarantee of a fair distribution of life quality". The central point is to provide worthy and sustainable conditions of mobility and to assure quality of life to the current and to the future generations.

As for intelligent mobility, Garau et al. (2016) consider that it is not possible to dissociate it from sustainable mobility, for there is no use in having only one system of intelligent traffic; it is necessary to invest in less polluting means of transportation, to reduce accidents and traffic jams, in continuous and safe bike lanes, to improve the individual mobility, to reduce the commuting time, and to favor the access to information, among others.

From the conception of Gudmundsson (2004) and Miranda; Silva (2012), the sustainable urban mobility acts in the displacement of goods and people in the urban area, covering several means, such as public transportation and automobiles, autonomously and in a non-motorized way.

Regarding the urban space, it is necessary to understand that it deals with a system of great complexity, since it interacts with a network of stakeholders and several bottlenecks that come from this interaction. Also, for an adequate urban planning, it is necessary to break free from the traditional and tight model of planning the city, widening view, the means of transportation, the urban spaces, and the sustainable mobility (MIRANDA; SILVA, 2012).

Supporting the concept of the Organization for Economic Cooperation and Development (OECD) and the Group of Experts on the Transport and Environment of the European Commission, Miranda and Silva (2012, p. 142) understand that the sustainable urban mobility "positively contributes to an economic and social state without harming neither the human health nor the environment".

For a system of transportation to be considered sustainable, it is important to have the following characteristics shown in Table 4.



Table 4 – The Sustainable Mobility Characteristics

Dimension	Characteristics
<b>Environmental</b>	It minimizes the activities that cause problems to public health and harm the environment; It reduces noise production; It minimizes soil use; It limits the levels of emissions and wastes to those the planet can absorb; It uses renewable resources; It enhances renewable sources of energy; and It reuses and recycles its components.
<b>Social</b>	It provides access to goods, resources and services so as to reduce the needs to travel; It operates safely.
<b>Economic</b>	It has an affordable fee (affordability); It operates efficiently to give support to the economic competitiveness; It makes sure the users pay the total social and environmental costs due to their mean of transportation's choices .

**Source:** MACHADO, 2010 in SUMMA, 2002.

In the meantime, the adoption of practices that cover the set of sustainability in its environmental, social and economic dimensions will favor the sustainable mobility and, on the other hand, will demand investments, an efficient management, and the breakdown of paradigms and a change of attitude.

It should be said that the sustainable planning of transportations will demand mental changes so as to design the planning and the practices, the funding, the broad and detailed analysis of the impacts, as well as the comprehension of the needs of the parties involved (MIRANDA; SILVA, 2012).

### Final considerations

Regarding the sustainable urban mobility, and based on the review analysis of the literature here developed, there is still no common ground about the concept of sustainable urban mobility, but it is true that if nothing is done in time, the quality of life in urban spaces in the cities will be unsustainable.

According to data from Gershenson (2013), in 2050 70% of the world population will be residing in urban centers. Thus, if today the problems that come from population growth, like the jammed and unsafe traffic, pollution, road casualties and accidents, the low levels of quality of life, the noise, the environmental and social unsustainability (Garau et al., 2016), among others, result in disorders of all kinds, it is necessary to break free from the current models of mobility.

As observed along this research, it is important to develop strategies that involve planning, innovation and urban mobility management, so as to ensure the sustainability of life, relationships and businesses in the cities. Among the possible strategic solutions, there is accessibility, administration and legislation, a negative environmental impact, market growth, a negative traffic jam, and the efficacy coefficient suggested by Maggi and Vallino (2016). Also, the solutions suggested by Muñuzuri et al. (2005), like the transfer stations, the modal change, parking, rules for building, spatial restrictions, time restrictions, regulations' scope, as well as investments in ecologic cars connected

to multimodal schemes of transportation, a growing market of buses, and the ICT integration / communication recommended by Marx et al. (2015).

The challenges to achieving the sustainable mobility are complex, since they involve changes in the way of thinking, innovation strategies, and using and planning urban logistics. Several decisions will probably displease some stakeholders, such as the possibility to design measures to restrict the use of private saloon cars, among others.

These decisions will play a considerable role for the public managers and might trigger a political burden, according to Miranda and Silva (2012), for the implementation of decisions which favor the public welfare and the community usually displeases some stakeholders.

Thus, the discussion doesn't end here and nor does the exhaustion of the topic. For now, the present study briefly elicited the aspects inherent to the innovative strategies about planning the sustainable urban mobility, aiming at rethinking policies and actions that are adequate to urban planning.

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