

## THE ELECTRIC SCOOTER AS SUSTAINABLE TRANSPORT IN SÃO PAULO'S URBAN MOBILITY

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**Abstract:** The article presented studies the technology in sustainable alternative transport, based on the application of the electric scooter and its contribution to urban mobility. The methodology applied has as a parameter the qualitative study, using bibliographic research and field research, aiming at the participation of the elements involved in the use of these devices. The general objective is to identify the aspects that contribute to the use of the electric scooter as sustainable transport in urban mobility in the city of São Paulo.

**Keywords:** Electric scooter, Urban mobility, Sustainable Alternative Transport.

## INTRODUCTION

Currently, there is a cultural change where automobiles do not have the same value as in the past. Purchasing a car is no longer the desire of younger audiences. Alternative means of transport efficiently and effectively meet the need for displacement in large cities. As well as sustainable transport that has cooperation with the environment.

Cities must quickly adapt to the concept of “smart cities”.

As Lemos (2013, p.48) states:

If in the 1990s we talked about “digital cities”, today the emerging term is “smart cities”. If digital was understood as access to computers and the deployment of the Internet in urban space, intelligent refers to context-sensitive computerized processes, dealing with a gigantic volume of data (Big Data), cloud networks and autonomous communication between various objects. (Internet of Things).

Urban mobility systems, in the face of population growth, increasingly depend on innovative technologies to safely and efficiently transport large numbers of people. Technological innovations aimed at urban mobility bring agility, convenience, sustainability, flexibility and adaptability to

users. And with this insight, we are directed to a question that encompasses part of the population that lives with displacement on individual alternative transport in the regions of São Paulo – what is the potential of the electric scooter as a sustainable alternative transport in urban mobility in the city of São Paulo?

The methodology used uses qualitative methods that Cardano (2017, p.12) “proposes, as main instruments of qualitative research, participant observation, discursive interview and focus groups”.

Bibliographic research will also be used, which according to Severino (2007, p.122) “is developed from citations by Authors in their books, articles or theses. They are used as Sources for the research which will be studied”. For our work, this method was used as a basis for the topic addressed for the resourcefulness of the subject.

For Marconi and Lakatos (2015, p.69) “field research is developed, after bibliographic research, with the objective of seeking information or collecting data to solve a given problem”. The data in the studied place and the other elements will be analyzed.

The biggest challenge is adapting innovative means of transport to Brazil’s cultural and technological conditions. Therefore, the general objective is to identify the aspects that contribute to the use of the electric scooter as sustainable transport in the urban mobility of the city of São Paulo.

## THEORETICAL BASIS

### URBAN MOBILITY

Analyzing the concept of population growth and its aspects necessary for the urban and progressive development of society is an essential task for managing the improvement of urban mobility conditions, the environment and social inclusion.

## TECHNOLOGY AND INOVATION

Although it is present in all fields and sectors, the technology has been increasingly improving as the needs of the population increase. Its scope is linked to aspects of techniques, methods and instruments.

Veratzo (2008, p.67) involves technology as “a practical knowledge derived directly and exclusively from the development of scientific theoretical knowledge through progressive and accumulative processes, where increasingly broad theories replace the previous ones”.

As a form of adaptations and development of an entrepreneurial adversity, innovation appears as a solution, in order to improve the cost and benefits, together with the quality of products and technology with the services available to the population.

Tigre (2006) explains that innovation comes from the active practical application of an invention. In other words, innovation is only present when a set of practices, ideas and objectives present a certain degree of notability of the individual about an object or service. According to Milton Santos (2005, p.47), “there is no innovation without invention, just as there are no techniques without technology”.

Noticing these elements that intertwine the innovation processes, we are directed to a trend towards technological innovations, progressing at certain levels of gradual variations.

According to Tigre (2006, p.107) “incremental innovations are those carried out daily in organizations, through the learning process. Radical innovations are discontinuous in time and space. More comprehensive and systemic innovations can give rise to changes in the technical-economic paradigm. The electric scooter is an incremental innovation, and over time it can develop changes and improvements in the

Urban mobility is linked to some externalities in the population, being attributed to people and goods; corresponds to the different answers given by individuals and economic agents to their displacement needs, considering the dimensions of the urban space and the complexity of the activities developed in it (MC, 2004).

In order to advance urban mobility, egalitarian management is necessary, respecting the Urban Mobility Law No. 12,587 (BRASIL, 2012), where:

I – Urban transport: set of public and private transport modes and services used to move people and positions in cities that are part of the National Urban Mobility Policy;

II – Urban mobility: condition in which people and loads are moved in the urban space;

III – Accessibility: facility made available to people that allows everyone autonomy in the desired displacements, respecting the legislation in force.

Relying on the organization and administration with the possibility of the effective integration of these means, the National Urban Mobility Policy acts with the objective of concretizing the principles and guidelines of the urban development policy, through the planning and democratic management of the National Mobility System Urban (BRAZIL, 2012).

Its goal is also to promote social inclusion, with access to basic services and social equipment, provide progress in the urban conditions of the population with regard to accessibility and mobility, promote sustainable development and public management with the aim of permanent improvement. urban mobility (BRAZIL, 2012).

daily life of society.

## TECHNOLOGIES IN ALTERNATIVE INDIVIDUAL TRANSPORT

Currently, people seek ease of displacement, sustainability and agility. One of the alternatives to facilitate mobility are active transport, which are means of transport for human propulsion: Bicycles, tricycles, skates, skateboards, scooters and wheelchairs. Everything that allows people to move only by the strength of their body, without the aid of engines.

However, as people increasingly seek flexibility and ease of locomotion in everyday life, one of the options that meet such needs comes with the transformation of technologies linked to active transport into alternative individual transport vehicles.

With the technological revolution, some innovative forms of locomotion have emerged to meet such needs.

### A) BOLT

Bolt is an electric and portable skateboard, the smallest in the world. It measures 60 cm and weighs 4 kg, and can be carried in a backpack. Its electric motor is 2,000 watts and a 5,000 mAh battery, which completes a recharge between 60 and 90 minutes. The Bolt can recharge the battery of other devices, such as smartphones, through the USB port (PIXININE, 2015) as shown in figure 1.



Figura 1 – portable electric skateboard.

Source: BOLT (2019).

### B) MOVPAK

Movpak is an electric skateboard that transforms into a backpack and also recharges other devices such as tablets and smartphones via its USB port. Figure 2 shows that the device is a transport alternative that is not only ecological and super practical. (PIXININE, 2015).



Figure 2 – skateboard backpack.

Source: MOVPAK (2019).

### C) FOOTLOOSE

Footloose (figure 3) is an electric bike that folds and has no chain, turns your own pedaling into energy. That power is stored in a lithium-ion battery and used to move it when the rider is tired. It has a range of around 30 km with an electric charge alone.

Its handlebars have a removable and mountable screen, through which you can control speed, energy output and other functions of the *Footloose* (PIXININE, 2015).



Figure 3 – Folding electric bicycle.

Source: FOOTLOOSE (2019).

## D) ELECTRIC SCOOTER

An innovative technological form of displacement is the electric scooter (figure 4), which has been gaining popularity in the largest metropolises of some countries. In this article, the focus is on this form of individual, technological and sustainable alternative transport, since this means of transport acquires notoriety and visibility for being easy to handle, not polluting the environment and also for having companies that provide the rental service of these vehicles. devices in the city of São Paulo.



Figure 4 – electric scooter.

Source: SCOO (2019).

## REGULATION FOR THE USE OF ELECTRIC SCOOTER IN THE CITY OF SÃO PAULO

In São Paulo, the use of alternative vehicles on cycle paths and lanes was regulated by decree 55,790 of 2014, where in addition to bicycles, motorized or non-motorized wheelchairs, skates, scooters, skateboards, tricycles and cargo bicycles have a direct participation in this regulation ( PMSP, 2014).

A few years before the enactment of the rule for the use of alternative vehicles on bike lanes and lanes, in 2007 Law No. provides for the creation of the cycling system in the city of São Paulo and other provisions (PMSP, 2007).

This governmental action brought enormous benefits to the city of São Paulo, related to investments in bicycle lanes and lanes favoring active mobility.

In order to formalize the use of bicycles, and already aiming at the increasing use of sustainable active transport and also a technological alternative as a means of integration in mobility, the São Paulo Mobility Plan - PlanMob/SP was prepared between 2013 and 2015, and is the instrument for planning and managing the Municipal Urban Mobility System, that is, the means and infrastructure for transporting goods and people in the municipality, for the next 15 years. The plan was prepared by the Municipality of São Paulo – PMSP with technical support from the Municipal Transport Department and the public companies SPTrans and CET, in partnership with the other municipal departments concerned with urban mobility, urban development and installment and land use, notably the Municipal Department of Urban Development (PMSP, 2015).

## THE USE OF THE ELECTRIC SCOOTER IN THE CITY OF SÃO PAULO

A field study was carried out, where the electric scooter rental service of two companies operating in the field of leasing active and technological individual transport was also tested, to seek and evaluate the use of the electric scooter as an individual alternative means of transport in the city of São Paulo, consisting of collecting some data to provide information for the article.

In the central region of the city of São Paulo, the use of electric scooters and other active and technological means of transport has become common, both on weekdays and on weekends, thus turning to options for going out on the road. city traffic, and, also containing the condition of being an incentive to physical exercises and including itself as a part of leisure in the midst of the urban situation.

## FIELD RESEARCH

Some companies offer rental of electric scooters in various parts of the city, focusing on the central region of São Paulo. The service of two companies that provide this service in the region of Avenida Paulista and Avenida Faria Lima were analyzed.

Scooters are an excellent option for displacement and less polluting than cars and motorcycles. They are also called e-scooters, and they are easy to park, some companies provide the model of not having a specific place to pick up or leave the scooter, the “dock-free” which means that there is no specific place to pick up or leave the scooter. scooter.

In order to use the scooter, an application is installed on the smartphone, according to the company to which the scooters belong, after which you must: use the APP map to locate the nearest scooter, put credits in your card account or money and click on start trip, scanning the QR code and unlocking the scooter.

The end of the race occurs when the credits available in the user’s account run out, or when the race ends in the application.

A comparison was made between companies A and B, which supply electric scooters at certain points in the city of São Paulo, and some information was extracted to analyze the services provided (Table 1).

Company A is a Brazilian startup that works with a bicycle sharing service and that in 2018 made available the rental of electric scooters in São Paulo. Its circulation is restricted to the area delimited by the company, according to its action map in the application. At the end of the race, they can be dropped off at charging points or dropped off within the company’s operating perimeter.

Company B was founded in Mexico, but has electric scooter rental services in several cities in Latin America, including São Paulo. The use of the electric scooter is limited by the

company and at the end of the race, they must be left in a physical parking spot.

SERVICES	EMPRESA A	EMPRESA B
APP	X	X
PREPAIYED CREDIT	X	
CARD	X	X
MONEY	X	
QR CODE UNLOCK	X	X
FREE HELMET		X
ELECTRIC SCOOTER RENTAL	X	X

Table 1 - Comparison of electric scooter services from competing companies.

Source: Authors (2019).

Evaluating the comparison of the two companies, it can be noted that there is a certain advantage of company A over company B, but their services and prices are basically the same, as they operate in the same region of São Paulo and serve the public that frequently travels. with electric scooters.

Figures 5 and 6 show an example of a location where electric scooters are supplied for rent in the city of São Paulo.

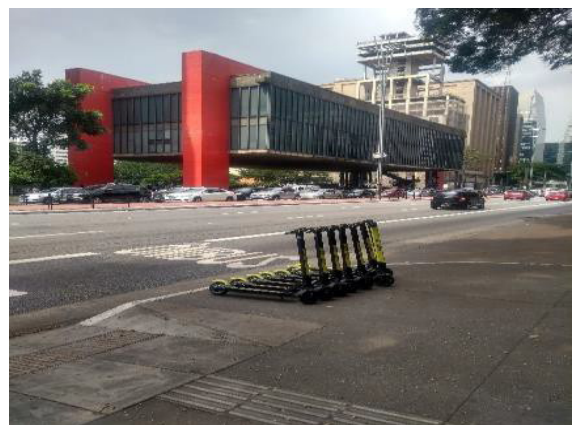


Figure 5 – parking spot of company A electric scooter.

Source: Authors (2019).





Figure 6 – parking spot of company B electric scooter.

Source: Authors (2019).

The displacement of people in a space is the main disadvantage that urban mobility currently faces. The population has been growing rapidly to the point where the already established control has to be reassessed by those responsible for improving the quality of movement of the population that, for the most part, are concentrated in peripheral areas, which requires a greater need for alternatives for displacement.

On a daily basis, people face situations where they expose their safety, in the most viable searches for travel to their destination, which, at the moment, are predominant in individual and collective transport, which sometimes cause the pollution they emit into the air, in addition to of residues and the garbage found in the circulation paths of the vehicles themselves.

One of the resources for a possible improvement in the sustainability of large centers is the use of active transport, such as bicycles, skates, scooters, among others. With population growth, and consequently the increase in vehicles traveling on urban roads, there is greater travel time between regions, due to the time of traffic flow. It is with this need to make people able to move from one point to another, in a short time and with greater agility, that some companies provide

active transport rental services, one of their services being available, an innovation both for urban mobility and for logistics: the rental of alternative technological transport.

Because they are simple and easy to handle, electric scooters are highlighted in the city of São Paulo, as well as because they already have points in the city where companies provide this service.

## IMPROVEMENT PROPOSAL

Technological active transport seeks to apply a way out of the precarious situation in regions where there is a high volume of congestion on urban roads. In addition to seeking agility, helping with sustainability, they facilitate locomotion, since they do not depend on the propulsion of their users, as they have the autonomy of functions, with the user only having to control the direction and speed in which they move.

As an alternative and innovative transport, which mainly aims at the ease of locomotion of the population of large metropolises, electric scooters are still restricted to areas of the central region of São Paulo, as it has the rental and parking points of electric scooters in this location.

One of the proposals would be to expand the service, with access points for electric scooters close to subway and train stations, parking lots and bus terminals, so that they can quickly integrate with other means of transport to contribute to urban mobility, a since it helps in decongesting vehicles on roads, consequently, generating more fluidity and avoiding greater pollution in the environment.

Another suggestion would be to increase the cycle lane network, in this way, there would be more kilometers of expansion of cycle lanes, allowing the use of users in an agile and fast way in the midst of public and congested roads, together with an increase in bicycle

lanes, which are restricted only to cyclists, ensuring the physical integrity and safety of users of active and alternative transport.

## FINAL CONSIDERATIONS

Through this study, it was noted that innovative technologies are fundamental for progress, especially when applied to logistics.

Sustainable alternative transport technologies facilitate urban mobility, as they are able to collaborate in the sustainability of the city and in the locomotion of the individual, as they promote faster displacement in little space, collaborating with the fluidity of the traffic. In the same way that it contributes so much to decongesting the traffic in metropolises, sustainable and technological alternative transports become an attraction for civilization, by managing to add leisure, incentive and contribution to the health and well-being of people, inclusion social, and effectiveness in locomotion and integration with other means of transport.

Thus, the work is concluded by stating that the implementation of the electric scooter in the city of São Paulo is a way of contributing to urban mobility, to the point where it alleviates the volume of vehicles circulating in the regions and collaborates with the sustainable city.

When innovation emerges as a technology, it is easier to be noticed, because, in addition to bringing a solution to a problem, it brings something new to its users. What happened with the electric scooters is no exception, because it is a response amid the troubled situation that individuals live daily in the city of São Paulo, resulting in an efficient instrument for the contribution of urban mobility, which may become common in the future, no longer an option but a standard transport in urban daily life.

The electric scooter has a wide demand and potential, because in addition to being a

sustainable and innovative transport, it helps in the solution to the traffic and congestion in the city of São Paulo. However, its use is still not common among people, because its circulation is restricted to the center of the city and the bike path network is still limited so that there is the expansion of strategic rental points for electric scooters in other regions of São Paulo. Another important factor is the price of the service provided, which has a high value and does not attract consumers to maintain the frequency of use of the service.

Therefore, with proper planning by governmental and municipal entities along with the method of mobilizing companies providing alternative sustainable transport sharing services, it is possible for the city to mobilize itself to use electric scooters consistently, thus contributing to an increasingly sustainable and appropriate development of urban mobility.



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