SUSTAINABILITY IN THE URBAN MOBILITY PLAN OF SÃO JOSÉ DOS CAMPOS: STRATEGIES FOR MICROMOBILITY AND PUBLIC TRANSPORTATION

SUSTENTABILIDADE NO PLANO DE MOBILIDADE URBANA DE SÃO JOSÉ DOS CAMPOS: ESTRATÉGIAS PARA A MICROMOBILIDADE E O TRANSPORTE COLETIVO

SOSTENIBILIDAD EN EL PLAN DE MOVILIDAD URBANA DE SÃO JOSÉ DOS CAMPOS: ESTRATEGIAS PARA LA MICROMOVILIDAD Y EL TRANSPORTE PÚBLICO

ANDRESSA APARECIDA FONSECA FARIAS | UNESP – Universidade Estadual Paulista, Brasil
RENATA CARDOSO MAGAGNIN, Dra. | UNESP – Universidade Estadual Paulista, Brasil

ABSTRACT
In 2003, Brazil's National Urban Mobility Policy adopted the principles of sustainable urban mobility at which the Urban Mobility Master Plan (PlanMob) is an instrument for implementing this at municipal level. In this context, this article analyses whether the Urban Mobility Plan for São José dos Campos incorporates the principles of sustainability, based on guidelines aimed at prioritizing active modes of transport and public transport. The methodology, which is exploratory and descriptive, is comprised of 23 themes that interfere with the municipal urban mobility policy and the implementation of actions aimed at sustainable development. The results show that the municipality has incorporated the principles of sustainability through programs such as "Vou de Bike", the expansion of the cycling network and the Green Line project, which reinforce the city's commitment to more sustainable mobility. These actions contribute to environmental sustainability by promoting more efficient and low impact commuting alternatives, as well as allowing São José dos Campos to consolidate itself as a model of innovation and efficiency, which was recognized in 2022, when the city was awarded the title of smart city.

KEYWORDS
Urban Mobility Plan; Sustainability; Micromobility; Public Transport.

RESUMO
Instituída em 2003, a Política Nacional de Mobilidade Urbana brasileira adota os princípios da mobilidade urbana sustentável, onde o Plano Diretor de Mobilidade Urbana (PlanMob) é um instrumento de efetivação dessa em nível municipal. Nesse contexto, esse artigo analisa se o Plano de Mobilidade Urbana de São José dos Campos incorpora os princípios de sustentabilidade, a partir de diretrizes voltadas a priorização dos modos ativos de transporte e do transporte público. A metodologia, exploratória e descritiva, é compreendida por 23 temas, que interferem na política municipal de mobilidade urbana e na implementação de ações voltadas ao desenvolvimento sustentável. Os resultados mostram que o município incorporou os princípios da sustentabilidade, por meio de programas como "Vou de Bike", a ampliação da rede cicloviária e o projeto Linha Verde, que reforçam o compromisso da cidade com uma mobilidade mais sustentável. Essas ações contribuem para a sustentabilidade ambiental ao promover alternativas de deslocamento mais eficiente e de baixo impacto, além de permitir que São José dos Campos se consolide como um modelo de inovação e eficiência, o que foi reconhecido em 2022, quando a cidade recebeu o título de cidade inteligente.

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PALAVRAS-CHAVE

Plano de Mobilidade Urbana; Sustentabilidade; Micromobilidade; Transporte Coletivo.

RESUMEN

Establecida en 2003, la Política Nacional de Movilidad Urbana brasileña adopta los principios de la movilidad urbana sostenible, y el Plan Director de Movilidad Urbana (PlanMob) sirve como herramienta para su implementación a nivel municipal. En este contexto, este artículo analiza si el Plan de Movilidad Urbana de São José dos Campos incorpora los principios de sostenibilidad, basándose en directrices centradas en la priorización de los modos de transporte activos y el transporte público. La metodología exploratoria y descriptiva abarca 23 temas que influyen en la política municipal de movilidad urbana y en la implementación de acciones orientadas al desarrollo sostenible. Los resultados muestran que el municipio ha incorporado los principios de sostenibilidad a través de programas como "Vou de Bike", la expansión de la red ciclista y el proyecto Linha Verde, que refuerzan el compromiso de la ciudad con una movilidad más sostenible. Estas acciones contribuyen a la sostenibilidad ambiental al promover alternativas de transporte más eficientes y de bajo impacto, además de permitir que São José dos Campos se consolide como un modelo de innovación y eficiencia, reconocido en 2022, cuando la ciudad recibió el título de ciudad inteligente.

PALABRAS CLAVE

Plan de Movilidad Urbana; Sostenibilidad; Micromovilidad; Transporte Público.

1. INTRODUCTION

Sustainable urban mobility has established itself as one of the fundamental pillars for building fairer, more equitable and resilient cities (United Nations, 2022; Un-Habitat, 2022).

As cities grow, challenges related to urban transport become more evident, such as congestion, air pollution, environmental degradation, and inequality in access to mobility (Gudmundsson; Höjer, 1996; Cheba; Saniuk, 2016; Canitez; Alpkokin; Kiremitci, 2020; OECD, 2020).

The predominance of the car as the main means of transport exacerbates these problems, intensifying the negative impacts on urban space and compromising quality of life, especially in developing countries (Gakenheimer, 1999; Newman; Kenworthy, 2015; ITDP, 2021).

In this context, cities that prioritize public transport, active modes and micromobility have stood out for promoting more inclusive and sustainable mobility alternatives (Beatley, 2000; Banister, 2008; WHO, 2022;).

Active mobility contributes not only to reducing pollutant emissions, but also to promoting public health, social inclusion, and improved accessibility, especially for the most vulnerable segments of the population (Magagnin, 2023).

Sustainability in urban mobility involves an approach that considers not only the reduction of environmental impacts, but also encompasses aspects of universal accessibility, economic efficiency, and social justice (Un-Habitat, 2013; GIZ, 2023; Magagnin, 2023). One of its fundamental principles is to reduce dependence on motorized private transport, replacing it with more efficient, accessible and less polluting systems (Newman; Kenworthy; 1999, Newman; Kenworthy, 2015).

The promotion of compact cities, with services and infrastructure distributed equitably across the territory, is identified as a strategy to minimize the need for extensive travel and improve urban efficiency (Moreno et al., 2020; ITDP, 2022).

The National Urban Mobility Policy (Law No. 12,587/2012) establishes guidelines for promoting a sustainable urban transport system in Brazil, guiding municipalities in the formulation of plans that prioritize public transport, active modes and universal accessibility (Brasil, 2012; Brasil, 2015). However, despite regulatory advances, challenges remain in relation to the effective implementation of these guidelines, such as cultural resistance to change, insufficient funding, institutional fragmentation, and a lack of coordination between urban planning and transport policies (UITP, 2022; IDB, 2023).

This study aims to analyze the Municipal Urban Mobility Plan of São José dos Campos (SP), seeking to understand how sustainability principles have been incorporated into its content and strategies. Based on a documentary approach, the analysis focuses on evaluating the guidelines aimed at promoting public transport, active mobility, micromobility, and universal accessibility.

The relevance of this study lies in verifying whether the local plan is aligned with the guidelines established by the National Urban Mobility Policy and the UN`s 2030 Agenda, especially with regard to Sustainable Development Goal 11, which aims to make cities more inclusive, safe, resilient and sustainable (Brasil, 2012; United Nations, 2022).

The importance of this study stands out not only because of the specific context of São José dos Campos, but also because it contributes to the debate on sustainable urban planning in other Brazilian cities. The implementation of public policies for sustainable urban mobility still faces significant challenges, such as cultural resistance to change, insufficient funding, and a lack of integration between different modes of transport (UITP, 2022; IDB, 2023).

The analysis of the plan may enable the identification of existing gaps, providing input for the improvement of transport policies and the construction of more sustainable, connected, and accessible cities.

Furthermore, studying the mobility plan of a sized city such as São José dos Campos makes it possible to assess the applicability of sustainable mobility concepts and strategies in diverse urban contexts the solutions adopted by cities seeking to balance urban growth with sustainability can serve as a model for other municipalities, encouraging the replication of practices aimed at reducing environmental impacts, improving quality of life, and promoting social justice.

2. OBJECTIVE

This article core purpose is to analyze whether the Urban Mobility Plan of São José dos Campos - SP incorporates the principles of sustainability, through the priority inclusion of strategies that promote the use of active modes and public transport in the municipality.

3. STUDY OBJECTIVE

The São José dos Campos Urban Mobility Plan (PlanMob SJC) was chosen as the object of study due to the prominent role that the municipality has achieved in the country, as a reference in the adoption of intelligent mobility, urban modernization and sustainable planning.

Located in the interior of the state of São Paulo, the municipality is part of the Vale do Paraíba and North Litoral Metropolitan Region, approximately 80 km east of the city of São Paulo (Figure 01).

Figure 1: Location of the city in the state of São Paulo - Brazil.
Source: The authors (2025).

The municipality is of great economic and technological importance. It is also crossed by important highways, such as the Presidente Dutra, Ayrton Senna, Carvalho Pinto, Dom Pedro, Tamoios and Geraldo Scavone, which favors economic development and industrialization.

Founded on July 27, 1767, over the years the city has become an important industrial hub, especially in the aerospace, defense and information technology sectors.

According to the Brazilian Institute of Geography and Statistics (IBGE), the municipality covers a total area of 1,099.6 km^2, of which 353.9 km^2 is urban and 745.7 km^2 rural (Prefeitura Municipal de São José dos Campos, 2025c). Its population is 697,054 (IBGE, 2022). Around 52.36% of São José dos Campos' territory is allocated to environmental protection areas, demonstrating an effort to reconcile urban growth with environmental preservation (Prefeitura Municipal de São José dos Campos, 2025c).

The city has grown in a dispersed way over the years, leaving behind large urban voids and creating challenges for those who live in the city. Many areas remain underutilized, while others expand rapidly, without proper integration with the existing infrastructure. As Costa (2007) and Reani (2017) point out, urban planning legislation has played a fundamental role in this dynamic.

Costa (2007) points out that, in certain periods, land use and occupation rules favored fragmented growth, while Reani (2017) highlights how urban zoning influenced the evolution of territorial occupation. The lack of efficient connections between different parts of the city makes mobility a daily problem for many people.

As Reani (2017) points out, road infrastructure has not kept pace with urban expansion, resulting in difficulties in getting around and unequal access to basic services such as health, education and public transport. At the same time, as noted by Costa (2007), it is possible to see in the data provided by the National Traffic Secretariat - SENATRAN that the rate of motorization has grown significantly in the last 23 years (SENATRAN, 2025), Figure 02, making individual motorized transport predominant and aggravating the challenges of traffic and quality of life in the city.

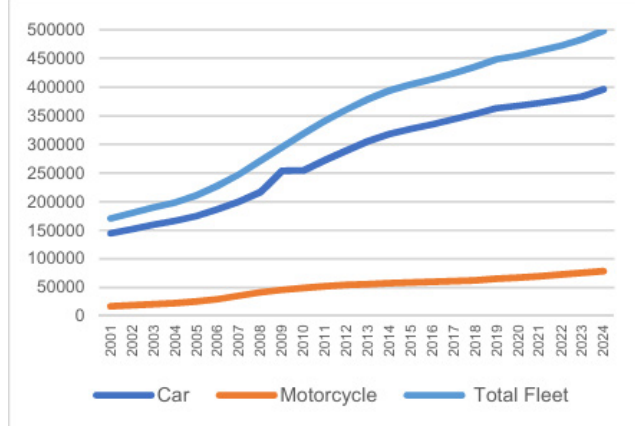

Figure 2: Comparation between the growth of the vehicle, car and motorcycle fleet in São José dos Campos
Source: The authors (2025).

In Brazil, the growing use of cars has led to problems in city mobility, such as congestion and pollution. With the implementation of the objectives and guidelines set out in the national urban mobility policy, municipalities have been encouraged to draw up Urban Mobility Plans (PMU), which seek to integrate different forms of locomotion and reduce dependence on private vehicles, strengthening public transport and encouraging active means such as walking and cycling (Magagnin; Rodrigues da Silva, 2008; Magagnin, 2023).

The municipality's Integrated Development Master Plan was established by Complementary Law No. 612/2018. According to Article 2, urban development in São José dos Campos is based on the principles of sustainability, which adopted the following principles:

the connection of environmental, social, economic, landscape and cultural axes; the reduction of social vulnerability; the promotion of improvements in the quality of life of the population and natural systems; nature-based development, with the valorization of environmental and ecosystem services, protecting ecosystems and promoting well-being and resilience through the implementation of green infrastructure.

The plan establishes guidelines for urban expansion, prioritizing the densification of already urbanized areas rather than expansion into new areas, which contributes to the optimization of spaces and the reduction of environmental impacts. In addition, the plan reinforces the need to preserve natural resources and promote green areas, with special attention to the recovery of degraded areas and the creation of new public spaces (São José dos Campos, 2018).

The combination of a favorable climate, a growing population, urban planning focused on sustainability and environmental preservation makes São José dos Campos a dynamic city that continues to stand out in the state of São Paulo, both for its capacity for innovation and for the quality of life it offers its inhabitants.

In 2022, the city reached an unprecedented milestone by becoming the first in Brazil to be awarded the title of "Smart City" by the Brazilian Association of Technical Standards (ABNT). The recognition was based on criteria established by ISO international standards, which cover aspects such as quality of life, use of technology and urban resilience (Prefeitura Municipal de São José dos Campos, 2024).

Developed to meet the requirements of Federal Law No. 12,587/2012, which established the National Urban Mobility Policy, PlanMob SJC was approved and published in 2016. The plan outlines guidelines covering the organization of public transport, the encouragement of active transport and the adoption of sustainable technologies to optimize urban circulation (São José dos Campos, 2016; Brasil, 2012).

PlanMob SJC includes actions and policies aimed at improving mobility, with an emphasis on prioritizing non-motorized modes of transport, such as walking and cycling, as well as promoting the use of public transport with a low environmental impact.

The plan is guided by principles such as universal accessibility, sustainable development and efficiency in the use of urban resources. It aims to ensure that everyone, regardless of their social status or place of residence, has access to transportation options that meet their daily needs. In addition, PlanMob seeks to reduce dependence on the use of private motor vehicles, minimizing the environmental impact, especially in relation to the emission of polluting gases.

A key aspect of the plan is the prioritization of non-motorized modes of transport. The creation of bike lanes and accessible sidewalks makes the city more walkable and bike-friendly, encouraging active mobility.

In addition to the benefits for people's health and well-being, this approach also helps to reduce traffic and pollution, making the city more pleasant to live in.

The city has stood out precisely for implementing innovative and sustainable solutions, which not only solve these problems, but also make it a benchmark in smart urban planning (Instituto Smart Cities, 2023). Committed to involving its citizens, it has held public consultations and events with the participation of society, thus ensuring that urban mobility policies meet the real needs of the community.

This process of constant evaluation is important if the plan is to be effective in the long term (São José dos Campos, 2016). However, like many Brazilian cities, São José dos Campos faces challenges related to, for example, growing urbanization and urban mobility. However, PlanMob SJC sets out to tackle problems such as congestion, inequality in access to public transport and the need to improve infrastructure in order to become a more inclusive, intelligent city that is prepared for the challenges of the future.

4. METHODOLOGY

The methodology used in this study combines exploratory and descriptive approaches, using indicators developed by Magagnin (2023). These indicators (Table 01) were defined to evaluate the content of the municipal law that established the Urban Mobility Plan, considering not only the minimum requirements established by Federal Law No. 12,587/2012, but also other factors that directly affect urban commuting.

The analysis method is structured around two main axes: (i) general characterization and (ii) detailed thematic analysis. In the general characterization, the fundamental aspects of the plan are analyzed, such as the accessibility of the document, the year of approval, the number of articles and the structure of the text, including annexes. This stage also checks whether the plan follows the guidelines of the National Urban Mobility Policy (PNMU), assessing its principles, objectives and guidelines.

The thematic analysis, on the other hand, delves into essential issues for sustainable urban mobility. Topics such as the organization and safety of road traffic, infrastructure for active modes (pedestrians and cyclists), and universal accessibility are assessed. In addition, it identifies whether the document addresses all the elements associated with public transport, identifying the types of services offered and the prioritization of these services and how they are prioritized in the plan.

Other elements analyzed include integration between the different modes of transport (public, private and non-motorized), fare policies, management of parking areas and strategies to reduce the use of individual motorized transport. Environmental, traffic and neighborhood impact studies are also considered, as well as the periodicity of the plan's review and update.

In this way, the approach makes it possible to analyze both compliance with legal norms and public policies and the plan's ability to promote more sustainable and integrated mobility. The evaluation of these themes was carried out using the content analysis technique, which consists of manually identifying the presence or absence of certain topics in the main text of the law or its annexes, by means of a detailed check.

The evaluation system presented measures the adherence of the São José dos Campos Urban Mobility Plan to the guidelines of the National Urban Mobility Policy (PNMU). By analyzing the presence and approach of the indicators within the In the body of the law and in the annexes (Table 02), this methodology makes it possible to identify which aspects of urban mobility are being properly covered and which still have gaps.

The adoption of a system for categorizing the topics covered in the body of the law and in the annex (complementary document) makes it possible to assess not only the presence of these topics, but also the degree of detail with which they are dealt with, differentiating simple mentions from detailed descriptions and normative references. This type of analysis is essential for identifying the strengths and weaknesses of the plan, as well as supporting revisions and improvements, ensuring greater effectiveness in the implementation of actions aimed at sustainable urban mobility. This tool is therefore a strategic instrument for public managers, researchers and others involved in formulating and monitoring urban policies.

Stage of analysis	Parameters
General Characterization	Availability and access facility.
	Year of approval.
	Normative instrument.
	Number of articles.
	Presence of annexes and document format.
Analysis of the document´s content based on themes	1 PNMU principles.
	2 PNMU objectives.
	3 PNMU guidelines.
	4 Integration of mobility with planning and urban land use.
	5 Road traffic - Safety and humanization.
	6 Classification, hierarchization of the road system and organization of circulation.
	7 Implement and improve sidewalks and areas for walking.
	8 Create suitable conditions for cyclists.
	9 Universal accessibility.
	10 Collective public transport.
	11 Types of public transport service.
	12 Prioritizing public transport.
	13 Fare policy.
	14 Integration of public transport modes with private and non-motorized modes.
	15 Individual motorized transport services.
	16 Types of individual motorized transport services.

Stage of analysis	Parameters
	17 Public and private parking areas.
	18 Instruments for discouraging individual motorized transport.
	19 Traffic impact report or study.
	20 Environmental impact report or study.
	21 Neighborhood impact report or study.
	22 Accessibility, public and school transport for rural areas.
	23 Systematic evaluation, review and periodic updating of PlanMob.

Table 1: Stages and parameters for analyzing the Urban Mobility Plan.

Source: The authors (2024).

Indicator	Parameter to be assessed		Form of assessment
Theme localization (Where it discusses)	Body of the law		All, except item 22.
	Annex	(I) Introduction	Items 1 to 10 and 12.
		(II) Diagnosis	Items 4 to 21.
		(III) Prognosis	Items 5 to 10, 12, 14,5,18 and 23.
Approach to the topic (How it is approached)	(IV) Cites		Presents the theme.
	(V) Partially cites		Presents related sub-themes.
	(VI) Does not cite		The item is not present.
	(VII) References another law		Presents the theme based on a reference to another law.
	(VIII) Cites and describes in detail		Presents the theme, being present in the diagnosis and in the body of the law and/or prognosis (Simultaneously).

Table 2: Summary table of the Urban Mobility Plan analysis.

Source: The Authors, 2025; based on Pinto; Magagnin, 2024.

5. RESULTS AND DISCUSSIONS

This section presents information that enables the identification of sustainability-related topics incorporated into the PlanMob of São José dos Campos. The analyses are divided into two parts: i) elements that generally characterize the plan, and ii) details of some topics related to the sustainable urban mobility policy in the municipality.

5.1 General characterization of the Plan

The São José dos Campos Urban Mobility Plan was approved in 2016 through Complementary Law No. 576 of 15 March 2016, four years after the Brazilian Mobility Law came into force. This plan establishes the guidelines for the Municipal Urban Mobility Policy, with the aim of improving the quality of life of the population, incorporating the principles of sustainability (São José dos Campos, 2016).

The process of developing PlanMob SJC was conducted by a multidisciplinary technical team, which included public consultations and detailed analyses of urban mobility in the city. The plan seeks to integrate different modes of transport, promoting sustainable and inclusive solutions (São José dos Campos, 2016).

The plan is publicly accessible through the official website of the Municipal Government, the Secretariat of Urban Mobility, or the City Council website. As a public document, the plan is available for consultation and can be downloaded in digital format, allowing citizens, urban planning and transport professionals, and researchers to access its guidelines and details (Prefeitura Municipal de São José dos Campos, 2025d).

The plan consists of the body of the law and a supplementary document, which is an integral part of

this law, called Annex 1 - Strategic Plan (São José dos Campos, 2016). It covers a set of strategies and actions aimed at implementing the plan, as well as guidelines for managing demand and improving the supply of the municipal urban mobility system (São José dos Campos, 2016).

The legal text consists of 22 articles, which establish the main guidelines and objectives of the plan. It is based on the implementation of improvements in public transport, greater accessibility for all, sustainable practices, and the integration of various modes of transport.

The technical annex, which complements the body of the law, consists of 65 pages, divided into six chapters and covers 46 topics. This topics incorporate the themes identified in the assessment of mobility in the city, the strategies to be adopted and the actions necessary to meet the real needs of the population.

The appendix also includes the bibliographical references that supported the proposals, as well as maps and graphs that help illustrate the current mobility scenario in São José dos Campos and the solutions planned for the future. Finally, the appendix presents the conclusions of the planning process, with reflections on the challenges encountered and the opportunities identified during the construction of the plan.

5.2 Analysis of the Plan's content

An analysis of the content of the São José dos Campos PlanMob revealed that, of the 23 indicators proposed to assess sustainability, only the indicator 'Accessibility, public transport and school transport for rural areas' is not present in the body of the law or in Annex 1 (Table 03).

In the supplementary document to the law (Annex 1), 11 indicators (47.83%) are present in the item General theoretical framework; 18 indicators (78.26%) in Diagnosis and 11 indicators (47.83%) in Prognosis.

The analysis identified that, of the 23 themes, 7 (30.44%) are present in both the body of the law and Annex 1 (Table 03). These themes cover the general theoretical framework, diagnosis and prognosis, and are: Theme 5: Road traffic - Safety and humanization, Theme 6: Classification, prioritization of the road system and organization of traffic, Theme 7: Implement and improve of sidewalks and pedestrian areas, Theme 8: Create suitable conditions for cyclists, Theme 9: Universal accessibility, Theme 10: Collective public transport and Theme 12: Prioritization of public transport.

When analyzing the indicators established by Magagnin (2023) and the organization of information in the PlanMob documents of São José dos Campos, it can be observed that, in general, the plan meets most of the criteria evaluated. There is a significant correlation between the required items and the content presented, which reinforces the municipality's commitment to aligning with the guidelines of the National Urban Mobility Policy and ensuring a comprehensive and well-founded planning structure.

The first three indicators, 'Principles,' 'Objectives,' and 'Guidelines,' are present in the São José dos Campos PlanMob. They are detailed in the body of the law (Articles 2 to 4) and in the theoretical framework of Annex 1, aligning with the general guidelines of the National Urban Mobility Policy (PNMU).

The 'Guidelines' are detailed in the appendix through the definition of eight structural axes of action in the municipality: Axis 1 - Urban space and planning, Axis 2 - Non-motorized transport, Axis 3 - Public transport, Axis 4 - Individual motorized transport, Axis 5 - Urban freight transport, Axis 6 - Road safety, Axis 7 - Environment and Axis 8 - Communication.

One of the important themes is the 'Integration of mobility with urban land use planning and management.' This theme is addressed in general terms in the body of the law and in more detail in the annex. As a strategy, the plan provides for the regulation of the planning instruments Joint Urban Operations and Simplified Urban Operations.

Both strategies are based on encouraging the use of public transport and walking, promoting mixed land use in the vicinity of public transport corridors. The implementation of Consortium Urban Operations aims not only to reorganize urban space, but also to improve accessibility and mobility in the areas in question, promoting the creation of a more integrated, accessible, and sustainable urban environment.

With regard to the indicator 'Road traffic - safety and humanization', the plan seeks to make traffic in the city safer and more organized. To this end, it creates a road hierarchy that balances the flow of vehicles and pedestrians, reducing conflicts and improving the experience of those who commute daily.

Analysis of the indicator 'Road system classification and hierarchy' revealed that the way São José dos Campos organizes its roads seeks to make mobility more balanced and safer for everyone, from drivers and public transport users to cyclists and pedestrians. In this system, large avenues absorb heavy traffic, while

smaller streets provide access to neighborhoods and local commerce.

It is important to note that the macro road structure, defined in Annex I of the São José dos Campos PlanMob, was modified by the Integrated Development Master Plan (São José dos Campos, 2018). This change impacted on the road hierarchy and the structural bicycle system originally proposed in the PlanMob. In addition, the 2018 Master Plan defined the Structural Public Transport Corridors, which were already mentioned in PlanMob.

The presence of the Presidente Dutra Highway (BR 116), which cuts through the city, significantly impacts the connection between neighborhoods and the general road system. This highway, being a high-traffic route and physical barrier, poses challenges and requires specific solutions to ensure the fluidity and safety of urban mobility in São José dos Campos.

Indicators	Law Body	Annex I			Approach to the theme				
		I	II	III	IV	V	VI	VII	VIII
1 PNMU principles.	X	X							
2 PNMU objectives.	X	X							
3 PNMU guidelines.	X	X							
4 Integration of mobility with planning and urban land use.	X	X	X						
5 Road traffic - Safety and humanization.	X	X	X	X					
6 Classification, hierarchization of the road system and organization of circulation.	X	X	X	X					
7 Implement and improve sidewalks and areas for walking.	X	X	X	X					
8 Create suitable conditions for cyclists.	X	X	X	X					
9 Universal accessibility.	X	X	X	X					
10 Collective public transport.	X	X	X	X					
11 Types of public transport service.	X		X						
12 Prioritizing public transport.	X	X	X	X					
13 Fare policy.	X		X						
14 Integration of public transport modes with private and non-motorized modes.	X		X	X					
15 Individual motorized transport services.	X		X	X					
16 Types of individual motorized transport services.	X		X						
17 Public and private parking areas.	X		X						
18 Instruments for discouraging individual motorized transport.	X		X	X					
19 Traffic impact report or study.	X		X						
20 Environmental impact report or study.	X		X						
21 Neighborhood impact report or study.	X		X						
22 Accessibility, public and school transport for rural areas.									
23 Systematic evaluation, review and periodic updating of PlanMob.	X			X					
Total items fulfilled.	22	11	18	11	11	7	1	9	4

Legend: I – General theoretical framework; II: Diagnosis; III: Prognoses; IV: Cite; V: Cite partially; VI: Does not cite; VII: References to another law; VIII: Cite and describe in detail.

Table 3: Analysis of the content of the Urban Mobility Plan of São José dos Campos.

Source: The Authors, 2024.

With regard to active modes, the São José dos Campos PlanMob provides for incentives for the use of public and non-motorized modes of transport in the city's modal split matrix (Art. 3, item 6). This includes the 'Implementation and improvement of sidewalks and pedestrian areas' and the 'Creation of suitable conditions for cyclists'.

This strategy is complemented by items 7 and 8 of Article 4, which recognize the importance of walking trips in the municipality's transport matrix. In addition, they indicate that cycling should be encouraged, especially for short and medium-distance journeys.

With regard to encouraging walking, Annex I of PlanMob mentions the need for the municipality to review Municipal Law No. 8,077 of 5 April 2010, which addresses sidewalk regulations. This revision should focus particularly on minimum dimensions and floor covering materials, in order to comply with the standards established by NBR 9050 (ABNT, 2021), which regulates accessibility on sidewalks and public walkways.

In addition, the plan includes the implementation of pedestrian routes connecting points of cultural interest and tourist attractions, prioritizing pedestrian mobility. These routes should allow access for cyclists travelling at low speeds and restricted automobile traffic.

In addition, the plan proposes improving accessibility to activities that generate travel demand, with the adaptation of the sidewalk that does not meet the minimum requirements for universal accessibility standards. It also provides for the creation of a body responsible for managing sidewalks in the municipality, which will monitor compliance with the provisions contained in the sidewalk legislation.

The plan also includes two important actions: the development of a Public Lighting Plan, with the aim of ensuring the attractiveness and safety necessary for pedestrian traffic, and the development of an Urban Tree Planting Plan, which aims to ensure comfort and attractiveness in pedestrian areas. This plan will define the species recommended for use in urban areas, as well as establish guidelines for planting and pruning trees.

As for bicycle traffic, the São José dos Campos PlanMob proposes measures to expand the bicycle path system, aiming to create suitable conditions for the use of bicycles as a sustainable and accessible means of transport. Data from the Origin and Destination survey, conducted in the municipality in 2011, indicated that daily trips by bicycle accounted for 41,990 (2.58% of the total), making it the fourth most used mode of transport in the city (Prefeitura Municipal de São José dos Campos, 2014). This strategy includes expanding the cycle path network (Figure 03), integrating disconnected areas to ensure a continuous and accessible cycle path network, and implementing complementary infrastructure (bike racks, bike lockers and changing rooms) in strategic locations, such as companies, business centers and transport terminal - PGTs (São José dos Campos, 2016). In addition, the plan provides for the standardization of elements of the cycle network, both in terms of infrastructure and horizontal and vertical signage. It also proposes regulating and implementing a bicycle rental system at strategic points, with a view to increasing their use.

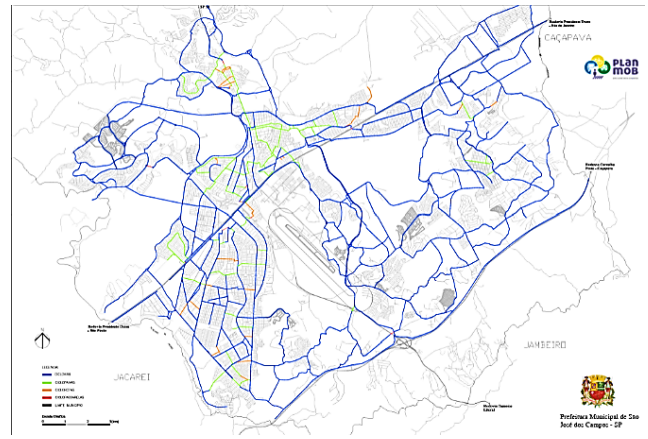

Figure 3: Proposal for the implementation of a structural cycle path system for SJC
Source: São José dos Campos, 2016.

Since the implementation of the Urban Mobility Plan in 2016, São José dos Campos has made continuous progress in promoting active modes of transport. The city has expanded its network of cycle paths and cycle lanes, creating a network that connects different regions. According to extension data, the cycle path system in São José dos Campos grew from 76.79 km before 2017 to 191.31 km planned for 2025 (Prefeitura Municipal de São José dos Campos, 2025e). This increase reflects an effort to cover all regions of the municipality (Table 04 and Figure 04). However, there are still areas that are not fully connected to the cycle network, which represents a challenge for the continuity and accessibility of the system. To ensure the functionality and accessibility of this infrastructure, PlanMob stipulates that cycle management in the municipality will be carried out by a body responsible for periodic maintenance.

Year	Km cycle path system
2017	76.79 Km
2017-2020	140.68 Km
2021	145.54 Km
2022	161.71 Km
2023	182.73 Km
2024	186.91 Km
2025	191.31 Km

Table 4: Evolution cycle path system in SJC.
Source: Prefeitura Municipal de São José dos Campos, 2025.

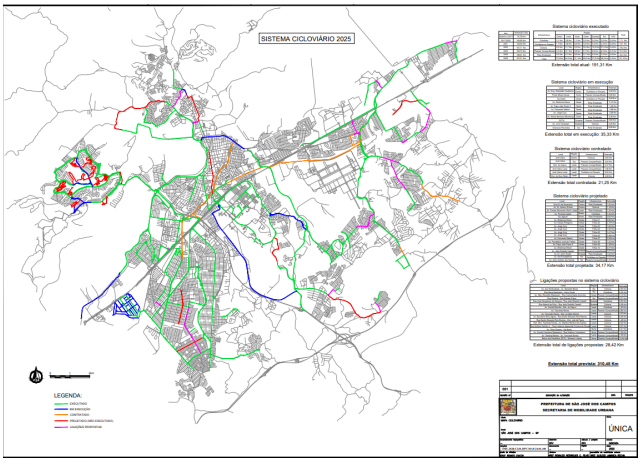

Figure 4: Existing cycle path system in SJC.
Source: Prefeitura Municipal de São José dos Campos, 2025.

An example of São José dos Campos' commitment to sustainable mobility is the 'Vou de Bike' (I'm going by bike) programme, launched by the municipal government in 2016 (Prefeitura Municipal de São José dos Campos, 2025a). This initiative facilitates the movement of cyclists and promotes awareness of the benefits of sustainable mobility. In addition, measures such as the regulation of bike-sharing services and the expansion of bike racks and bike parking facilities have facilitated the use of bicycles as a means of daily transport. Municipal Decree No. 17,963, dated 14 September 2018, establishes rules for the operation of these services (São José dos Campos, 2018). However, to date, the municipality has only implemented the bicycle sharing system (Figure 5), which has already established itself as an efficient mobility alternative for many residents.

Figure 5: SJC Bike Share Station
Source: Google Street View, 2025.

In its first year of operation, the service registered 28,750 registered users and 104,411 trips, 66% of which were made using a single ticket, with average trip times ranging from 15 to 30 minutes (Prefeitura Municipal de São José dos Campos, 2025a).

In addition, these actions also include a bill, pending since 2021, that proposes to expand the installation of bicycle racks and bike stands in public spaces throughout the city. Such actions not only improve urban mobility and encourage healthier and more sustainable habits, but also contribute to reducing traffic and pollutant emissions (ITDP, 2020; Cebrap, 2022).

These laws reflect the municipality's ongoing efforts to develop urban mobility policies in line with global sustainability guidelines. The goal is to improve safety, accessibility, and diversity of travel, with the aim of promoting more efficient and sustainable mobility. These actions are in line with the guidelines of the National Urban Mobility Policy, which emphasizes the use of non-motorized transport to make cities more inclusive (Brasil, 2012).

In line with PlanMob guidelines, São José dos Campos has made significant advances in urban mobility. Noteworthy is the implementation of policies aimed at the safety of cyclists and pedestrians, through educational campaigns and the review of road infrastructure, with a view to safer travel. With continuous investments and the introduction of new regulations, the municipality seeks to align its mobility practices with guidelines for sustainability and innovation in urban transport.

These actions contribute to environmental sustainability by promoting efficient, low-impact transportation alternatives that result in reduced carbon emissions. Initiatives such as these are aligned with concepts such as the '15-minute city' model, in which citizens have access to essential services on foot or by bicycle (Moreno et

al., 2020). In a global context, these measures indicate a growing trend towards urban transformation to adapt to environmental challenges (Souza, 2020).

From a sustainability perspective, the adoption of active transport - which includes walking and cycling - directly contributes to reducing greenhouse gas emissions, mitigating the impacts of the climate crisis (Cebrap, 2022). In addition, this approach reduces the need for large investments in infrastructure for motor vehicles, such as the expansion of avenues and car parks, and promotes a more efficient use of urban space, with the preservation of green areas (Magagnin, 2024).

Investing in active transport is a strategy to make cities more sustainable, safe, and pleasant for everyone. With adequate incentives and well-planned infrastructure, walking and cycling can become increasingly viable options for people's daily lives, promoting a balance between mobility, quality of life, and environmental preservation (Brasil, 2012).

The promotion of active transport also has economic implications, since non-motorized modes of transport require significantly lower operating costs compared to motorized vehicles. With the right infrastructure, such as wide pavements and cycle paths, it is possible to provide more accessible and inclusive mobility alternatives, benefiting people from different social backgrounds (Souza, 2020). Furthermore, cities that invest in adequate infrastructure, such as wide pavements and safe cycle paths, promote social inclusion, allowing more people to travel safely and independently (Vasconcellos, 2001).

Returning to the analysis of the São José dos Campos PlanMob, it can be seen that the parameter 'Universal accessibility', a fundamental principle of the PNMU, is widely addressed. In the body of the law, it is dealt with in general terms, while Annex 1 provides a more detailed description of its implications and strategies.

The legal basis for accessibility in the municipality includes Complementary Law No. 361/08 (amended by Complementary Law No. 586/16). This legislation establishes, in its Article 1, the mandatory adoption of the criteria and parameters set forth in accessibility standard NBR 9050 for the design, construction, installation, and adaptation of public and private buildings. Article 4 of the same law sets deadlines for the adaptation of these buildings, under penalty of a fine. In addition, Law No. 8,077/10, which provides for the construction, maintenance and conservation of sidewalks in the municipality, reinforces the standards to ensure accessibility in these spaces.

With regard to public transport, parameter 10, which deals with 'Public transport services', is addressed comprehensively in the law and in detail in the annex. On the other hand, parameter 11, relating to 'Types of public transport services,' is found only in the annex. Other topics, such as 'Prioritization of public transport' (12) and 'Fare policy and reduction of urban public transport costs' (13), are present in both documents.

Paragraphs 8 and 9 of Article 3 establish that municipal urban mobility policy should make public transport more attractive than the use of private motorized transport, ensuring that it is democratic, accessible and efficient. Article 4, sections 10 and 11, highlights the prioritization of public transport projects that structure the territory and induce integrated urban development, in addition to ensuring the quality of the service provided. Article 6 deals with the regulation of public transport services.

In Annex 1, Axis 3, which deals with public transport, the document presents several actions to improve the infrastructure and management of the system in the city. Among the guidelines and actions proposed, the following stand out: institutional strengthening for public transport management; promotion of institutional coordination with metropolitan planning spheres; the implementation of the Public Passenger Transport System Restructuring and Modernization Project (MOBI); the expansion of the scope of information systems for users; the establishment of guidelines and principles applicable to the provision of municipal public transport services, including expected standards and service level targets for the system; and the regulation of roads and areas for the boarding and alighting of chartered vehicles.

According to data obtained from the Mobility Secretariat website, Integrated Public Transport Corridors have been implemented in the municipality as part of the Public Transport Prioritization Policy. The project covers the main streets and avenues in the central area of the city, where most of the transport system's lines operate. The initiative includes the implementation of horizontal and vertical signage on the roads, as well as small works, such as safety islands, which guarantee priority in urban spaces for buses and pedestrians, including the implementation of exclusive bus lanes (Prefeitura Municipal de São José dos Campos, 2025d).

The municipality uses the Cittamobi real-time bus app, which allows users to track bus schedules and routes, as well as the location of bus stops. This system is regulated by Decree No. 19,294 of 28 March 2023, which provides for the accreditation of legal entities interested in making

available to users, free of charge and through urban mobility apps for smartphones and/or web platforms, an operational information system for municipal public transport (São José dos Campos, 2023).

The municipality has adopted several initiatives to improve urban mobility, such as the implementation of Integrated Public Transport Corridors and the use of the Cittamobi transport app. These actions are in line with the city's commitment to integrate different modes of transport and promote sustainability in transport. In line with these guidelines, the São José dos Campos Green Line project was announced in 2021 by the Municipal Government as part of the city's Urban Mobility Plan initiatives (Prefeitura Municipal de São José dos Campos, 2025b). This project represents an update of the sustainable and technological guidelines of the mobility plan approved in 2016, with the implementation of a sustainable corridor. The project is being carried out in stages and aims to integrate different modes of transport, promoting improved urban mobility with an emphasis on sustainability and innovation (Cebrap, 2022).

The Green Line is one of the main sustainable urban mobility projects in São José dos Campos, reflecting the principles of the National Urban Mobility Policy (Law No. 12,587/2012) and the guidelines of PlanMob SJC (Brasil, 2012; São José dos Campos, 2016). Its main objective is to offer a modern and efficient public transport system, aligned with the needs of a smart city, with several features that demonstrate its commitment to innovation and urban sustainability.

The project operates with electric vehicles, which significantly reduces pollutant emissions and offers an environmentally friendly alternative to traditional transport (Bezerra; Santos; Delmonico, 2021). In addition, it facilitates integration between buses, bicycles and other means of transport, promoting intermodality and the use of sustainable alternatives (Brasil, 2013).

The infrastructure includes exclusive lanes for electric vehicles, accessible boarding and alighting stations, and a digital ticketing system that speeds up the passenger boarding process (Prefeitura Municipal de São José dos Campos, 2025b). Connectivity and the use of real-time monitoring technology ensure greater operational efficiency, improving the user experience (Prefeitura Municipal de São José dos Campos, 2025a).

The exclusive lane for public transport contributes to traffic flow, reducing travel time and optimizing routes. In addition, the use of electric vehicles reduces carbon emissions, reinforcing urban sustainability goals (Brasil, 2004). The reduction in noise pollution and congestion improves the quality of life of the population, providing more comfortable and efficient transport.

Returning to the analysis of the São José dos Campos PlanMob and its accompanying document, it was possible to observe that the indicator 'Integration of public transport modes with private and non-motorized modes' (14) is covered in Article 8 of the legislation. This article regulates the integration of public transport modes and their integration with private and non-motorized modes, and establishes that such integration must provide for the following measures: (i) defining infrastructure to support physical integration between public transport and private and non-motorized modes; (ii) defining technical specifications for public transport technology systems (monitoring and ticketing); and (iii) defining technical specifications for the traffic control system. These guidelines aim to promote efficient integration between different modes of transport, facilitating user travel and contributing to a more sustainable and efficient mobility system.

The item 'Motorized individual transport services' (15) appears in both documents, with more detailed technical explanations in the annex. The parameter 'Types of motorized individual transport services' appears exclusively in Annex 1.

'Public and private parking areas' (17) is clearly presented both in the law and in the annex, with additional explanations. As for 'Instruments for controlling and discouraging individual motorized transport' (18), this is briefly mentioned in the body of the law.

With regard to 'Traffic, environmental and neighborhood impact reports or studies' (19, 20 and 21), these are included in both documents, but without details of how they should be carried out and evaluated. Finally, with regard to 'Accessibility, public transport and school transport for rural areas' (22), this topic is not addressed in either document, and with regard to the 'System for the periodic evaluation, review and updating of the urban mobility plan' (23), the topic appears only in the body of the law, with some additional details.

According to the legislation, the Urban Mobility Plan must be updated every 10 years after its publication. Although this update has not yet taken place, the city has remained in compliance with mobility demands through the creation and publication of ordinary and complementary laws and decrees.

The Municipal Urban Mobility Policy of São José dos Campos constitutes a regulatory framework. It guides

actions related to transport and mobility, aiming to structure and organize the transport system in a way that is more efficient, accessible and sustainable for the entire population (São José dos Campos, 2016). The policy establishes clear guidelines, concrete goals, and strategic actions aimed at improving the movement of people and vehicles in the city. It promotes integration between different modes of transport, prioritizing social inclusion, reducing environmental impacts, and promoting urban quality of life.

This policy contributes to sustainable urban development by encouraging public policies aimed at improving infrastructure and creating more accessible and integrated spaces (Pinto; Magagnin, 2024). Such initiatives have allowed São José dos Campos to keep pace with the evolution and adaptation of the mobility system, consolidating itself as a model of innovation and efficiency. This recognition culminated in the title of smart city in 2022.

Similarly, other Brazilian mobility plans in cities of similar size have incorporated principles of sustainable development. They prioritize strategies that promote the use of active modes and public transport with a view to reducing individual motorized transport.

Sorocaba (SP), for example, included guidelines in the Sorocaba Urban Transport and Mobility Master Plan (PDTUM) to expand sidewalk infrastructure with the aim of improving pedestrian safety. The actions are based on three main axes: i) development of a plan for standardization, prioritization and requalification of sidewalks; ii) implementation, inspection and management of sidewalks; and iii) educational programmes. Regarding the cycle network and the bike-sharing system. Another highlight in the municipality is the adoption of the BRT system, whose results so far have been very positive (Affonso; Magagnin, 2022).

Joinville (SC) has also implemented sustainability guidelines in line with the principles of sustainable urban mobility. The Plan defines guidelines, strategies, and targets for 10 priority areas for the municipality (IPPUJ, 2016). With regard to walking, the main objective is to improve the quality of journeys, making them attractive and safe. The plan provides for the development of a Walkability Master Plan in the second half of 2015. Other highlights include the expansion of the bicycle network and the implementation of a bicycle sharing system, in addition to incentives for public transport. The plan proposes the development of a Public Transport Master Plan and feasibility studies for the implementation of other modes of public transport integrated with the SIT, such as Aeromóvel, VLT, VLP, urban trains, and others (IPPUJ, 2016; Magalhães; Rabay; Meira; Santos, 2022).

In a study conducted by Magalhães, Rabay, Meira, and Santos (2022), it was found that the PlanMob of São José dos Campos provides greater detail on various strategic actions than that of Joinville. The authors highlighted that São José dos Campos delves deeper into topics such as infrastructure practices for universal accessibility, infrastructure practices in other sectoral policies, control and education practices, and study and survey practices in São José dos Campos. In contrast, Joinville's PlanMob incorporates better information on infrastructure practices and road equipment.

The analysis of the São José dos Campos Mobility Plan, together with the examples of Sorocaba and Joinville, reveals a common trend among Brazilian cities of similar size towards sustainable mobility. Despite differences in the level of detail and strategies adopted, the importance of adopting active modes, public transport and accessible infrastructure in the municipalities' transport matrix is recurrent, indicating a growing national commitment. The advances and challenges faced by cities reinforce the need to adopt consistent public policies, continuous investment, and effective management to build more efficient, inclusive, and resilient mobility systems.

7. FINAL CONSIDERATIONS

This study aimed to evaluate whether the Municipal Urban Mobility Plan of São José dos Campos - SP incorporates the principles of sustainability, through the inclusion, as a priority, of strategies that promote the use of active modes and public collective transport in the municipality, as recommended by the guidelines established by the National Urban Mobility Policy (PNMU), using an exploratory and descriptive methodology.

The analysis, based on the indicators proposed by Magagnin (2023), allowed us to identify that the Municipal Urban Mobility Plan (PMMU) of São José dos Campos largely incorporates the principles of sustainability, focusing on reducing dependence on individual motorized transport and promoting more sustainable alternatives, such as active modes of transport (walking and cycling) and public collective transport. However, although sustainability is a central guideline of the plan, its implementation still faces challenges, especially with regard to the efficient integration between the different modes of transport

and the creation of adequate infrastructure for active modes, which are still insufficient to fully meet demand.

Regarding priority strategies, the São José dos Campos plan highlights the importance of promoting sustainable transport, prioritizing, in theory, the use of bicycles and walking. However, the prioritization of public transport and active modes over individual motorized transport is not always clear and effective, as mobility actions, such as the creation of accessible cycle paths and sidewalks, often fall short of meeting the needs of the population, especially in peripheral areas of the municipality. The creation of exclusive bus lanes, for example, still needs to be expanded further, which limits the effectiveness of strategies to encourage public transport.

Among the plan's strengths, it recognizes the need to promote sustainable mobility, with concrete actions to expand the cycle network and seek improvements in public transport. However, there are significant shortcomings, such as the lack of well-defined intermodality, insufficient infrastructure for bicycles and pedestrians, and low incentives for the implementation of innovative technologies, such as MaaS (Mobility as a Service), which could optimize the integration of different transport modes.

The implications for sustainable urban development are clear, as well-structured mobility planning has the potential to improve the quality of life of the population, reduce environmental impact as well as make the city more inclusive and accessible. Promoting active modes of transport and improving public transport can contribute to reducing carbon emissions, reducing congestion and increasing the efficiency of urban land use. However, the effectiveness of these measures depends on the continuity of public policies and their adaptation to the needs of the population over time.

Among the recommendations, it is essential that São José dos Campos invest in a more robust infrastructure for active modes of transport, such as expanding the cycle path network and improving sidewalks, in addition to ensuring greater integration between the different modes of transport. The adoption of technologies that enable the integration of different mobility services, such as ride-sharing apps and on-demand public transport systems, can also be an important step in improving the effectiveness of the plan. Associated with these measures, it is also important to carry out educational campaigns to promote the use of sustainable transport alternatives.

Future prospects point to the need for continuous studies on the effectiveness of the actions implemented and constant monitoring of the plan's evolution, adapting it according to changes in urban dynamics and the population's needs.

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AUTHORS

ORCID: 0009-0006-4791-8267
ANDRESSA APARECIDA FONSECA FARIAS | Mestranda | Universidade Estadual Paulista - UNESP - Faculdade de Arquitetura, Artes, Comunicação e Design Programa de Pós-graduação em Arquitetura e Urbanismo - Endereço para correspondência: Raposo Tavares, nº4-45 - Jardim Santo Antônio, Bauru/SP - CEP 17013-031
e-mail: a.farias@unesp.br

ORCID: 0000-0003-2324-5521
RENATA CARDOSO MAGAGNIN | Doutora | Universidade Estadual Paulista - UNESP - Faculdade de Arquitetura, Artes, Comunicação e Design Programa de Pós-graduação em Arquitetura e Urbanismo - Endereço para correspondência: Avenida Eng Luiz Edmundo Carrijo Coube, nº 14-01 - Vargem Limpa. Bauru/SP - CEP 17033-360
e-mail: renata.magagnin@unesp.br

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