The conception of "axes" in São Paulo, Brasil: a mixture of travelling of managers and ideas, new urban plan methods, in an incomplete incorporation of Transit Oriented Developments (TOD) agenda

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Abstract (up to 125 words)
This article focuses on the relationship between urban planning and mobility present in the "axes" of the 2014 São Paulo Strategic Master Plan, which became zones in 2016, understanding the conceptual and theoretical origin of the idea that proposed densifying where there is public transport infrastructure. The initial hypothesis was that the inspiration for the axes came from the concept of Transport Oriented Development (TOD), but a bibliometric analysis of scientific articles and manuals, and interviews with the urban planners responsible for regulation, denied this. Urban regulation in previous decades oscillated between zones and urban design, and the axes ended up incorporating an incomplete TOD agenda without improving active mobility or the climate change agenda.
Keywords: transit oriented development; urban planning; urban design; zoning

Introduction

In the year of 2013, the city of São Paulo in Brazil was experiencing the June's Journeys, a movement triggered by the increase in transport fares that stopped the city pushing for better travel conditions and public transport services. The relationship between urban planning and mobility gained the political scene and was materialised with the strategy of concentrating densification (constructive and, in theory, of population) along high-capacity public transport infrastructures – subways, trains and bus lanes –, creating the Axes for Structuring of Urban Transformation (*Eixos de Estruturação da Transformação Urbana* – EETUs) in the 2014 São Paulo Strategic Master Plan (2014 *Plano Diretor Estratégico* - PDE), which became zones in 2016 Land Subdivision, Use and Occupation Law (2016 *Lei de Parcelamento, Uso e Ocupação do Solo* - LPUOS), as it is known and here will be called "axes".

But what was the conceptual and theoretical origin of the axes idea? The proposal for densification where there is transport is not new and can be seen in previous urban regulations, but how were the concepts and ideals appropriated in the axes proposal? To answer these questions, this article analyses how the TOD concept was disseminated in Latin America through the analysis of international manuals prepared by non-governmental organisations and financial institutions, and a bibliometric analysis of scientific articles. Semi-structured interviews were also carried out with urban managers leading the preparation of the PDE 2014

and LPUOS 2016 to understand the choices and design of regulation[1]. Finally, one table at the end of the paper summarises our main findings about the set of regulations.

The hypothesis was that axes inspiration came from the concept of Transport Oriented Development (TOD) disseminated through manuals from international organisations in Latin America, but the research denied the initial hypothesis. The conception of the axes seems to result from a mixture of: (i) experiences of managers, who participated in previous public administrations that tested some models – such as the “Curitiba model” or other bus rapid transit (BRTs) initiatives; (ii) institutional changes, which united urban and mobility planning in the same institution; and (iii) of new methods for urban proposals, such as economic-legal-financial modelling.
The urban regulation in previous decades oscillated between zones and local planes, and axes are zoning, which ended up with incomplete urban design guidelines, and not incorporating or improving active mobility, nor the climate change agenda and the reduction in transport pollution, in an incomplete incorporation of TOD agenda.

TOD in Latin America

The TOD concept has its origin in the United States in the 1990s as a way to overcome a car-centric, low housing density suburban growth. It is expected to change the model based on road transportation, as it is highly polluting and environmentally predatory, considered “distant, dispersed, and disconnected” (Evers et al., 2018) and unsustainable. The strategy is to strengthen the structure of public transport systems and, in the areas surrounding lines and stations, promote the increase of building and population density, the diversity of uses of the space, and social and housing typology diversity. These measures would generate more demand for public transportation, value active mobility (walking or cycling), and promote the building of quality public spaces (Cervero, 1993).

Through urban development that linked the built environment to the provision of transport (Carlton, 2009), the aim was to change the pattern of urban mobility, promoting compact urban environments with mixed use, which would encourage people to live close to public transport and, thus, reduce dependence on the car. In this context, some movements emerged in urban planning seeking to reverse urban sprawl based on automobiles, such as neotraditional neighbourhoods, walkable communities, pedestrian pocket and transit-oriented development (Cervero, 1993; Ibraeva et al., 2020). The dissemination of the TOD concept can be separated into 3 moments without a well-defined transition and which permeate each other: (i) the elaboration and dissemination in the Global North (1993 - 2010), the association with the climate change agenda (2007 - currently), and insertion in Latin America (2013 - current).

The first publications of the concept were ate the early 1990s by Peter Calthorpe (1993) with the book “The Next American Metropolis" and the report prepared by Robert Cervero and the Federal Transit Administration (1993) “Transit-Oriented Development in the United States:

[1] The list of manuals and academic articles researched are at the appendices. The authors' investigations used as the basis for this article are approved by Plataforma Brasil (CAAE: 73827423.9.0000.5390). The following people have been interviewed until the production of this article: the architect Fernando de Mello Franco, then head of the Department of Urban Development (2013-2016); the urban planner Kazuo Nakano, Director of the Urbanism Office of the São Paulo City Department of Urban Development (2013-2014); Nabil Bonduki, then member of the São Paulo City Council and rapporteur of the 2014 PDE (2013-2016); the architect Marcelo Ignatios, Superintendent of Project Structuring (2013-2016); the architect and engineer Alexandre Seixas, Senior Technical Advisor (2013); and the architect Tácito Pio, Senior Management Analyst (2001-current).

Experiences and Prospects” focusing on disseminating the idea and assisting in the implementation of the first experiences. Probably to facilitate the understanding for a large group, a list of six key components (Calthorpe, 1993) became three dimensions, known as the 3 Ds (Cervero and Kockelman, 1997): density, diversity and design. The first refers to housing and employment density; the second to population diversity, uses, services and facilities, and the third is related to the quality of urban design, especially for pedestrians. The idea is that working synergistically, they would bring better results. Some authors later would include “distance to transit” and “destination accessibility” considering parking supply and demographics conditions forming the 5 Ds (Ewing and Cervero, 2010).

The complexity of the variables, synergy and hierarchy between them and the particular characteristics of each territory make the concept difficult to be applied. Some authors claim that the hierarchy of most important factors for the concept to succeed are reduced travel time for public transport, followed by the presence of a job offer and then the quality of urban design (Arrington and Cervero, 2008). Others warn that the difficulty of applying the concept as a policy took to unfinished proposals (Carlton, 2009) and others alert that the implementation of the concept increases the price of land and could cause gentrification (Ibraeva et al, 2020).

In the middle of 2000s, after the Rio 92 and in face of natural disasters and the warning of climate change, the concept is linked to the climate crisis as a way to reduce the emission of CO2 from urban transport by reducing the use of motorised vehicles, the travel distance and increasing the use of active modes. The first relevant appearance is in the IPCC (Intergovernmental Panel on Climate Change) report in 2007, bringing in the chapter “Transport and its infrastructure” the need to reduce motorization through the association between transport planning and urban planning. It was not directly related to TOD, but brings references from Robert Cervero indicating an approach that effectively happens in the 2014 report appointing the concept as a solution for reducing travel distances in urban areas, approaching green urbanism or green TOD (IPCC, 2014).

In the latest IPCC report (2022), with the aggravation of the climate crisis, the concept enters a global agenda for mitigating the climate crisis, being present in the United Nations SDGs (Sustainable Development Goals) – closely related to SDG 11 of sustainable cities and communities. It is also included in the agendas of international organisations that assist cities, such as C40, which is a global network of city halls that supports cities in actions to combat the climate crisis. C40 has produced a guide to good practices and has actions related to transport planning in São Paulo, such as “Cities100: São Paulo - incentivizing Density Near Public Transit” implemented in 2015 after the 2014 Strategic Master Plan which promoted densification near the public transport, that will be explained in the next section.

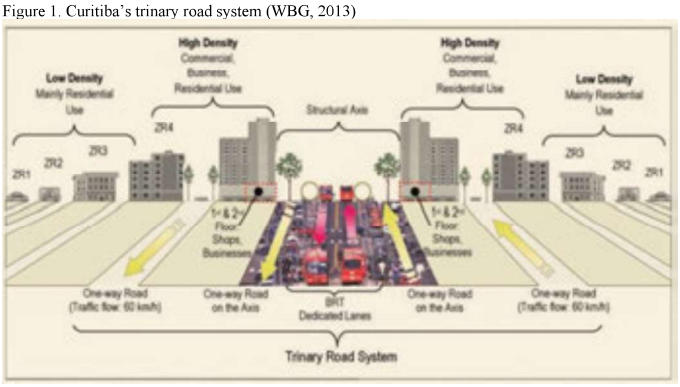
In Latin America, the concept already came with a counterpoint appeal for climate change. Its dissemination began in 2010 with a sustainable transport-oriented development manual (CTS, 2010) in Mexico, but more strongly in 2013 when manuals were published by the WBG (World Bank Group) and ITDP (Institute for Transportation and Development Policy) bringing the concept with an appeal to the sustainability agenda in urban transformations, present in the terms “Sustainable Transit-Oriented Cities”, “Toward Sustainable Urban Cities”, an example of experiences in cities in the Global South, such as Ahmedabad in India, Bogotá in Colombia and Ho Chi Minh in China (WBG, 2013) and a metric model to assess the application of the concept through urban design (ITDP, 2013).

This insertion in Latin America and the Global South was associated with experiences of implementing BRTs (bus rapid transit), justified by the speed and ease of implementing buses as public transport infrastructure compared to rail (WBG, 2013). Also associated with capturing appreciation with the objective of financing implementation, relating to the experience of RICs (Rail Integrated Communities) in Japan (WBG, 2015). The presence of JICA (Japan International Cooperation Agency) as an inducer/seeder of the Japanese concept and experience in Latin America, operating in cities such as Belém (Brazil), Bogotá (Colômbia).

When the concept was introduced in Latin America, there was a difference related to the 3 Ds because its inclusion was related to the analysis criteria as the 3 Ds to be avoided: distant, dispersed and disconnected (WRI, 2018). As a way to change urban development to a more compact, connected and coordinated one.

The Curitiba experience or “Curitiba model” appears in manuals as an example of implementation to be followed, while in academic production there are criticisms. This model is a transformation through a master plan and zoning materialised in the Structural Sectors of the 1966 Master Plan, providing for fast structural roads with an exclusive bus corridor on the central axes of the road, that is, use of the BRT, and one-way roads on the adjacency. The Structural Sectors are areas along the structural roads with greater construction potential, providing for the scaling of the maximum permitted height of buildings through taller, denser buildings close to the road axes and lower, less dense buildings in the middle of the block. Jorge Wilheim was the urban planner that idealised the 1966 Master Plan and in 2002 he was ahead of the São Paulo Master Plan. The mayor of Curitiba that implemented the bus system was Jaime Lerner (1971-1974) during his first term.

Figure 1. Curitiba’s trinary road system (WBG, 2013)



The proposal for densification in Curitiba's axes was widely disseminated as a quick solution, known as the “Curitiba model” that would articulate the expansion of segregated bus lanes, a Latin American example of the implementation of the BRTs agenda, accompanied by a zoning proposal which would allow staggered verticalization. Despite being widespread, there has been criticism since the 2000s about uneven development and deepening socio-spatial inequality

(Pilotto, 2010) with social homogenization of higher-income strata in the most vertical areas along these axes (Stroher, 2014; 2017).

The São Paulo Regulation

The city of São Paulo has historically associated urban planning and its road system, from the beginning with the first communities formed from the paths of the original peoples, which turned into streets (Nigriello, 2024) and with the implementation of road transport, the The city expanded and new communities were formed.

From the 1940s to the present, the automobile has become a protagonist of the urban environment with urban and transport planning focused on it. Some regulations relating verticalization to road infrastructure occurred during the administration of Mayor Prestes Maia (1938-1945), who argued that avenues should be the pillars of urban transformation and proposed a model combining large avenues to improve car accessibility with new occupation patterns expressing an urban design of how transformation should happen.

From the 1970s onwards, São Paulo's regulation was limited to a combination of direct plan and zoning with the first set consisting of the 1971 Integrated Development Master Plan[2] and 1972 Zoning[3]. This set of regulations proposed verticalization along existing or planned road axes to promote commercial or industrial activities close to developed poles. At the time, the city was planning the firsts public transportation with the metro’s Lines 1-Blue opened in 1974 and the 3-Red in 1979, also the bus corridors Santo Amaro Avenue and Nove de Julho Avenue implemented in the late 1980s.

The Dictatorship took place from 1964 to 1985 and when the democratic period was starting the 1988 Federal Constitution and the 2001 City Statute[4] brought instruments discussed in the 1960s, such as concepts of Created Land (*Solo Criado*) and the Onerous Granting of the Right to Build (*Ortoga Onerosa do Direito de Construir* – OODC) – promoting the discussion about having one floor area ratio of one time the area of the plot for the entire city associated with the concept of Created Land.

The PDE 2002[5] and LPUOS 2004[6] are the first set of regulations formulated after the Dictatorship and the 2001 City Statute which incorporated the OODC and a more democratic process in the zoning elaboration, where each Subprefecture could discuss the densification rate in a down-top process. The densifiable areas were located near the public transport and scattered within neighbours.

The period was marked by significant advances in São Paulo’s urban mobility, including the implementation of *Bilhete Único* (Unified Ticket)[7]; and the expansion of the public transportation network structure greater for bus corridors than for the subway network. Bus

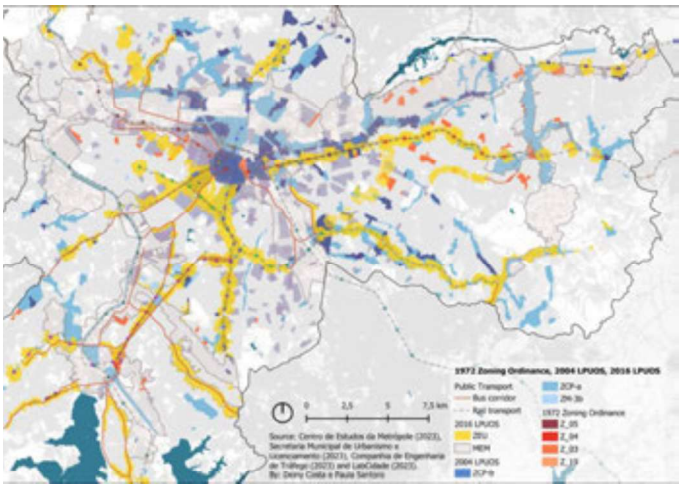
[2] Law No. 7,688, of July 4, 1971.
[3] Law No. 7,805, of November 1, 1972.
[4] Federal Law No. 10,257/2001.
[5] Law No. 13,430, of September 13, 2002.
[6] Law No. 13,885, of August 25, 2004.
[7] Card used in the public passenger transit system in the city of São Paulo that enables the integration of the public transport system.

corridors were implemented on Rebouças Avenue, Francisco Matarazzo Avenue, and the *Fura Fila* guided bus project (2007), while 8 lines of the rail system were operating.

And finally the current set in force PDE 2014[8] and LPUOS 2016[9] proposed the end of scattered verticalization by concentrating densification along the medium- and high-capacity public transportation structure network through zoning rules, called "axes," which correspond to the Axes for Structuring of Urban Transformation (*Eixos de Estruturação da Transformação Urbana* – EETUs) in the 2014 master plan, which later became the Axes Zone for Structuring of Urban Transformation (*Zona Eixo de Estruturação da Transformação Urbana* – ZEU) in the 2016 LPUOS.

These three regulatory sets are related within the evolution of the idea of densification via zoning initially in the centralities of neighbourhoods and road axes - within a context with reduced public transport infrastructure – for densification exclusively on medium and high capacity public transport routes (Costa and Santoro, 2024).

Figure 2 – Overlap of 1972 Zoning Ordinance, 2004 LPUOS, and 2016 LPUOS



[8] Law No. 16,050, of July 31, 2014.
[9] Law No. 16,402, of March 22, 2016.

Source: Costa and Santoro, 2024.

The context leading up to the 2014 PDE is related to the protests staged in June 2013, the first year of the Fernando Haddad administration (2013-2016), as a moment when the mobility agenda, the struggle for better transportation conditions, and the public transportation and active mobility systems strongly emerged. The protests of June 2013 started with the increase of public transport fare in São Paulo city and spread over Brazil for better conditions of mobility and living conditions.

In addition to having successfully overturned the fare hike, these protests “put the transportation and overall urban mobility agenda at the centre of the conversation” (Lemos, 2021, pp. 228-229). Cycling activism had a role in this period with the cycling agenda growing and gaining relevance in previous decades, penetrating institutional structures with activist public managers, through institutional activism (Abers, Sefafim, and Tatagiba, 2014) reflected on the presence of civil society in councils, that shifts the place of active mobility to a “subaltern regime” in relation to the car-centric “ruling regime”[10] (Lemos, 2021).

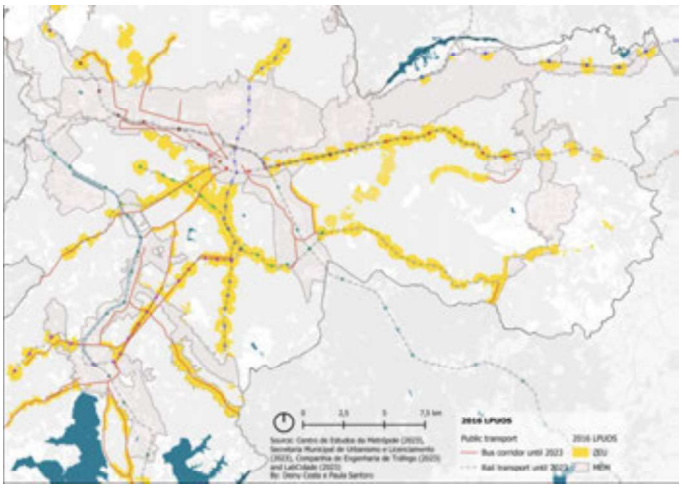
This mobility agenda was so strong that the term “axes” itself had been included in Haddad’s political campaign program the year before, as he ran for mayor, in which the connection between development and mobility was being discussed[11]. This axes were designed as the ZEU in the 2016 LPUOS and with the forecast of other areas to be densified after the approval of the expansion projects for the public transport system, the Planned Urban Transformation Structuring Axis Zone (ZEUP – *Zona Eixo de Estruturação da Transformação Urbana Prevista*). The new axes implemented after 2016 are related to the construction of the Line 6-Orange, extension of the Line 2-Green and BRT Aricanduva. Alongside densification in mobility axes, the reduction of densification in the middle of the neighbourhoods, where the construction potential is at most twice the land area, worked in containing the scattered verticalization (Santoro et al., 2023).

Figure 4 – The 2016 LPUOS[12]

[10] On the dominant and subaltern regime, see Geels and Kemp (2012). According to the authors, from a niche segment in the car-centric dominant regime, pressured by protests or disruptive and counter-hegemonic actions, it eventually takes on a place in the regime, albeit subaltern.

[11] Information collected during the interviews.

[12] Map observations: ZEU means zone of urban transformation structuring with minimum FAR of 1 and maximum FAR of 4; MEM means Macro-Area for Urban Structuring with a FAR defined in later regulation. The stations have the colours of the lines to facilitate identification.



Source: CEM (bus corridors), São Paulo city government (2014 LPUOS, and main roads). By the authors, 2023.

In addition to the axes, the possible densification and verticalization in this regulatory set are in areas of Special Zones of Social Interest (*Zonas Especiais de Interesse Social* – ZEIS) and in the Macro Area of Metropolitan Structuring (*Macroárea de Estruturação da Transformação Urbana* – MEM).

Not all ZEIS have construction potential equal to that of the axes, only ZEIS 2 – unbuilt or underused lots suitable for urbanisation –, ZEIS 3 – idle or underused properties, located in regions with good infrastructure and job offer – and ZEIS 5 – these are empty or underused lots in areas equipped with urban services, equipment and infrastructure, where there is a private interest in producing popular market housing developments.

MEM is an area along the Pinheiros and Tietê Marginals and metropolitan connection roads, where land use is predominantly idle and urban transformation is desirable. In this area, densification is possible via specific regulation where urban parameters are defined and an urban design is planned, and this transformation occurs through Urban Intervention Project (*Projeto de Intervenção Urbana* – PIU) or Consortium Urban Operation (*Operação Urbana Consorciada* – OUC).

The urban design experiences in the regulation of São Paulo return to the management of Prestes Maia (1938-1945) in a combination of design for road axes with the definition of the lot's occupation pattern. In the 1970s and 1980s, the CURA Program (Urban Communities for Accelerated Recovery) enabled the transformation of territories with improvements to roads, public facilities and housing (Lucchese, 2004). An example of implementation was the

Jabaquara/Conceição Project, which combined municipal cooperation for improving roads and public equipment, with state cooperation in planning housing complexes. The program was discontinued with the end of the National Housing Bank (*Banco Nacional da Habitação* – BNH) in 1985, its main federal financier, and after unsuccessful cases, such as the Brás-Bresser Project marked by the high cost of expropriations for the construction of the avenue, canalization of streams and other equipment, and the construction of the housing complexes took place a few years later with most of the land being private areas (Anelli, 2011).

The firsts experiences with OUC was in 1997 with the OUC Faria Lima and later with the OUC Água Espraiada 2001. The OUC model was showing signs of depletion as criticism about the instrument does not involve (or has a limited character to) democratic participation and management; criticism about the interventions produced, for being elitist and exclusionary and being essentially road- and infrastructure-oriented; the cost of Certificates of Additional Construction Potential (*Certificados de Potencial Adicional de Construção* – CEPACs) compared to other areas of the city where compensation for building rights is cheaper, easier to get, and less controlled by investors (Santoro, 2021).

In the 2000s, the Urban Intervention Areas (*Área de Intervenção Urbana* – AIU) proposed by the PDE 2004 were polar areas of neighbourhood centralities or mobility hubs and linear areas of road axes capable of densification via future regulation. The idea would be urban transformation through urban design, but it was never implemented. The need for a subsequent specific law to implement land use change became an impediment to urban transformation.

Until 2023, no PIU or new OUC was implemented[13] after the promulgation of the last regulatory set, with densification and verticalization concentrated on the axes, so that zoning was the inducer as in previous regulatory sets. The choice for zoning is based on previous experiences of the urban project not being viable and also on management's choice for rapid implementation, as the possibility of self-application of zoning was an ally for management in the face of the mobility challenges that management was experiencing – in view of the political pressure around June 2013 (Costa and Santoro, 2024).

Although the transformation occurred through zoning, there was an intention to design the urban area, mainly the ground floor of the projects and the interface between public and private[14]. In this sense, the “basket of incentives” is designed to enable an urban design favourable to active modes – pedestrians and cyclists –, restriction to individual motorised modes and a design of the building’s volume in exchange for greater construction potential. The items in the basket include mixed use on the ground floor, public enjoyment, sidewalk widening, in addition to restrictions imposed such as the minimum size of the active facade – restricting walls or blind walls – and restrictions on vehicle parking spaces on the facade.

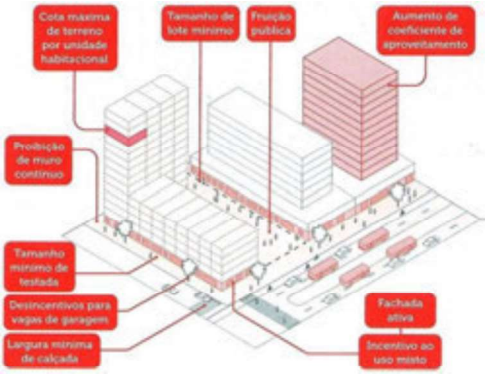
Despite the transformation not being through urban design, there was an intention to design the ground floor – and the interface between public and private – and the building volume. Through a combination of urban incentives, called by one of our interviewees as the “basket of incentives”, the regulation of the axes oriented to a built-up volumetric design through non-computable built-up areas.

[13] With the exception of OUC Faria Lima, in force since 1997, and OUC Água Espraiada, since 2001.
[14] Information collected during the interviews.

This basket proposes a design for the interface between public and private areas, allowing the ground floor not to be counted as a built area if amenities were implemented for human scale, such as active façades, lot fencing restrictions, and sidewalk widening. Alongside with this "basket of incentives" the car amenities were restricted such as reduction of parking area for cars on the building facade and limited to the parking area in the garage as a non-computable area – in the previous regulations there was a limit of the minimum number of spaces per square footage or housing unit regulated.

The "basket of incentives" when combined with other instruments also determined the building volume as some areas were considered non-computable areas, such as horizontal circulation and balcony. This possibility and the lack of height limit allowed tall buildings with balconies; and when associated with the solidarity quota – which is an incentive for the real state to produce units for low income population and incentive social diversity – more construction potential is permitted.

Figure 5 - Axes incentive diagram



Source: illustrated PDE 2014.

The incentives that translate into non-computable built-up areas for the purpose of calculating the Onerous Granting of the Right to Build are not new in São Paulo urban planning – they have emerged since the 1950s plans, although restricted to some areas. The 1970s set of regulations – 1971 PDDI and 1972 Zoning Ordinance – already defined areas that would not be included in the calculations of the total built-up area of development projects[15]. The "basket of incentives" works together with the restriction of non-computable built area defined with a limit of 59% of the total built area. This restriction is new in regulation and guides businesses

[15] Defined by the dimensions of the common area of up to 4 sq.m per housing unit and a caretaker's housing unit of up to 60 sq. m. (Art. 15, Par. 4).

in choosing the combination of incentives for the design of the building's volume, such as a menu where parking areas, internal circulation areas, balconies and technical areas are considered.

This urban form was not only guided by urban parameters that had historically guided the relationship with roads – such as building heights in relation to the width of the road, setbacks, etc. –, but by using the basket of urban incentives that adopts the right to build as a “language,” as a “bargaining chip” for certain urban results (Santoro, 2021, p. 81; Stroher et al., 2023). By choosing to create zoning regulations, public managers tried to incorporate the urban design through this “bargaining chip” giving more square length in exchange for a ground floor design with widening of sidewalks, public fruition and active façade.

Advances in this regulation also include mobility by reducing the use of individual vehicles and increasing the use of active modes and public transport. At the beginning of the 2000s, urban regulation allowed up to 50% of the non-computable built area to be covered by parking spaces and garages for cars, being changed in the PDE 2014 and LPUOS 2016 by limiting 1 space per housing unit as a non-computable area. Also this regulation established for the first time a minimum rate for bicycle parking and amenities for cyclists in the garage, such as changing and repair rooms. The incentive for garage buildings close to some peripheral stations were marked in a map in a way to promote the intermodality and reduce the car use in the expanded centre of the city.

In relation to advances in the public transport system, although medium and high capacity transport has expanded, it is still below the needs of the city and the metropolis. The expansion of the bus lane system, managed by the municipality, was an agenda during the administration of Mayor Fernando Haddad (2013 - 2016) as a response to the protests of June 2013 and due to its ease of implementation, since the asphalt network infrastructure was already existing. The railway system – under state responsibility – requires more time to design and implement, and has made less progress than planned since the first lines in the 1970s. Urban regulations already provide for new axes in accordance with the planning of bus corridors and subway or train lines. Some axes already in place are related to the construction of Line 6-Orange, extension of Line 2-Green and BRT Aricanduva.

The process of preparing the PDE 2014 and LPUOS 2016 followed a top-down decision-making model, with the first bill[16] being prepared in less than a year – started in January 2014 and delivered to the São Paulo City Council in September of the same year –, and as soon as the bill was delivered, the drafting of the zoning began. The city government was very active during the discussions around the 2014 PDE law at the City Council, therefore technicians played a central role in the design of the set of regulations, and decisions were more centralised, having a different kind of public participation than the one involved in the previous set (2002 PDE and 2004 LPUOS).

The design of the bill centralised in the administrative and management body is mainly due to the possibility of implementation in a short period of time. The experience of the previous regulatory set, which took place in a decentralised way with the participation of the population through workshops in Subprefectures where urban parameters were discussed, was a long process and reflected areas with different construction potentials. Another issue for short-term

[16] Bill No. 688/2013.

implementation was the urgency in meeting the urban mobility demands of the period represented by the June 2013 protests.

The 2016 LPUOS did not start from decentralised regional plans, unlike the previous one, but rather discussed the city as a whole, in a centralised manner involving economic-financial and legal modelling made by the administrative body. The diversity in institutional structure made it possible to articulate urban and transport planning. This administration counted with a multiplicity of professionals from different specialties, such as urban planners focused in urban design or with experience in others urban planings, transport planners, economists and professionals in the legal field.

This intra-governmental integration was a cohesive and aligned group of elected and technical officials who allowed the axes to be designed in a partnership between the Secretariat of Urban Development and Transport[17] – which also prepared PlanMob 2015 (São Paulo Urban Mobility Plan)[18] – and a team from SP Urbanismo[19]. According to some of our interviewees, a group was formed to conceive urban typologies and urban design for the many different urban scales (including micro) of the axes, to be implemented especially with bus corridors – for which the municipality is responsible. This group also included "transporters", managers coming from the mobility agenda, to be involved in urban planning.

The design of the axes initially came from the desire to improve the implementation of bus corridors, mainly from the experience with the Santo Amaro Corridor with cases of being run over after implementation[20]. The impetus was for the implementation of bus lanes to create a more pedestrian-friendly urban environment, including widening sidewalks and a diversity of uses on the ground floor of the lot – avoiding the blind gables resulting from the latest regulations. This design included economic-financial and legal modelling that enabled the desired urban transformation both on an intra-urban and lot scale, involving the real estate market not only in the volumetric designs and interface between public and private, but also in the production of housing of interest. social (*habitação de interesse social* – HIS).

This production of HIS by the market takes place through the Solidarity Quota, defined by the increase in the construction potential of the project if HIS units are built on the lot itself or another lot in the city or the possibility of payment to Urban Development Fund (*Fundo de Desenvolvimento Urbano* – FUNDURB). The initial idea of the Quota was to promote socioeconomic diversity within the lot itself, but adaptations were made to the design of the regulation, distorting the instrument towards compensation possibilities beyond the lot.

[17] The drafting of the 2015 PlanMob stands out in the period. The plan provides guidance regarding actions to ensure better urban mobility conditions over a 15-year horizon and is the result of the National Urban Mobility Policy (*Política Nacional de Mobilidade Urbana* – 2012 PNMU) – Law No. 12,587 of January 3, 2012.

[18] Decree No. 56,834, February 24, 2015. The plan guides actions to guarantee better conditions for urban mobility within a 15-year horizon and is the result of the National Urban Mobility Policy (*Política Nacional de Mobilidade Urbana* – PNMU 2012) – Law N. 12,587, of January 3 2012.

[19] At the time, it was coordinated by the architect Gustavo Partezani Rodrigues (who has a background in urban and mobility design); the architects Marcelo Fonseca Ignatios (who also worked with real estate assessment) and Alexandre Seixas Rodrigues (who holds a doctoral degree in urban mobility planning); the economists Bruno Borges and André Kwak; and counsel José Apparecido, who has a background in urban design and planning.

[20] Information collected during the interviews.

The mobility crisis was not the only discussion happening at the time, the public discussion around the effects of the verticalization model sparked a massive conversation with different narratives in the media. Groups were divided by: the resistance movements formed by associations of residents of areas impacted by this verticalization accessed and would like to preserve the neighbour as it is; or groups who resisted the destruction of cultural and environmental value which are non-designated heritage assets; or movements in favour of verticalization known as YIMBY (“yes in my backyard”). More recently, another group has emerged aiming to show that, more than being on opposite sides, the ongoing discussion regarding verticalization is a fallacy, because it conceals the interests of the real estate market and finance in producing these changes (Rolnik et al., 2021).

The modelling of the axes reflected the transformation on a municipal and lot scale. This simple and unified densification rule for all public transportation axes did not take into consideration the territorial differences affected by zoning regulations[21], reflecting differences in the urban transformation along these different axes. Although there was an intention, from the beginning, to establish differences between them, as reported by some interviewees, that did not happen as there was limited time to conduct studies to draft the proposal, and it was even more difficult to do so when drafting the 2016 LPUOS, as it could mean reducing floor area ratios, a setback that would make it harder to pass the zoning ordinance law. This single rule applied to all axes reflected a different form of appropriation or abandonment of the different axes by the real estate market.

The combination of rules and incentives in the axes, such as the possibility of greater construction potential, such as the “incentive basket”, and the absence of size limits made the production of large and tall buildings viable, with some projects having 500 housing units. The concentration in one territory and size of these projects led to issues of urban infrastructure overload, production of units without thermal comfort (Viana, 2024), large buildings with a similar design (do Val, 2023) and production of units for social housing distorted from the function (Stroher et al, 2023).

Commenté [1]: seminário dos eixos

It appears that the conceptual theoretical basis of the axes is the concept of TOD through the relationship between urban and transport planning and urban mobility directed towards a modal transition from individual motorised transport to collective and active public modes – on foot and bicycle – through incentives for densification close to public transport axes and modelling of the ground floor and public/private interface. Also due to the temporal convergence of the elaboration and implementation of the PDE 2014 and dissemination of the concept in Latin America and Brazil, both in the mid-2010s. However, this hypothesis was not confirmed in the interviews, with a consensus among those interviewed that the concept was not the basis theoretical.

One of the interviewees mentions that during the discussions about the implementation and improvement of bus lanes, he remembered the concept and looked for references that could help with planning, but that it was not a topic that entered the meetings and guided the axes or the PDE 2014. There is a convergence among some interviewees that the agenda of improving

[21] A broader research hypothesis believes that a reading of location, base, and land structure, the available urban mobility structure, and real estate production, identifying different producers (real estate agents) and the different products produced by them, can be helpful to understand the differences between the proposals and what has been implemented along the axes so far.

bus corridors and the experiences of OUC Água Branca and Bairros do Tamanduateí were what drove the proposal for the axes. Other interviewees and the analysis of densification along the last three sets of regulation (Costa and Santoro, 2024) show that the idea had already been present since the 1972 Zoning, or in the PDE 2002 AIUs, or the 2004 LPUOS. The inspiration from the “Curitiba model” and 1966 PD also appeared in the interviews with a flow of actors and urban planners ahead of the drafting of regulation.

In this way, it is possible to understand that the result is exactly a combination of previous experiences in the urban regulation of the municipality itself and the flow of managers and actors in public administrations testing models and proposing discussions on forms of urban intervention.

Final Remarks

This article shows that despite the TOD concept being related to the discussion around the relationship between urban and transport planning and being disseminated in Latin America in early 2010s, it’s not the conceptual basis of the last urban regulation in São Paulo city – 2014 PDE and 2016 LPUOS.

Despite the TOD concept being disseminated in Latin America at the same period of the axes of São Paulo’s in the 2014 PDE and 2016 LPUOS, it was not a concept that influenced the design of the regulation. The interviews and analyses of institutional historical contexts, models utilised, and proposals for urban regulation lead us to our first hypothesis for this work, according to which the conception of the model that inspires the theoretical-conceptual basis of the axes may be precisely the result of a combination of circulation of actors and planners involved in the structuring of public planning agencies. The different backgrounds of the managers involved in the urban discussion and the flow of these actors into the public administrations that tested some models, such as Candido Malta, Nabil Bonduki and Jorge Wilheim. Also the migration of ideas and the “Curitiba model” brought by Wilheim after his experience in Curitiba.

A densification near medium and high capacity public transport and restriction in the middle of neighbourhoods happened, however there are some differences between the axes and the TOD concept that resulted in an incomplete agenda. The choice of transformation by zoning not by urban design, due to the political moment and the need for short-term implementation. There was a desire to promote social diversification, but the release of the obligation to carry out construction on the same lot and the distortion of the production of social housing made it unworkable. The restrictions on the car use non-computable built areas were those possible within the dynamics that already occurred and were determined in the city's previous regulations.

References

Arrington G.B.; Cervero, R. Effects of TOD on Housing, Parking, and Travel. Transportation Research Board, 2008.

ABERS, R. N.; SERAFIM, L.; TATAGIBA, L. (2014) Repertórios de interação estado-sociedade em um estado heterogêneo: a experiência na Era Lula. Dados: Revista de Ciências Sociais, Rio de Janeiro, v. 57, n. 2, p. 325-357. Available at: http://bit.ly/2wN0X7H. Accessed on: 5 Apr. 2023.

BERNARDINI, S. P.; SATO, P R. (2021) Análise sobre a estrutura nos planos urbanísticos recentes de São Paulo (1968 - 2016). URBE, Revista Brasileira de Gestão Urbana, v. 13. DOI: https://doi.org/10.1590/2175-3369.013.e20200195. Accessed on: 6 Feb. 2023.

CALTHORPE, P. The Next American Metropolis. Princeton: Princeton Architectural Press, 1993.

CAMPOS FILHO, C. M. (1972) Desenho para São Paulo: o corredor metropolitano como estrutura urbana aberta para a grande São Paulo. 1972. Doctoral dissertation. São Paulo, University of São Paulo.

CERVERO, R. (1993) Transit-Supportive Development in the United States: Experiences and Prospects. Washington, DC: Federal Transit Administration.

CERVERO, R.; KOCKELMAN, K. Travel demand and the 3Ds: Density, diversity and design. Transportation Research Part D: Transport and Environment, 1997, p. 199-219. DOI: 10.1016/S1361-9209(97)00009-6

COSTA, D.F. and SANTORO, P.F. Between zones and urban plans: models mobilized in the Axes in São Paulo. Cadernos Metrópole, São Paulo, v. 26, n. 60, pp. 511-535. DOI: 10.1590/2236-9996.2024-6006

CTS México. Manual de Desarrollo Orientado al Transporte Sustentable (DOTS). México: 2010.

EDWING, R.; CERVERO, R. Travel and the Built Environment: a Meta-Analysis. Journal of the American Planning Association, 2010, p. 265-294. DOI:10.1080/01944361003766766

EVERS, H.; AZEVEDO, L.; BETTI, L. P.; FERNANDES, C. S.; RODRIGUES, G. P.; MONTANDON, D. T. (2018). DOTS nos Planos Diretores: Guia para inclusão do Desenvolvimento Orientado ao Transporte Sustentável no planejamento urbano. WRI. Available at: <https://wribrasil.org.br/pt/publicacoes/dots-nos-planos-diretores>. Accessed on: 20 Oct. 2021.

FELDMAN, S. (2005). Planejamento e zoneamento. São Paulo: 1947 - 1972. São Paulo: Editora da Universidade de São Paulo (University of São Paulo Publishing House)/FAPESP.

GEELS, F. W. and KEMP, R. (2012). The Multi-Level Perspective as a New Perspective for Studying Socio-Technical Transitions. In: GEELS, F.; KEMP, R.; DUDLEY, G.; LYONS, G. Automobility in Transitions? A Socio-Techinical Analysis of Sustainable Transport. New York, USA, Abingdon, UK, Routledge.

IBRAEVA, Anna; CORREIA, Gonçalo H. A.; SILVA, Cecília; ANTUNES, António P. Transit-oriented development: A review of research achievements and challenges. Transportation Research Part A: Policy and Practice, 2020. DOI: 10.1016/J.TRA.2019.10.018

IPCC, Intergovernmental Panel on Climate Change. Cap. 8 Transport. In Assessment Report 5 of Working Group III, 2014.
IPCC, Intergovernmental Panel on Climate Change. Cap. 10 Transport. In Assessment Report 6 of Working Group III. IPCC: 2022.

ISODA, M. K. T. (2013). Transporte sobre trilhos na Região Metropolitana de São Paulo: estudo sobre a concepção e inserção das redes de transporte de alta capacidade. Master’s thesis. São Paulo, University of São Paulo.

ITDP, Instituto de Políticas de Transporte & Desenvolvimento. Padrão de Qualidade TOD v2.0. ITDP Brasil, 2013. Available at: <https://itdpdotorg.wpengine.com/wp-content/uploads/2014/03/TOD2_Portugues.pdf>.

LEMOS, L. L. (2021). Política, mobilidade e espaço: a bicicleta na cidade de São Paulo. Doctoral dissertation. São Paulo, University of São Paulo.

LISBOA, L. C. L. (2019). Transporte de Londres, Paris e São Paulo: aspectos fundamentais do planejamento e expansão das redes de transporte estruturais e sua relação com a organização do tecido urbano. Doctoral dissertation. São Paulo, University of São Paulo.

LUCCHESE, M. C. (2004). Curam-se cidades uma proposta urbanística da década de 70. Doctoral dissertation. São Paulo, University of São Paulo.

NIGRIELLO, A. O desenho de São Paulo: por seus caminhos. São Paulo: Cultura Acadêmica: KPMO Cultura e Arte, 2024.

NERY JR. J. M. (2005). O zoneamento como instrumento de segregação em São Paulo. Cadernos Metrópole, n. 13, pp. 171-198. Available at: https://revistas.pucsp.br/index.php/metropole/article/view/8803. Accessed on: 6 Feb. 2023.

PILOTTO, A. S. (2010). Área metropolitana de Curitiba: um estudo a partir do espaço intra-urbano. Master's thesis. São Paulo, University of São Paulo.

PMSP and METRÔ (1979). Leste-Oeste: em busca de uma solução integrada. São Paulo, PMSP, Metrô.ROLNIK, R.; REZE, S.; ARAÚJO, L.; BILYK, V. (2021). A falácia da verticalização. Folha de S. Paulo, 5 Oct. 2021.

SANTORO, P. F. (2021). “20 anos do Estatuto da Cidade: Operações Urbanas, Parcerias Público-Privadas, Projetos de Intervenção Urbana… E a matrioska!” In: ALFONSIN, B. de M. et al. 20 anos do Estatuto da Cidade: reflexões sobre temas-chave. São Paulo, EDEPE/IBDU.

SANTORO, P. F.; STROHER, L.; COSTA, D. F.; GONÇALVES, P. V. S.; CANAN, H. G.; AZZOLINI, G. S. (2023) Enxugamento dos miolos ou concentração da produção imobiliária nos Eixos de Estruturação da Transformação Urbana no Plano Diretor Estratégico de São Paulo de 2014? Fórum SP 2023. Available at: https://www.iabsp.org.br/forumsp23/caderno_de_resumos.pdf. Accessed on: 5 Nov. 2023.

SANTORO, P. F.; WISNIK, G. (2013). Article for the exhibition “De que leis é feita a verticalização em São Paulo?” (“Of what laws verticalization is made in São Paulo?”) Curated

by Paula Freire Santoro and Guilherme Wisnik, with photos by Leonardo Finotti, exhibition included in the Architecture Biennial of November 2013.

SILVA, J. R. F. da. (2014) Zoneamento e forma urbana: ausências e demandas na regulação do uso e ocupação do solo. Master's thesis. São Paulo, University of São Paulo.

SOMEKH, N. (1997) A cidade vertical e o urbanismo modernizador: São Paulo 1920 - 1939. São Paulo: Studio Nobel; 1st. Edition.

STROHER, L. E. M. (2014) A metrópole e o planejamento urbano: revisitando o mito da Curitiba-modelo. Doctoral dissertation. São Paulo, University of São Paulo.

_____(2017). Reestruturação da metrópole periférica e o impasse da reforma urbana em Curitiba. Eure (Santiago), v. 43, n. 128, pp. 273-294.

STROHER, L.E.M.; SANTORO, P.F.; SOUZA, P.S.; CANAN, H.G. (2023). Fake HIS: a falsa inclusão nos eixos de mobilidade via produção habitacional de mercado. Revista Pós FAUUSP, December.

VIÉGAS, M. F. (2020). Linha Paulista do Metrô de São Paulo: reflexos da inserção urbana na arquitetura e no método construtivo das estações. Master’s thesis. São Paulo, University of São Paulo.

WBG, World Bank Group. Transforming cities with transit: transit and land-use integration for sustainable urban development. Washington, DC: 2013. Available at: <https://documents1.worldbank.org/curated/en/947211468162273111/pdf/Main-report.pdf>

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