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From rail system to bus system: Questioning and confirming Curitiba's originality

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Abstract

The background of this paper relates to a research project focused on the "transfer of ideas" (policy transfer), particularly within the field of public transport. Transfer of ideas is a comprehensive concept that focuses on the process in which knowledge is created, shared and used in different contexts to expedite policies implementation. The paper's main objective is to analyze the experience of the city of Curitiba, Brazil, in the conception, development and implementation of its Public Transportation System, looking at the import and export of guidelines, legislation, techniques, and practices, verifying the city's role as a pioneer hub of innovative urban practices. Analyses are strongly supported by in-depth study of documents produced by municipal, national, international and private sector institutions, related bibliography and qualitative input from expert interviews. Methods included exploratory research, documentary research and semi-structured interviews, targeting four main stakeholder groups. Results highlight an interplay between endogenous elements in the System's technique, design, policy-making and legislation, and imported influences in the development of the "Curitiba Model", both in overt and subtle manners. Conclusions support that there are components of originality to the Model, which have been a source of the export of ideas related to it, fueled by a combination of actions by municipal public institutions, multilateral funding organizations, national and international thinks-thanks, private companies and individuals. However, failure in adapting to contemporary trends such as increased car ownership and to new technologies may put in jeopardy the ability of Curitiba's Public Transport System to remain a Model for the future.

Keywords: Transfer of ideas; Policy transfer, Public transport system; Bus rapid transit; Curitiba

INTRODUCTION

Among the central issues affecting the quality of life of city dwellers worldwide, and, consequently, one of the main challenges faced by urban planners and city managers, revolves around the ever-growing fleet of private automobiles and the related adverse effects of this reality. Within this context, the search for efficient and affordable public transportation systems is a topic of great interest.

In this scenario, the "Curitiba Model" achieved a degree of national and international recognition as a successful and innovative case.

Curitiba is the capital of Paraná state, in Southern Brazil. According to data from the Brazilian Census Bureau (IBGE), the city's population was approximately 360,000 inhabitants in the early 1960's, within an overall metropolitan population of roughly 540,000 (COMEC, 1999). Current IBGE estimates give the dimension of the growth during the past decades: Curitiba is nowadays the home of 1.9 million people, core of a 3.7 million Metropolis (IBGE_Cidades, 2019)

The timeframe of the present study focuses on the period between 1966 till 2016, which encompasses two significant junctures in the history of the city's transportation system: the beginning of its implementation, with the sanction of the 1966 Master Plan; and the rupture, in 2016, of a decades-long management policy of steady public transport systems' integration between Curitiba and the metropolitan municipalities.

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The experience of Curitiba, therefore, was concretely initiated with the execution of the 1966 Master Plan, which included some key features: zoning based on street hierarchy, closing of central streets, prioritization of public over private transport and introduction of exclusive bus lanes, consolidating what would be called Bus Rapid Transit/BRT (Ardila-Gomez, 2004). Assimilation of tested experiences and continuity of public policies made the city a reference and positioned it in a valuable circulation of ideas. Its model is presented as innovative but subject to exogenous influences, reflecting fragmented experiences adopted abroad and suggesting setbacks when compared to cities that replicated its model in modernized versions.

Though these characteristics are difficult to measure and confirm, the case in point argues that it is plausible to attest intricate transfer and circulation of ideas and circumstances that indicate both the assimilation and the export of guidelines, practices, techniques, and projects, making recipients and originators eventually undistinguishable. However, originality seems to favour local resources and the result became known as the "Curitiba Public Transport Model".

From the 1980's, several studies already highlight Curitiba as an exporter of authentic urban solutions, particularly in public transport (ITDP, 2007). Better understanding how the ideas of its public transport system were built, which were their influences, how they were transferred elsewhere, how this interplay was shaped by an array of interests, were the main objectives for this study.

2. MATERIALS AND METHODS

2.1 Theoretical Framework

The research topic of "transfer of ideas", also largely found on international literature as "policy transfer", is a comprehensive concept that focuses on the "…process in which knowledge about policies, administrative arrangements, institutions and ideas in one political setting (past or present) is used in the development of policies, administrative arrangements, institutions and ideas in another political setting (Dolowitz and Marsh, 2000, p. 5)".

In the urban domain, from the 1970's, developing countries in particular were encouraged to absorb urban planning ideas formatted in foreign programs (Ward, 2010). With the evolution of technology and the globalization process, this "transfer of ideas" happens at a much higher speed than in the past, turning into an attractive, quick and cost-effective option for cities worldwide. In this way, public transport and urban planning initiatives are transferred by different technical and political actors as a solution of local urban conflicts. It has become increasingly more frequent the use of successful urban examples to motivate the development of similar proposals, outside the limits of their original realms, though with limitation and doubts about its efficiency due to differences in institutional, socioeconomic, political and cultural contexts (Dolowitz and Marsh, 1996; James and Lodge, 2003; Healey, 2011).

The promotion of the concept of the "transfer of ideas" has been used as a management tool, as a way of exchanging knowledge to guide and even stimulate urban innovation. The adoption of this tool also attempts to diminish uncertainties; gain time in the implementation of projects; and ease the need to legitimize action (Benson and Jordan, 2011).

The investigation here presented sets on the dynamic relationships between the import-export of ideas that inspired the development of Curitiba's public transportation system; its endogenous, original features; and the export of this system as a positive reference to other cities in the world. It was developed through the following sources: critical review of technical reports produced by city's, as well as by national and international institutions; selected bibliography; interviews with key actors who took part in the proposal and implementation of the so-called Model; and analysis of public-private interinstitutional practices between the city of Curitiba and the local bus/technology company (Volvo International).

2.2 Methodology and Key Sources of the Case Study

The search of information about the issues related to the "transfer of ideas" in the domain of public transport systems within the temporal timeframe of the study, particularly for Curitiba, followed an exploratory and documentary research methodology, coupled with qualitative elements derived from a set of semi-structured interviews.

Four key groups of stakeholders were analysed through exploratory and documentary research: public institutions connected to the planning and management of the city's public transport system; private institutions that disseminate the Model through technical consultancies, specialized bibliography and participation in conferences/seminars; multilateral agencies, which finance similar solutions worldwide, and that included the case of Curitiba in "best practices" databases; and liberal professionals, who either in the public or in the private sector, have been crucial in the conception, formatting and implementation of the System.

The documentary research was pursued through the consultation of documents available at public bodies, as well as published official documents. Exploratory research related to the topic in national and international bibliographies was also utilized.

Within the focus of the *import of ideas*, municipal laws and technical documents produced by the municipality, particularly the Municipal Institute of Research and Planning of Curitiba (IPPUC) and the Municipal Agency for the Public Transport of Curitiba (URBS) were key sources.

Within the focus of the *export of ideas*, in addition to this local body of references, main sources were documents produced by the World Bank, the Inter-American Development Bank, the United Nations Organization, the Brazilian Association of Public Transport (ANTP), the Bus Rapid Transit Association (SIBRT), the Asociación Latinoamericana de Sistemas Integrados para la Movilidad Urbana Sustentable (SIMUS), the World Resources Institute (WRI), and the Institute for Transportation and Development Policy (ITDP), which consider, in their specific institutional contexts, the Curitiba Model as an influence for the implementation of other transportation systems.

The semi-structured interviews were applied to ten professionals which were determined through a mental mapping methodology following a set of specific parameters: linkage with Public Administration in the areas of public transport, urban planning or related fields for over ten years; participation in projects relayed to these areas in a managerial or decision-making

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capacity at the time that key features of the Model were implemented; and participation in the development of foreign projects as part of technical cooperation missions or as private consultants. The interviews followed a set of ten questions which guided the interchange and which could be expanded according to the responses of the interviewees.

3. RESULTS AND DISCUSSION

3.1 Importing Ideas: from Rail to Road System

The implementation of Curitiba's bus transport system was preceded by several frustrated rail projects. None of them were executed, but revised versions absorbed technological evolutions and served as inspiration for the unprecedented road solutions adopted by the city. This cumulative assimilation leveraged the emergence of significant interventions, which are considered the most important in the city and commonly understood as icons of change in the history of its public transport system: the Express Bus in 1974 - known as "the" or "one of the" first BRTs in the world (PMC, 2004) -, the "Speedy Bus" (*ligeirinho*) in 1991, and the Biarticulated Bus in 1992, which would be a real BRT according to currently accepted concepts (URBS, 1995).

Foreign rail principles which were partially incorporated to Curitiba's bus system suggest that the applied innovations involved a myriad of received influences, either implicit or clearly observed. For instance, the embryo of the BRT system can be traced to the city of Chicago in its 1937 plan of transforming three railways in express bus corridors (Goodman, 1972).

Notwithstanding, main characteristic of such development and appropriation process 1. clearly confirms the "social construction of things (Pinch and Bijker, 1984) and 2. confirms the emphasis of the city on consolidating fragments of practices, techniques and policies into a comprehensive transit network, receiving additional insights from other contexts and reinventing them based on its own learning. Figure 1 synthesizes this process of knowledge absorption by municipal technicians in visits abroad and the subsequent local adaptation of ideas. Fragments mentioned above are observed in the diversity of foreign cities and in their initiatives investigated by agents considered to be the proponents of Curitiba's Model.

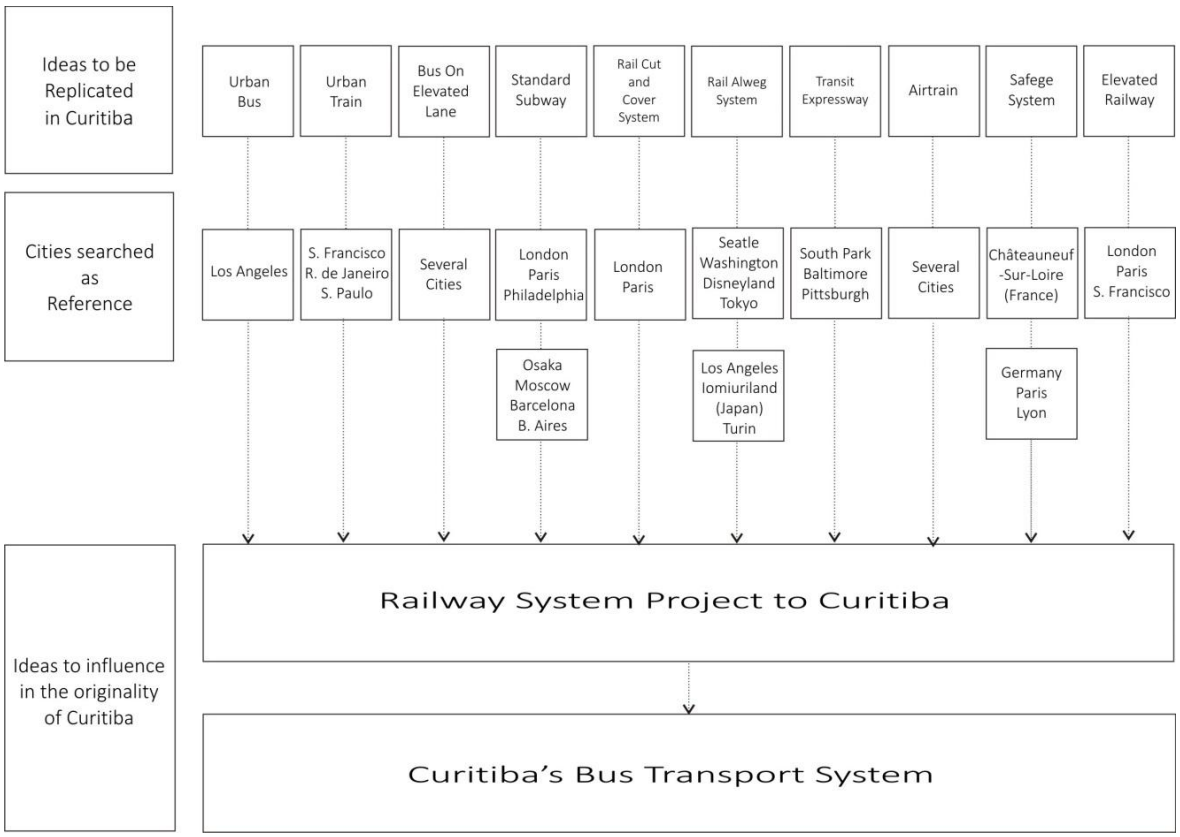

Fig. 1: Transport systems visited to refer the mode to be implemented in Curitiba
Source: Authors, based on the Preliminary Study for the Metro (IPPUC, 1969).

The importance of understanding other experiences was clearly justified: "to avoid errors that could arise due to a hasty choice of a system, without a careful verification of the conditions that Curitiba presented to receive this or that solution" (IPPUC, 1969, p. 15).

Originality is to be found in locally tailored association and adaptation of ideas, but also as a response to financial constraints. The metro system initially suggested to Curitiba by its local experts, as they had seen in Pittsburgh/PA and Baltimore/MD, with elevated concrete structures and electric vehicles on tires conducted by guide rails placed in the pavement (ibid), for example, proved too expensive. Despite this limitation, these very same systems influenced the innovative local Express Bus, running on an exclusive lane road network.

These foreign influences were concurrent to Curitiba's originality in the adopted solutions. Technical and operational details adopted by Curitiba have immediate correspondence to what was seen abroad; others confirm local originality: chassis lower than

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those used at that time; greater load capacity; more powerful engine to respond to different demands, terrains, and road geometries; wider doors to guarantee levels of comfort that were unprecedented to local users; and a visual identity developed to differentiate the new system from the conventional buses. More important than all was the innovation proposed (and implemented) by local architects in terms of integrating public transport to the land use legislation and the municipal road system. This triple integration is reflected in a very specific urban design of exclusive bus lanes, but, again, assimilating foreign influences. Dely and Oikawa (2016), for example, confirm the creativity of such design but recognize the influence of the system conceived for the city of Runcorn, England, with its inventive physical pedestrian minded divider. Gnoato (2006) points outs similarities to urban design proposals developed for the city of Toulouse.

In addition to technical efforts, managerial local specificities equally facilitated the circulation and implementation of new ideas in the city: a multidisciplinary technical team (with long tradition to work for the municipality); the creation of the Research and Urban Planning Institute of Curitiba/IPPUC (in 1965, one of the first of its kind in Brazil); a mayor leading a group of professionals with academic training focused on urban issues (mostly from the recently created local courses of engineering, architecture and urbanism); expertise to negotiate with foreign banks (building interinstitutional and professional relations going further than the initial financial programs of agencies such as the World Bank); and the installation of bus/trucks manufacturer, Volvo (collaboratively taking Curitiba as a laboratory).

This body of initiatives allowed Curitiba to implement a flexible and low-cost public transportation system, in comparison with rail alternatives, attracting the attention of national and international planners (IPPUC, 2004), and soon inspired solutions in Brazilian cities such as Sao Paulo (1975), Goiânia (1976), Porto Alegre (1977), Belo Horizonte (1981) and Recife (1982) (IDTP 2007; Global BRTData, 2017). As pointed out by Ultramari and Duarte (2009), the resulting alterations in the city's landscape from the approval of the 1966 Masterplan characterize it as a true "urban inflection", a decisive point in the trajectory of Curitiba, which defines its history in "before" and "after".

Internationally, the pioneering character of Curitiba's solutions from the 1970's is acknowledged in publications such as UN-Habitat's Global Report on Human Settlements 2013, which focused on Planning for Sustainable Urban Mobility. Jirón (2011) highlights Curitiba as the first city to implement a BRT system in Latin America and that, since then, a real boom in BRT systems emerged, followed by the experiences of Quito and Bogotá.

3.2 Exporting Ideas: Recognizing local originality

There is a wide range of agents that facilitate the dissemination of the city's transport and planning system. Prominence may be detected in the technical and political structure of the city's planning, environmental and public works agencies; in its international relations team; and in the company responsible for operating the transport system (URBS – Urbanização de Curitiba S.A.). These bodies, working organically, are responsible for receiving national and foreign delegations seeking information about the city and for developing interinstitutional protocols proved critical for boosting a continuing transfer of ideas.

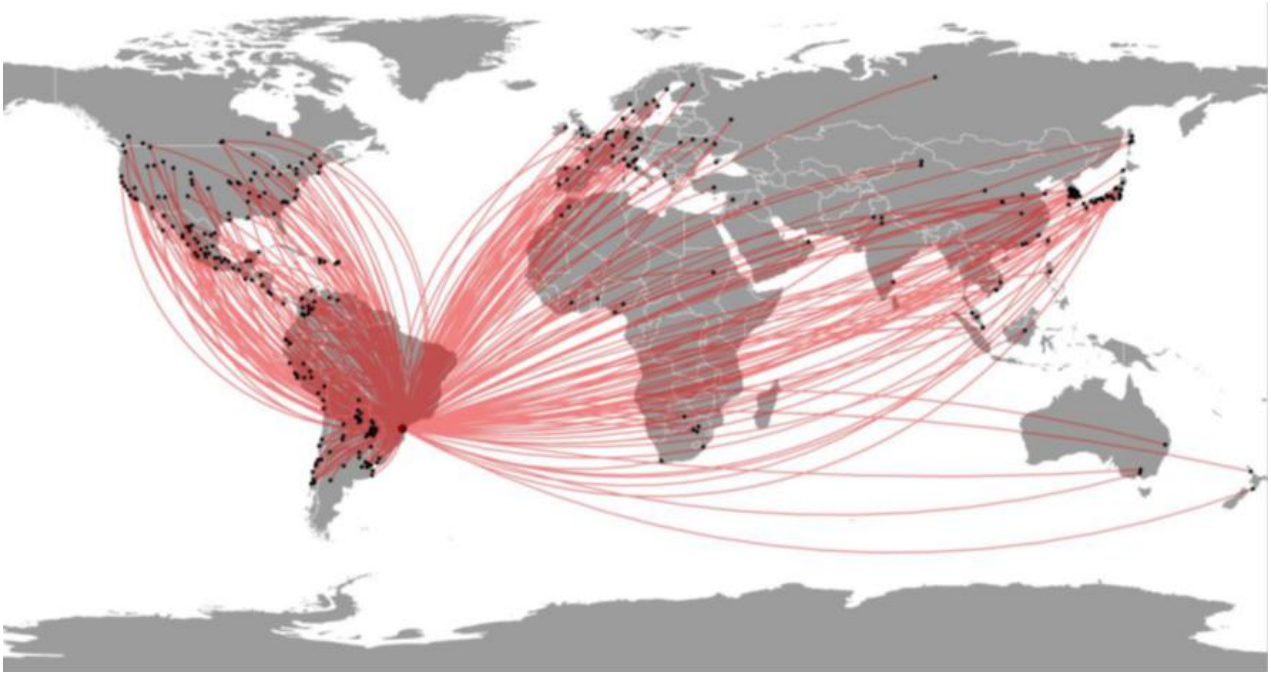

Fig. 2: International delegations formally visiting Curitiba (2000-2016)
Source: Prestes, 2018, based on URBS annual report (2016).

This process of exporting ideas is categorized into two types: ideas sought, and ideas taken. The first is represented by an impressive number of foreign cities' delegations coming to Curitiba to learn about its transport system. The second type is carried out by agencies able to disseminate technical and managerial information about the city and to reproduce it as good practices: the World Bank (responsible for financing most of the existing transport infrastructure in the city), the United Nations and the European Union (holding major debates at the global level), the National Association of Public Transport (carrying out

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forums/seminars/publications), and companies like Volvo (in the intention of popularizing their product, ends up publicizing Curitiba). Successful public transit in Curitiba is a good example of "public authorities thinking private and private enterprise thinking public" (Campbell, 1997, p. 9-10).

Financial agencies disseminate the case of Curitiba with the purpose of reducing uncertainties in the implementation of transport projects, of obtaining positive financial results, and of strengthening financial operations. The replication of the Curitiba Transport Model facilitated by the creation of best practice banks, such as those initiated by the World Bank, also favours the export of ideas developed in the city. For the World Bank, with its great capacity to position itself as a global intelligentsia, the Master Plan of Curitiba of 1966 - still in use - remains visionary, necessarily flexible, and capable of generating a unique model of transport (Gwilliam, 2002).

Another example is the Japan International Cooperation Agency (JICA), in Brazil since 1976, through its Official Development Assistance program focused on Practices in Management and Sustainability for developing countries (2011-2015), trained professionals from Latin America, Asia and Africa in a partnership between JICA, IPPUC and the Brazilian Cooperation Agency - ABC (JICA, 2016).

The UN-Habitat (2015), exemplifying the role that public transport can have as an inducing factor of urban development, references Curitiba as a good example of Transit Oriented Development, combining a lower cost bus rapid transport solution and land use policies, demonstrating a planning for people approach.

The private sector has made this export even more remarkable, based on consistent dialogues with public authorities and resulting in consultancies and dissemination of models, services and products already tested by the city. An interesting example is the Biarticulated Bus project, specially developed for Curitiba in 1992, and currently exported worldwide by Volvo International and its local subsidiaries (Amaral, 2017). The important role of the private sector in the dissemination of Curitiba's Model may also be observed in individual consultant initiatives, or in those of consulting firms. Professionals responsible for this dissemination are primarily those in key posts when designing or implementing projects related to public transport in other cities (Prestes, 2018).

4. CONCLUSION

Diffusion of ideas can be understood as a snowball effect (Hopkins, 1994), in which adoption of innovation may influence enlarged contexts. In the case of urban innovations, individual-to-individual learning plays an important role as a diffuser, but organizational or institutional learning often predominates, with the help of a variety of relationships networks. This helps to explain the establishment of Curitiba as a model.

In highlighting the role of municipal management as an exporting agent of itself, one concludes there exists a successful urban marketing project, as observed by Arantes et al. (2002). When analysed from the import perspective, a reduction of innovations is noticed, but, prior to that, a clear intention of dialogue is seen, as well as a search for external experiences and a capacity for analysis, criticism, and implementation.

The implementation of the Express Bus, Speedy Bus and the BTR are often seen as inventions of Curitiba. However, the originality of Curitiba's public transport may be foreshadowed by the premises adopted in railway systems designed abroad, as recognized by municipal reports. More than confirming conceptual influences of one mode on another, our research reveals an undeniable process of learning from what had already been tested elsewhere.

In the context of exporting ideas, the prominence of certain agents, such as international think tanks, is considered vital. However, it seems to be the running of the city itself, with its collection and association of expertise, institutions and companies the most vital element in this dissemination. or even the marketing can sometimes sacrifice the experimental nature and quality of the service provided. Therefore, the establishment of the export of ideas dynamics would thus largely rest in day-to-day assignments, and not primarily in explicit initiatives of dissemination.

Finally, if innovation is a true characteristic of initiatives native to the city of Curitiba, its ability to maintain such singular position among other cities in the world, and even in Brazil, suggests further discussion. Reliability, punctuality and efficiency are paramount in having people choosing to ride public transport systems over private cars, and in this equation, the use of new technologies and artificial intelligence to optimize performance seem paramount (Fang et al., 2014). A trend of increasing car ownership and ridership, coupled with financial restrictions for both public and private investments, has restricted Curitiba's ability to expand and modernize its long-built transportation infrastructure and system. With the adoption of such technological features still so far on the horizon, can the once creative Model of Curitiba keep its relevance in the circulation of ideas within the area of the public transport?

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Conflict of Interest

Authors declare no conflict of interest.

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