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ARTICLE

Public Policy Instruments and Their Impact: From Analogue to Electronic Government in the Bus Services of São Paulo*

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This article deals with the relations between public policy instruments and production practices of objects related to government action. It demonstrates that the materiality of the instruments built to make a public policy object legible to its operators has independent effects on the relations among private operators, bureaucrats, and the public sector. Based on the bus service provision policies in the city of São Paulo between the 1980s and the 2000s, it shows that transportation policies are structured around the dilemmas and conflicts associated with the production of reports and databases. This article suggests that everyday practices and instruments, especially those associated with the documentation of operational performance, are key dimensions to understand the limits and potential of both state capacities and the regulation of companies' profits. Because of its materiality, documentation practices and document pathways, operate as devices and artifacts which structure opacities, asymmetries of information, and power struggles between the state bureaucrats and private companies in the construction of service legibility. This article concludes that the transition from the governance through analogue instruments to the governance through electronic instruments is characterized by more transparency and greater regulatory potential over the private sector.

Keywords: Mass transportation; analogue government; electronic government; public policy instruments; state capacities.

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The power of companies is widely accepted in public and academic debates as a determining factor in the production of urban public policies. The evaluations of the public mass transportation sector are also done in accordance with this widely disseminated view. This article, whose evidence was produced through the study of different administrations in the city of São Paulo, does not disagree with such interpretation. It reveals, however, that the main conflicts in this policy are not limited to disputes over the fare. Rather, they occur mainly around technical instruments such as remuneration equations, databases, reports, forms, cards (paper and magnetic), turnstiles, contactless smart cards, electronic scanners, and monitoring software.

Studies of the conflicts between bureaucrats, politicians, and bus companies tend to sideline the 'daily' production of a policy. By doing so, they overlook a fundamental question: the relations between these different agents — bureaucrats, bus companies, and government — and the instruments that regulate the provision of mass transportation services by bus.

In fact, the literature on public policies has paid very little attention to the policy-making processes and the arrangements that have structured the profitability of transportation companies (CHEIBUB, 1984; ETIENNE and ZIONI, 1999; HIGA, 2012; HIRATA, 2011). Because of this absence, there is the a-historical and mechanical assumption of the company owners' effectiveness in maximizing profit in different institutional contexts. We argue that the analysis of this maximization has ignored the daily practices of service provision and the materiality of profit making in the urban political economy of bus services. The same can be said about the characterization of the actions of governments and bureaucrats to explain the inefficiency of government regulation over this service provision, for example. The fact is that analytical efforts to examine policy instruments and the conflicts of this sector — thus going beyond government agendas — are still scarce. The result is that we still know very little about how effectively bus services - and public policies in general - are actually governed.

This article makes an effort in that direction. It seeks to analyze the daily production of the bus service provision in the city of São Paulo to answer the following questions: Who governs what? How is the service provision actually governed? What power resources and strategies do private companies use to make their profit and how does the state control the provision of services? What technical resources did past municipal administrations use to produce mass bus services?

This article focuses on these issues. Public policies and their changes are seen from the point of view of production practices of bureaucratic objects in the daily provision of mass transportation bus services. The study shows that public policy instruments have their own materiality, which is the object of conflicts between the agents, because such instruments affect state control over private provision. Power relations translate into policy instruments that directly affect corporate profitability and the state control of service production. These, therefore, are the object of dilemmas and conflicts present in the daily construction of the operational performance of these policies.

This premise of the study draws on previous developments in the public policy literature. First, I rely on Scott's (1998) contribution to legibility processes. For the author, apprehending (and controlling) the functioning of society through classification, schematic categories, statistics, and simplification is part of the rationality of the state. By supplanting informal practices, local intermediaries and local categories, the construction of government over society would involve the systematization of synoptic visions of groups that were previously opaque to state agents. Such schematic knowledge would be useful and necessary for the exercise of government. An illegible society would be an obstacle to any effective state intervention. Thus, the construction of legibility is an approach that centrally positions government technologies and everyday bureaucratic practices (SHARMA and GUPTA, 2006) in the studies about state capacities (GOMIDE and PIRES, 2014; SKOCPOL, 1985).

Legibility is a field of power disputes with significant impact on policies. As Hull points out (2012), state categories are generated and applied in their reference domains through complicated and extensive document chains and other artifacts of representation. The creation of bureaucratic objects — that is, units that will be the target of government actions, such as housing to be expropriated or, in this case, passengers to be transported — is mediated by documentation practices. This creates state representations that are observed through artifacts that allow the operational dimension of policies. This finding implies, for the public policy analyst, a movement to rescue the visibility of the documents. That is, the analyst should look 'at them' and not through them, and therefore treat documents as mediators, things that change and modify the bureaucratic objects they should carry. The translation of bureaucratic objects into state categories has an independent impact on the production of policies. Thus, according to Hull (2012), rather than imagining the state as a neutral observer, the analyst's task is to demonstrate how the

unity of state representations is achieved (or not) through political coordination. In other words, it is important to examine the vast material and practical mediation necessary for the creation of links between state representations and bureaucratic objects. Thus, one must investigate the political implications of the distinction between the discursive dimensions (such as laws) and the material dimensions of administrative technologies, for better understanding of the various potential forms of addressing interests in bureaucratic arenas. The strategies employed by the agents involved in the bureaucratic discourse may be very different from those involved with material references (such as documents) that translate these same discourses into concrete artifacts of policy making. Agents can achieve their interests despite the failure of legal change in policies through strategies associated with technologies that give operational body to the action of the state (HULL, 2012). In many cases, the documentation practices developed to build the legibility of a given field of intervention become operational through the use of public policy instruments.

Secondly, I adopt the proposition that public policy intervention instruments are not axiologically neutral, but technical and social, as stated by Lascoumes and Le Galès (2007). Instruments structure public policies through their own logics, producing autonomous effects that are sometimes unexpected. In line with the argument of these authors, I argue that it is also around these instruments of government intervention that the translation of bureaucratic objects occurs in state representations, which implies that these instruments are indispensable for the analysis of the conflicts about the artifacts through which the legibility of a government field of action is continuously structured.

Finally, I draw on Marques' contribution (2016a), for whom the political economy of bus services has its circuits of value and profitability directly associated with the production of the city. That is why companies are interested in deeply influencing urban policies. Nevertheless, as the author argues, this does not happen through systemic elements, but through resources of power and concrete strategies used in the relationship with other agents in institutional contexts.

The evidence presented in this article contributes to the understanding of both changes and stability in bus mass transportation policies. These can be observed in how the state and private companies exercise government through documents and instruments. They play a key role in the limits and potentialities of state capacities and profit making. I demonstrate how the change of devices and documents in the production of passenger information and ticket revenues between the 1980s and the 2000s has significantly

changed the power relations in the provision of bus transportation services in the city of São Paulo, leading state and private agents to develop different strategies in the production of artifacts and resources for the provision of public services. As we shall see, government by analogue instruments creates enormous possibilities of asymmetry of information and opacity in the production of bureaucratic objects. The transition to government through electronic tools, in turn, reorganized public-private sector relations, not as a result of redefining formal responsibilities and agencies, but rather through the creation of new documentation practices. In short, what might seem to be merely a technical change produced far-reaching political consequences.

This study focuses on the period between the 1980s and the 2000s, when the transition from the "analogue" to the "electronic" governance[1] of bus services in the city of São Paulo took place. This process strengthened state control over private service provision[2]. This study was based on 32 semi-structured interviews with bureaucrats, managers, members of the union of private companies and (former) employees of the companies, as well as secondary data, documents, legislation, handbooks, and ordinances.

This article suggests the need to expand the elements that make up the analytical understanding of bus transportation policies in the city, hitherto strongly linked to pricing and remuneration, towards the structuring elements of this policy, namely, the forms of production and circulation of its bureaucratic objects, that is, passengers, fares, and trips.

This article is organized into three sections, in addition to this introduction and the final remarks. In the first section, I briefly reconstruct the trajectory of transportation policies in the city of São Paulo between 1989 and 2016. In the second section, I present the analogue instruments for the production and circulation of transported passengers and fare revenues in bus services between the 1980s and the 1990s, emphasizing the relationship between documentation practices and instruments in the organization of opacity strategies against the state by private bus companies and street level bureaucrats. In the third section,

[1] Starting with Marques (2014), and adding the contributions of Hull (2012) and Lascoumes and Le Galès (2007), governance is understood here as the configurations of state and not-state agents, interconnected for formal and informal bonds, practical materials, documents and instruments of public policies, immersed in specific institutional contexts in the process of producing public policies.

[2] The impact of electronic ticketing, implemented in 2003, on state passenger control and fare revenues has remained stable to this day. For this reason, this article does not address the 2010s, where, except for the implementation of 4kb cards in lieu of 1kb by the Haddad administration (PT), there was no substantial state activism in this sphere of services. On the other hand, the same cannot be said about the control of bus trips. For more on this subject, see Campos (2016b).

I examine the transition to the 'electronic' governance of bus transportation policies. In the final remarks, I explore the findings and analytical implications of this study.

Public policies for bus transportation in São Paulo (1990-2016)

At the beginning of the Luiza Erundina (Partido dos Trabalhadores, PT) administration in 1989, the bus transportation system was operated by 39 different private companies. On the state side, the Municipal Company of Collective Transportation (CMTC) was responsible for the operation of about 30% of the services. On the private side, 38 authorized concessionaires, distributed in 23 exclusive areas of operation, operated the remaining services (CAMPOS, 2016b). As of 1992, the Luiza Erundina administration implemented the municipalization policy. This eventually enabled arrangements for the implementation of two objectives defended by PT technicians who opposed state-owned bus services. First, the administration intended to increase the planning capacity of all bus lines. Secondly, they advocated the end of the financing model known as direct remuneration. In other words, they intended to dissociate the financial balance of the bus system from the price of tickets by creating a subsidized fare: part of the municipal budget would be used to fund part of the operating costs of private companies.

These objectives were incorporated into Law 11.037 of 1991. After that, transportation companies and CMTC began to operate via 08-year contracts, extendable to two more years. These contracts now involved groups of vehicles instead of areas of operation. The operation of the service became public and the revenue collected was centralized in the newly created 'System Account', to be managed by the municipal administration.

The city then implemented the indirect remuneration instrument. It was based on the operational costs and was an instrument that produced incentives to attract passengers. Operating costs were to be covered by the public budget, regardless of fare revenue. It was also the first direct public subsidy established to offset the disparity between revenue and cost. In this new arrangement, the bus fleet reached 10,850 units in August 1992, as a result of the launching of 40 new calls for tenders by the Luiza Erundina administration (Secretaria Municipal de Transportes, 1992).

The Paulo Maluf administration (Partido Progressista Brasileiro, PPB), (1993-96) took the opposite direction. As of 1995, Paulo Maluf put an end to the state's direct operation of services through the outsourcing and privatization of CMTC's assets. Public

tenders were launched to auction and lease garages and public vehicles. In this process, CMTC was renamed São Paulo Transportes (SPTrans) and became the regulatory agency of the sector.

Even though municipal Law 11.037/1991, which implemented the municipalization, was maintained as the main regulatory framework of the services, the city hall produced the Term of Amendment Nº 01 of 26 of February of 1993, limiting the remuneration of the companies to the total of their fare revenue. The companies then started to receive in proration, that is, according to the ratio between the operating cost of each lot of operation and the total cost of the system. This change limited the policies of subsidies and led to a gradual recovery of the value of the fare as the main component of the costs of the bus system in the city of São Paulo.

In the mid-1990s, the administrations of Paulo Maluf and Celso Pitta produced initiatives to restructure fare collection and inspection, with the objective of expanding regulation and reducing cost through the incorporation of new technologies for financial and information management. The first of these programs was the 'Automatic Fare Collection' of 1996, which will be analyzed further below. It replaced manual turnstiles and paper tickets with hybrid electronic validators and magnetic cards. The second program was a new inductive control system implemented in 1996 (SPTRANS, 1996a). The system of inductive links should monitor the compliance of each bus line and provide the data for the remuneration of private companies. In the following administration of Marta Suplicy (Partido dos Trabalhadores, PT) (2001-2004), however, the inspection was again based on the visual monitoring of vehicles at the street level.

In the Marta Suplicy administration, Law 13.241/2001 created a new regulatory framework for the network: the Interconnected System (SI), perhaps promoting the greatest change in bus services in São Paulo ever since the creation of the CMTC in 1947. In this, clandestine transportation, organized in cooperatives, came to play a key role in the bus network, both institutional and spatial. The bus network was divided into two subsystems, with different functions: the structural subsystem, responsible for the macro-accessibility in the city (long distances), integrating the various regions of the city, and the local subsystem, responsible for micro-accessibility (shorter trips inside each region). Private companies started to operate on the basis of concession contracts for ten years, which could be extended to five years, in the case of private transportation companies, and permitting contracts of seven years, which could be extended to three years, in the case of

cooperatives. The remuneration of private companies began to be calculated based on the number of carried passengers, with different values according to the areas of operation.

Simultaneously, the SI promoted the incorporation of a large set of new technologies, of which the most important was the Electronic Ticket System, including electronic validators and contactless smart cards (including the Single Ticket/Bilhete Único). Additionally, the Integrated Monitoring System and the Automatic Vehicle Location (AVL) were also implemented in order to increase the control and monitoring of the companies' operations (CAMPOS, 2016b).

At the end of the bidding process, of the 51 companies that operated services in 2002, only 18 companies and 11 cooperatives were contracted, some of them united in 16 consortia and some operating individually in exclusive areas.

The José Serra (Partido da Social Democracia Brasileira, PSDB) and Gilberto Kassab (Democratas, DEM) administrations, between 2004 and 2012, discontinued the deployment of the SI in the bus services of São Paulo. In spite of this, Serra's administration made an agreement with the State Government and with Caixa Econômica Federal (CEF) to allow for the use of the Bilhete Único in the rail systems. They also created a revenue distribution system among the participant companies called Clearing System. Moreover, several measures were taken to fight fraud in the use of the Electronic Ticket System, such as the user registration campaign. In 2008, the Gilberto Kassab administration launched the Bilhete Único Amigão, which enabled users to make four trips within eight-hours on Sundays and holidays.

The Fernando Haddad administration (Partido dos Trabalhadores, PT (2013-2016) resumed the agenda of prioritizing mass transportation. His first decision was the expansion of time-related modalities (Daily, Weekly and Monthly) in 2013 and 2014. The Controlled Operation program centralized the control of the operations (CAMPOS, 2016b) and managed new service provision contracts. It also enabled the creation of the 'Small Hours Network': a set of 151 bus lines that run over night. In addition, free transportation for students was secured through Law 16.097/2014 and SMT Act 003/15, of 2015. There was also an expansion of about 300 kilometers in exclusive bus- lanes between 2013 and 2014. Finally, the Municipal Transit and Transport Council was created through decree 54.058 of July 1, 2013.

Governance by analogue instruments (1980-2000)

In São Paulo, the municipal government and private transportation companies regulate and control the supply of bus lines, operating costs, provision of bus services, business profitability, and the value of fares based on the knowledge of the performance of passenger circulation, fare-related revenues, and trips. The production and circulation of these bureaucratic objects in this particular policy require specific tasks to be done, as well as which individuals and groups should carry them out. In other words, the provision of bus services demands a set of key instruments. Knowledge about the operation of these instruments is organized on the basis of schematic categories and their material references, such as documents, reports, databases, cost spreadsheets. The production and circulation of bureaucratic objects in this particular policy is mainly represented by artifacts/instruments that relate to fare revenue, passengers transported and trips made[3]. In the following sections, I argue that the understanding of what is at stake in public policies necessarily involves the study of the forms of production and circulation of bureaucratic objects. The following section characterizes the period we call 'analogue' in bus transportation governance in São Paulo in the 1980s and 1990s. During this period, the 'materiality' of the instruments that organized the documentation practices and the opacities of the daily production of bus services were based on analogue instruments, which were not neutral in relation to the power resources of the agents involved in the production of this policy.

Blurred boundaries and opacities in the construction of legibility

In the analogue period, the production of passengers and fare revenue were based on two tools: manual turnstiles and paper tickets. These allowed for the creation of statistics, classification, indicators, and the construction of a synoptic vision of the performance and usage of the services. The tickets made the economic transaction done at the turnstiles easier, reducing the need for 'cash' in the cashier of the collectors. The sale of these tickets at CMTC booths produced advanced fare revenue, increasing the cash flow of the bus system, as well as enabling the verification/measurement of the company's remuneration. Finally, paper tickets played an important role in containing revenue loss by directly limiting the incentive to bus robbery, a common practice in the analogue period.

[3] This article limits itself to analyzing the forms of production and circulation of passengers and fare revenues. For more about the trips, see Campos (2016b).

Manual turnstiles separated people from passengers, that is, they separated those who had already made the payment and could pass the turnstiles from those who had not done so yet or were entitled to free passing. Placed inside the buses, the turnstiles required the payment of the fare and served as physical barriers between the entrance door and the exit. At the same time, they mechanically ensured the measurement of the number of paying passengers through their turns. On the operating vehicles, there was the circulation of money bills, coins, paper tickets, people, and passengers.

Every day, shortly before the start of the operation at dawn, collectors and bus drivers waited in the garages for the scale of lines and vehicles organized by the traffic foremen. Collectors and line supervisors had the task of documenting the number of turns indicated in the manual turnstiles at the beginning of the day, the so-called 'beginner' record.

During the trips, the mechanical production of the number of passengers occurred under the responsibility of the collectors, seated next to the turnstiles. The collectors were in charge of selling tickets, turning the turnstile, providing information on the services and assisting the driver whenever necessary. At the end of the itinerary, the documentation of the performance of each half-trip[4] was produced jointly by collectors and bus stop inspectors. The report of the former listed the names and records of the employees responsible for the vehicle, prefix, line, odometer, departure and arrival time of each half-trip and, finally, the 'finisher', the final number of turns registered in the turnstile. The inspector duplicated the documentation of the number of passengers and schedules for future checking. With the inspector's stamp on the report, the collector could return to the garage for accountability in the department in charge of systematization and document checking, the Recebedoria (Recipient Office).

At booths in the bus companies' garages, collectors handed out money bills, coins, and paper tickets, as well as half-trip reports, to the recipients. These produced a second document regarding the fare revenue and checked the consistency between the number of passengers transported and the amounts collected. The protocol determined that these tasks should be carried out in the presence of the collectors — which was not always the case in private companies. If inconsistencies were identified, the missing value was the responsibility of the collectors.

[4] The term refers to the completion of a one-way journey between the end stops of each line. A "full trip/trip" would therefore be the fulfillment of round trips on each line.

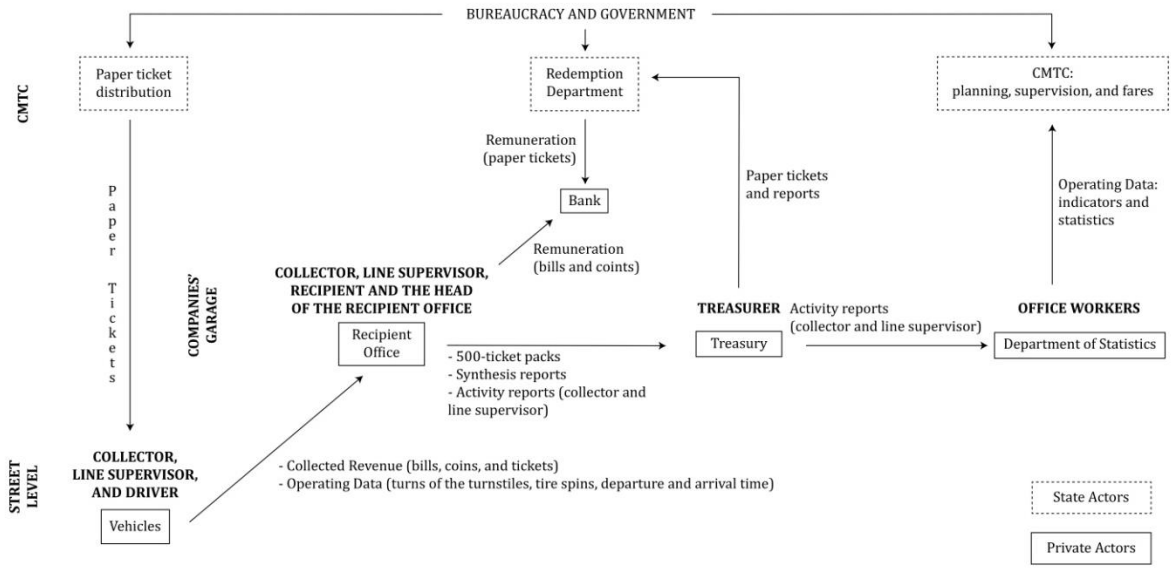
After counting, a receipt was issued by the recipient and the collector was released. At the end of the day, the former cashed out and gave the head of the department the amounts received and the daily reports on the collection of each trip. The latter produced a synthetic statement for the treasury of the companies. Until 1992, all fare revenues in the form of bills and coins were taken by armored cars to be deposited in the checking accounts of the companies. After that, these values were centralized in the 'System Account' of the Municipal Transportation Department (SMT). The remuneration of the SMT to the companies was fully done within 09 days. Bus tickets, in turn, were counted per unit and organized by the recipients in groups of 500 tickets to be passed on to the treasury of the companies.

The third check of the number of tickets was carried out in the company's treasury. This share of the revenue, however, was measured and checked by 'weighing' groups of 500 tickets on precision scales. This was done by the treasurers. A first weighing was done by counting the units. This became a standard that served as the basis for the subsequent counting of the other groups of tickets. At the end, the treasurer documented the fare revenue obtained via bus tickets, sent the reports of the collectors and inspectors to the statistics department of the company and forwarded the tickets to the CMTC, where the companies' remuneration for the collection of tickets was done. In the statistics department, synthetic and statistical indicators were produced, such as the number of passengers per type of passenger, per period (day, month, year), per trip, per vehicle, and per line. In addition, there was another check of the consistency between the documentation produced by the inspectors and collectors. These documents were forwarded to the CMTC for monitoring and regulation.

In the Redemption department, CMTC bureaucrats had the task of verifying, once again, the number of tickets in relation to the documents produced by the companies in the presence of a representative of the company's union, Transurb[5]. Groups of 500 tickets were organized for each company and then served as the standard unit for verification of the remainder by weighing. After accounting for the remuneration of companies via tickets, they were sent to be withdrawn from circulation and destroyed in shredders. Figure 01 below shows the analogue instruments for producing information on revenue and passenger traffic.

[5] Transurb, or Union of Urban Public Transportation Companies of São Paulo, was created in 1961, under the name of São Paulo Bus Companies Association. Since 2003, it is called SPUrbanuss.

Figure 01. Diagram of the analogue production of fare revenue and transported passengers



Complex associations between collectors, inspectors and bureaucrats scattered about various spaces in the production of documents, turnstiles and tickets operated in these circuits. As a result of their material characteristics, these analogue instruments were responsible for the creation of manual documents and measurement practices with very low control by the public sector. This was mainly caused by significant asymmetries of information. These artifacts/instruments that produced the legibility of the bureaucratic objects of this policy - that is, the circulation of fare revenue and passengers - structured the relations between the agents involved in this policy, namely private operators and agents of the public sector. These instruments operated as follows: 01. paper tickets and manual turnstiles had to be first handled by thousands of operators; thus, turnstiles needed to be turned by collectors at each payment, measuring each passenger unit in turns of the turnstile; paper tickets had to be counted (by weight and by unit) so that they could inform the appropriate private remuneration (the same can be said for bills and coins); later on, 02. turns of turnstiles and groups of tickets had to be registered manually (and in pen) in other documents; 03. thousands of unofficial passenger and revenue records produced daily on different material bases by different operators (collectors and inspectors) needed to be coordinated, grouped, systematized, checked, and synthesized in reports by other agents located in the garages of the companies and in the CMTC, for the construction of a unified set of representations of the operational performance of the bus services.

The delegation of two types of decisions to street-level operators, the 'measurement via analogue' instruments and the 'manual translation of the materiality of these instruments into reports' produced high levels of information asymmetries among the state, private companies, and street-level operators in the legibility of the production and circulation of revenue and passengers. At the same time, these analogue instruments constrained the state control and monitoring alternatives of measurement, opening a narrow and highly costly range of instruments and control protocols, which involved verifying the physical integrity of turnstiles and paper ticket, the 'ex post' checking of documents by comparing different sources and assigning the measurement to different agents and through different procedures.

There was no escape. Even though other sets of agents and procedures could be used (and indeed they were)[6], the materiality of manual turnstiles, paper tickets, and documents did not allow for the full elimination of opacities in the regulation.

Omitted passengers and ticket laundering

Policy instruments are the basis for the creation of schematic knowledge. As stated by Lascoumes and Le Galès (2007), they are not axiologically neutral, but technical and social, in such a way that they organize public policies according to their own logic, producing autonomous effects. On the other hand, they are subject to arrangements that may lead to unforeseen results. Therefore, in the study of the legibility of bureaucratic objects of a public policy, we must take into account the mediation and documentation practices necessary for the establishment of connections between state representations and those bureaucratic objects. The case of the city of São Paulo reveals that passengers and fare revenues were not only circulated and produced by the practices and procedures indicated above, but also by practices of omission, fraud and manipulation of documents and instruments. Such events have shaped governance decisions in a non-trivial fashion.

Two cases illustrate how instruments and documents necessary for the legibility of bureaucratic objects actually produced opacity. The original problems arose due to the formal procedures themselves. But they revealed how the instruments used for the creation of bureaucratic categories — the circulation of passengers and fare revenue — in

[6] For these arrangements, see Campos (2016b).

operational documents proved 'vulnerable' to practices that hindered the monitoring by the public sector.

At the end of January 1984, the federal government raised the price of diesel by 29.84%. Transportation companies immediately demanded the pass-through of cost increases to the price of bus fares, a major markup in the context of direct remuneration[7]. It had only been three years since the federal government had decided to pass on authority over the value of fares from the Interministerial Price Council (CIP), a federal agency, to the municipalities. The definition of fare values, the main distributive conflict of this particular policy, resulted from a closed decision-making process between the municipal executive branch and private companies, based on the CIP costing worksheet.

However, Mayor Mario Covas denied the markup requested by the companies. Thus, on February 10 and 11, 1984, Transurb published a letter in São Paulo's main newspapers stating the official position of the group of companies about the gridlock, saying that:

> (...) as of the midnight of the 14th, private companies, due to the difficulties worsened by the recent and brutal markup on diesel prices, will take the following actions: (...) adjust the number of buses in each line so as to bear the increase in the costs of diesel oil and oil products, which reached 30%, adapting, for this purpose, the existing workforce. Companies are obliged to maintain this last decision, until the transfer of the current increase in diesel oil is authorized (Companhia Municipal de Transportes Coletivos, 1984, pp. 04-05).

Faced with this gridlock, Mayor Covas, supported by a law of 1977, authorized the CMTC to intervene in the operation of the companies to guarantee its continuity. On February 11, 1,100 CMTC employees were relocated to intervene in 13 of the 38 concessionaires. At the same time, a comprehensive audit was carried out, identifying irregularities and distortions in the production of information on the circulation of passengers and buses by companies.

CMTC found problems in the operation of turnstiles and odometers, the non-use of the collectors' standard report and the count of the earnings in the absence of the collector. This suggested the possibility of incorrect data production, thus hindering the monitoring of the companies by the public sector. The most iconic case, however, was the identification of the 'fraud' of the Passenger Index per Kilometer (IPK). CMTC found out that the average

[7] Under the context of direct remuneration, the only service financing fund is the fare revenue. For more on the impact of remuneration instruments on political dynamics, see Campos (2016a).

IPK declared by the companies for the calculation of fares was 30% lower than the average found in the audited garages, significantly contributing to the confirmation of a previous assessment about the "lack of reliable operational data" (Prefeitura Municipal de São Paulo, 1986, p. 61).

At the time, two performance indicators occupied a significant position in the fare calculation equation, the IPK and the Annual Average Distance (PMA)[8] produced, respectively, from turnstile and odometer information. Below I reproduce the fare calculation equation in the period to clarify the meaning of these events. In this case, variable costs (CV) related to fuel, lubricants and running costs, while fixed costs (CF) related to vehicle depreciation, vehicle remuneration, warehousing, facilities, equipment, personnel, accessories, vehicle maintenance, and administration costs (Companhia de Engenharia de Tráfego, 1985).

$$Fare = \frac{\frac{Cr\$}{km} + \frac{Cr\$}{\frac{busxyear}{PMA}}}{IPK} = \frac{CV + \frac{CF}{PMA}}{IPK} = Cr\$bypassenger$$

We see that, in the fare equation of that period, the fewer passengers declared (lower IPK), the more expensive the fare. In the context of direct remuneration, this led to greater profits. Thus, by exploiting opacities in the provision of information to the state about the circulation of passengers, translated from manual documents and turnstiles, private companies regulated their own profitability. In other words, by omitting the number of passengers and changes in traffic indicators, companies were able to substantially skew the calculation of charging and the decision-making process. This type of practice was only possible thanks to the analogue instruments through which the bureaucratic objects of this particular policy became legible to the public sector.

The IPK was the result of a chain of representations, through which the bureaucratic objects of this particular policy — passenger circulation and fare revenue — were made legible. In the analogue system, passenger tracking was difficult, if not impossible. With unofficial records, passengers and turns of turnstiles are continuously

[8] The PMA was concerned with the "average annual mileage rode by the vehicle during the year, which can be calculated by line, company, or area of operation" (Companhia de Engenharia de Tráfego, 1985, p.10).

moving on the buses in operation in the city. In this context, the IPK became relatively autonomous and weakly connected to the process responsible for its production. These conditions made it an easy target for manipulation, with limited ability to identify the documents and individuals (and associations among them) responsible for the changes. The instrument that produced the indicator of the number of passengers transported was the result of practices carried out by an extensive network of agents (state and private) responsible for producing different measurement artifacts. The collective authorship of the instrument made it difficult to hold accountable to the public authorities.

Another instrument subject to manipulation was also explored: the manual counting of fare revenues. This calls into question the assumption that companies are effective at maximizing their profit, widely present in the literature, since the action of other agents, such as 'street-level bureaucracies', has also proved important, suggesting the relevance of relationship networks among agents (state or private) located in different stages of the measurement artifacts analyzed here.

In the same period, new agents began to participate actively in the circulation and production of paper tickets. Merchants, gas stations, and street vendors began to accept them for the acquisition of several goods. Tickets then acquired the status of currency, albeit partial. On the other hand, the tickets were not reintroduced into other economic exchanges in the form of money, but marketed as goods. Moreover, practices of interception, distribution, and even production contributed to the formation of an informal and illegal market of bus tickets. Tickets began to be sold at a lower price directly to the companies or in street markets. The production of counterfeits and the creation of the transportation voucher in 1986 contributed to the substantial expansion of this market.

The expansion of the channels of access to cheaper tickets favored other actions in the management of fare revenues. One of these practices was the so-called 'vira', operated, in general, in bus lines with a high flow of passengers. After collecting a considerable amount of paying passengers, the line was interrupted and the vehicle was routed to the garage. With the fare revenue already produced, all bills and coins were replaced with tickets acquired in the new market, so the difference between the value of the fare paid in cash and the cost of the injected tickets produced a surplus at the time of the remuneration of the companies via paper tickets.

A similar result was also achieved by the simple addition of tickets acquired in the informal market to the groups of 500 tickets passed on to the CMTC Redemption sector. In

this case, however, the strategy was accompanied by defrauding the number of passengers carried[9].

However, as one CMTC bureaucrat said in an interview, "every collector was a potential point of ticket laundering". At least two practices were carried out by them with the objective of extracting individual income through the manipulation of tickets and money: collectors bought tickets for half the price and exchanged the money for them, or passengers sold tickets to the collectors, who charged a fee for this exchange for cash[10].

The analogue instruments for reading the bureaucratic objects of this policy allowed daily practices to produce several levels of asymmetry of information and governance limits, not only between the state and private companies, but also internally in the companies contracted to operate the services (private or state-owned). As a result, in the analogue model, the agents involved in the production of the services had several resources to affect the legibility of the bus transportation policy.

From analogue to electronic

The circulation and the production of bureaucratic objects in bus transportation in the city of São Paulo have been subject to substantial changes after the mid-1990s, thanks to the transition from analogue to electronic governance. Opposing municipal administrations in the ideological area and with different agendas have implemented responsible policies to increase state control over the production of information concerning the circulation of passengers and fare revenues, so as to reduce opacity. This section reconstructs this process in order to point out the relations between instrumentation, bureaucratic practices, and legibility in this new model of governance.

Automatic fare collection

In the public transportation policies, the Paulo Maluf (1993-6) and Celso Pitta (1997-2000) administrations were guided by an agenda of municipal government restructuring, efficiency, and cost reduction. In addition to this flagship, the privatization of

[9] This became evident for bureaucrats through the procedures of verification of groups of tickets finding highly improbable compositions. For example, the presence of all the tickets from the same set, with sequential serial numbers in the same group. However, the checking of tickets beyond weighing was done only through samples.

[10] Both practices, however, require ethnographic studies of possible instrument-mediated coalitions among bus companies, middle-ranking officials, and street-level bureaucrats in the circulation and production of bureaucratic objects. This was not done by this research.

the public provider - CMTC - and its change into a São Paulo Transportation regulatory agency (SPTrans), the Paulo Maluf administration sought to "replace the current collection system, basically done by manual processes" (SPTRANS, 1996b, p. 05). Technological innovations imported from other cities around the world (such as Seoul, South Korea) have inspired important changes in the management of this particular policy, substantiated in the 1996 Automatic Fare Collection program.

Through amendments in the municipalization contracts of 1992 and a cooperation agreement signed only in the Celso Pitta administration in 1997, private companies were given the responsibility to implement new technologies. Transurb, in turn, was responsible for the formulation, implementation, and shared management of a new collection system under the supervision of SPTrans. The new costs were added to the remuneration for the service provided.

After testing various technologies, the Celso Pitta administration chose to deploy three tools in lieu of manual turnstiles and paper tickets. Instead of the tickets, the city chose to use the 'Edmonson magnetic tickets', already widely used in the São Paulo state subway system, and 'contactless smart cards'. Manual turnstiles, in turn, would be replaced with turnstiles controlled by 'hybrid electronic validators' capable of simultaneously processing tickets and cards and controlling the turnstile release mechanism. Furthermore, a garage management system and a central system were implemented to control and send the data produced by the validators to SPTrans.

In practice, however, only hybrid electronic validators and magnetic tickets were implemented. Their partial implementation in about 3,500 vehicles implied the concomitant withdrawal of bus collectors. This dramatically increased the evasion of fare revenues and passengers, something that was already occurring due to the organization and growth of clandestine transportation in the 1990s (HIRATA, 2011). The practice of 'jumping the turnstile' increased considerably. Additionally, the unequal expansion of payment modalities made the access to the bus network more complex and less integrated. In view of these results, the program was discontinued at the end of 2000. New arrangements would only occur in the following administration, with the implementation of the Interconnected System.

The electronic ticket system

Mayor Marta Suplicy's agenda (PT, 2001-2004) turned to the integration (inter- and intramodal) of transportation services, the adoption of a new fare policy (time-related fares)[11] — with the consequent return of the so-called 'subsidy' to the companies — and the formalization of clandestine transportation. SPTrans reused and redirected some of the technologies already in use, particularly the hybrid validators, to achieve its objectives and implement the so-called Electronic Ticketing System (SBE), consisting of subsystems, validators, and contactless smart cards, the well-known 'Bilhete Único' (the card used by the citizens).

The use of the cards was organized around four coordinated activities via the SBE subsystems: the issuance of cards, electronic credits, control and management of credits, and the registration of users to use the card (SPTRANS, 2009). With the implementation of an electronic data center in SPTrans, acquired from Microsoft, the first three activities were carried out by the Central Processing System (SCP), which was entrusted with the maintenance of the checking accounts, which allowed the control of the credits loaded in the tickets and their use in the validators. Subordinated to this, the Card Issuing System was responsible for recording the data structure, reload rules and the encrypted keys of the SBE. Finally, the Credit Generation System was given the task of generating, recording and validating all electronic credits. All these activities are now controlled and centralized in SPTrans.

The control and management of credits is up to the Central Distribution System, around which a credit distribution network was organized at different levels: SPTrans's own network, complementary network (responsible for the capillarity of the recharging equipment), the online store and those accredited to sell transportation vouchers[12]. In each of these, a machine is connected online to an SCP subsystem, the Electronic Credit Recharge System, which coordinates the procedures for data transfer, debit authorization and credit recharge.

[11] The Interconnected System project involved the implementation of different 'time-related fares' in bus services. With only one payment (of different amounts depending on the benefit in question), users would have unrestricted access (or restricted to a large number of trips) to services for a certain period. However, only hourly rates were implemented.

[12] After an agreement between the City Hall and the State Government for the integration of the Bilhete Único to other modalities of transportation, done in 2005, distribution stations in the METRO and CPTM stations were also created.

This last activity is coordinated by the Registration and Assistance System, where SPTrans bureaucrats register users, answer complaints, reimburse credit and revalidate expired gratuities.

Based on these subsystems, the forms of circulation and production of passengers and revenue under this new technological context can be better understood. In the garages, the Garage Management System (SGG) is responsible for transmitting the parameters and restrictions of card use established by the SCP to all validators. This is done by approaching the GPC card to the validators. Before departure, with the vehicles already in the stops, the line supervisors finalize the setup of the validators based on three different cards: 'service', which performs the opening and closing of the measurement of each service; 'line', which identifies what lines will be operated; 'half-trip', which records the start/finish time and the direction of each trip.

If the payment of the fare is made in cash, collectors have the responsibility to charge the passenger and release the turnstile by approaching the 'on-board card' to the validators. On the other hand, the same can be done by users bearing their charged 'Bilhete Único', without the participation of the collector[13]. Thus, validators proceed to process and check the validity of the card, deduct and update the data of integration and the total credit of the cards, release the turnstile and, finally, store the data related to the transaction.

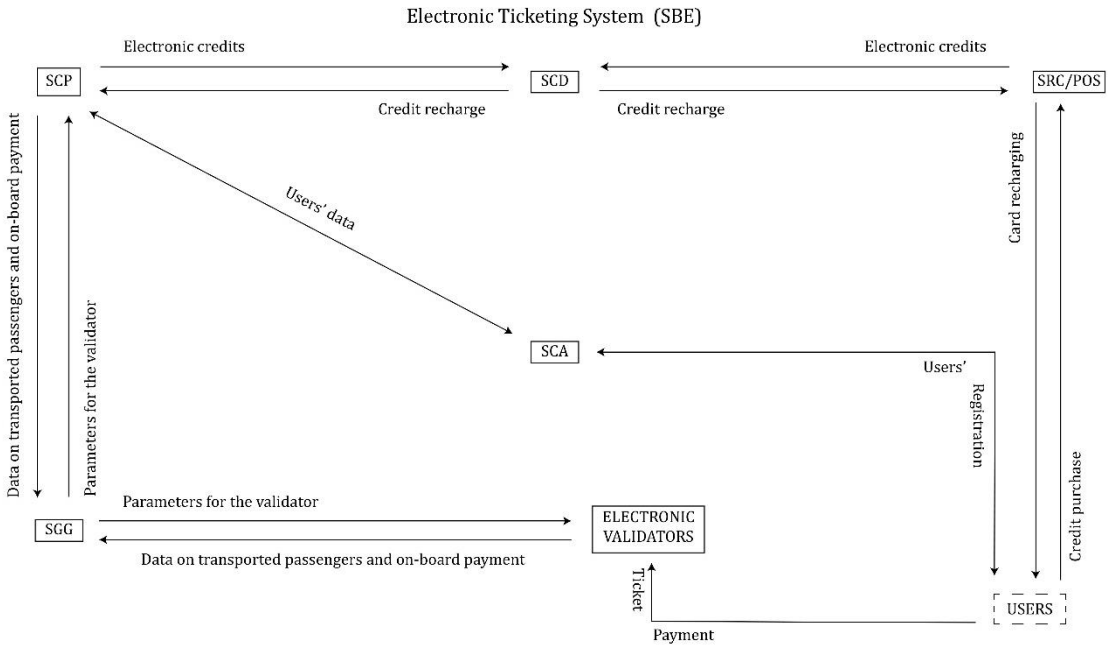
At the end of the working day, back to the garage yard, the electronic revenue and passenger data is transmitted via radiofrequency from the validators to the SGG, which then passes on the data to the SCP. The latter systematizes this information and produces the compensation data of private operators. Figure 02 graphically shows the operation of the SBE.

The implementation of the SBE enabled the integration of passengers to the system in any stop of the municipal territory, reducing the city's dependence on bus terminals with turnstiles. It also enabled integrated fare-free trips, thus reducing historical inequalities of access. On the other hand, this has reduced the economic advantages of illegal transportation, encouraging its formalization. However, the SBE has not only altered the status of power relations in the clandestine sector, as Daniel Hirata (2011) has pointed out, but also between SPTrans, private companies and operators in the production of information on revenues and passengers.

[13] In 2005, only 31.5% of the passengers paid in cash. This percentage reached 7.9% in 2014 (SPTRANS, 2015).

With mandatory use for the production of passengers and revenue, the materiality of validators and cards has structured new legibility relationships between agents and operators. An important change derived from the introduction of electronic instruments was the substitution of indirect and manual practices in the payment of fares, passenger transportation and measurement of revenue and passenger by practices of direct and semiautomatic measurement. These operated as follows: first, validators needed to have their systems programmed via cards to incorporate the parameters of the SBE and correct delimitation of the services to be measured; second, validators needed to be operated by collectors (or passengers) via cards (on-board or Bilhete Único), automatically producing the release of the turnstile, passenger and revenue measurement, fare collection and data storage. Finally, with the return of the vehicles to the garages, the systematization of the electronic data took place through the 'validators - SGG - SCP' chain.

Figure 02. The electronic construction of passengers and fare revenue in the electronic model



The coordination, grouping, systematization, verification and systematization of 'physical' documents and reports was no longer required of the agents, as was the case with analogue instruments. In other words, new instruments imply that new relations between technologies and agents would begin to operate in the practices involved in the construction of bureaucratic objects. On the other hand, because of the new decisions delegated to street-level operators, it is not possible to argue in favor of the full

automation of quantification. From instrument quantification and manual translation to reporting, these agents became responsible for programming the electronic validator systems through the different contactless smart cards (described above), without which measurement would not be possible.

The main components of the SBE, validators and cards, have changed the characteristics of the human resources necessary for the provision of bus services, on the one hand, demanding greater technical training, on the other, fewer operators in the measurement activities. Fundamentally, it has brutally reduced asymmetries of information and opacities between SPTrans, private companies and street-level bureaucrats in the documentation of operational performance. They have affected, therefore, the range of private sector monitoring possibilities by reducing the discretion of intermediaries in the measurement, above all, street-level operators.

However, the end of ticket circulation did not completely extinguish the existence of operators' manipulation practices. These have turned to the breaches in the parameters of the electronic validators, with the use of different cards (on-board and free Bilhete Único) for the manual generation of ghost passengers. In light of these practices, SPTrans has carried out internal audits to identify patterns in the use of cards above usual limits, blocking cards and changing usage parameters[14].

Final remarks

Placing focus on the analysis of aspects that are sidelined in urban governance and still scarcely explored (and politicized) by the field of public policy studies, this article suggests that the examination of public policy instruments enables us to characterize the relations between the design of public policies and their processes of production, conflicts and dilemmas.

Some remarks can be made about the governance of bus services and the strategies adopted by state and private agents. In this article, I argue that it is possible to understand the logics of transformation and structuring of transportation policies based on the conflicts and dilemmas found in the forms of production and circulation of bureaucratic objects. State and market produce the political-institutional ordering of bus services, especially through the daily construction of the service provision. The analysis

[14] For more on these practices, see Campos (2016b).

of the conflicts between the state and private companies — in this case, mass transportation by bus — cannot be restricted to the general design of the policy. This policy is unfolded and organized, daily and continuously, around technical devices and legibility devices. This implies that disputes between state and private agents also occur in connection with these instruments. The production and circulation of objects works as a necessary condition for decision-making processes, delimiting their contours.

Second, for the state, private companies and street-level operators, what is (or is not) documented and how the documentation is made is fundamental. The understanding of the urban political dynamics in bus services, then, does not only involve the incorporation of the space, as Marques points out (2016b), but also the 'objects' immersed in institutional and relational contexts. That is, conflicts also occur with respect to the materiality of the governance. In the services in question, the operation of devices and documents conformed the practices of service provision documentation, with clear political implications, as these instruments structure forms of opacity and asymmetry of information, producing unequal resources of power between state, companies and street-level operators.

This article demonstrated how intermediaries in charge of producing knowledge about the provision of services, as the persons responsible for its measurement, can employ different types of strategies, through the manipulation of legibility operators, whose result is the incorporation of biases that affect the regulation of profitability and the decision-making process. On the other hand, for the public sector, this same materiality can impose different limits and possibilities of regulation.

If we compare the various municipal administrations, the main strategy for the management of conflicts over public regulation of the private sector was the production of new public policy instruments in order to enable potentially more effective state control of opacities (but not their extinction).

The transition from analogue governance to electronic governance in the construction of legibility has simultaneously promoted the strengthening of the regulatory potential of the state and private transportation companies, respectively, on the private provision of bus services and the discretionary practices of the operators. The implementation of the set of SBE devices suggests that contemporary changes in the processes of mediation between objects and state representations do not point to a new

equilibrium in a zero-sum game (with losers and winners) in relations between state and companies, but rather a counterintuitive result against consolidated narratives.

For the state, greater control over the production of fare revenues and passengers makes the distributive conflict with the private sector less opaque, strengthening, in specific (and partial) ways, the effectiveness of public spending on transportation services. Greater control over these objects increases the precision of the amount of private remuneration (calculated based on the number of passengers carried) and the amount of government resources necessary to pay for bus services. That is, greater control over the collected revenues, the main component of bus service financing[15], allows for better measurement of the public spending expenditure necessary to finance the system.

Furthermore, in this context, the widespread use of the Bilhete Único produced an 'inertial effect' on the dynamics of this policy. The dissemination of its use consolidates the electronic model of governance, imposing very high costs for future initiatives to change the infrastructure of these services.

Faced with the theoretical approaches consolidated in the field of public policy studies, the findings of this work suggest that the famous effort to open the "black box of the state" proposed by historical neoinstitutionalism (SKOCPOL, 1985) left in the box 'things' (devices, tools and artifacts) that are significantly important for power relations and public policy. Shouldn't we now 'bring the things in'?

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References

CAMPOS, Marcos Vinicius Lopes (2016a), O mercado de viagens e as disputas em torno das linhas de ônibus. *Novos Estudos CEBRAP*. Ed. 105, Vol. 35, Nº 02, pp. 35-53.

CAMPOS, Marcos Vinicius Lopes (2016b), Ferramentas de governo: instrumentação e governança urbana nos serviços de ônibus em São Paulo. *Masters dissertation*. Faculdade de Filosofia, Letras e Ciências Humanas. Universidade de São Paulo.

CHEIBUB, José Antônio Borges (1985), *Capacidade de governo no serviço de transporte público*: o caso de São Paulo. São Paulo: Instituto de Estudos Econômicos Sociais e Políticos de São Paulo. 128 pp..

[15] According to data obtained on the SPTrans website, this figure reached 48% of the service financing fund in 2017.

COMPANHIA DE ENGENHARIA DE TRÁFEGO (CET) (1985,) *Boletim Técnico 34*. São Paulo: Secretaria Municipal de Transportes.

COMPANHIA MUNICIPAL DE TRANSPORTES COLETIVOS (CMTC) (1984), Intervenção nos Transportes. São Paulo: CMTC.

ETIENNE, Henry and ZIONI, Silvana (1999), Ônibus na metrópole: articulação entre iniciativa privada e intervenção pública em São Paulo. In: *Viação ilimitada: ônibus das cidades brasileiras*. Edited by BRASILEIRO, Anísio and ETIENNE, Henry. São Paulo: Cultura Ed. Associados. pp. 119-186.

GOMIDE, Alexandre de Ávila and PIRES, Roberto Rocha C. (2014), *Capacidades estatais e democracia: arranjos institucionais de políticas públicas*. Brasília: Ipea. 385 pp..

HIGA, Caio Vinicius (2012), Políticas de transporte coletivo em São Paulo entre 2001 e 2010: meio ambiente construído, sistemas técnicos e organização dos serviços de transporte. *Masters dissertation*. Programa de Geografia. Universidade de São Paulo.

HIRATA, Daniel Veloso (2011), Produção da desordem e gestão da ordem: notas para uma história recente do transporte clandestino em São Paulo. *Dilemas: Revista de Estudos de Conflito e Controle Social*. Vol. 04, Nº 03, pp. 441-465.

HULL, Matthew S. (2012), *Government of paper*: the materiality of bureaucracy in urban Pakistan. University of California Press. 301 pp..

LASCOUMES, Pierre and LE GALÈS, Patrick (2007), Introduction: understanding public policy through its instruments—from the nature of instruments to the sociology of public policy instrumentation. *Governance: An International Journal of Policy, Administration, and Institutions*. Vol. 20, Nº 01, pp. 01-21.

MARQUES, Eduardo (2016a), De volta aos capitais para melhor entender as políticas urbanas. *Novos Estudos Cebrap*. Ed. 105, Vol. 35, Nº 02, pp. 15-33.

MARQUES, Eduardo (2016b), Notas sobre a política e as políticas do urbano no Brasil. *Série de Textos para Discussão CEM*. Texto para discussão Nº 018/2016. pp. 01-55.

PREFEITURA MUNICIPAL DE SÃO PAULO (PMSP) (1986), Plano municipal de transportes coletivos. São Paulo: Prefeitura Municipal de São Paulo.

SCOTT, James C. (1998), *Seeing like a state*: how certain schemes to improve the human condition have failed. Yale University Press. 445 pp..

SHARMA, Aradhana and GUPTA, Akhil (Ed.) (2006), *The anthropology of the state*: a reader. Oxford: Wiley-Blackwell. 424 pp..

SECRETARIA MUNICIPAL DE TRANSPORTES (SMT) (1992), Municipalização dos ônibus da cidade de São Paulo. São Paulo: Prefeitura de São Paulo.

SÃO PAULO TRANSPORTES (SPTrans) (1996a), Fiscalização eletrônica de Frota. São Paulo: SPTrans.

SÃO PAULO TRANSPORTES (SPTrans) (1996b), Cobrança automática de tarifas. São Paulo: SPTrans.

SÃO PAULO TRANSPORTES (SPTrans) (2015), Anexo I: O transporte coletivo público de passageiros no município de São Paulo. São Paulo: SPTrans. Available at *<http://www.prefeitura.sp.gov.br/cidade/secretarias/transportes/noticias/?p=199226>*. Accessed on July, 11, 2016.

SÃO PAULO TRANSPORTES (SPTrans) (2009) Sistema informatizado para a gestão do transporte coletivo do município de São Paulo. São Paulo: SPTrans. Available at <http://www.sptrans.com.br/pdf/biblioteca_tecnica/sistemas_informatizados_para_a_gestao_do_transporte.pdf>. Accessed on October 30, 2017.

SKOCPOL, Theda (1985), Bringing the state back in: strategies of analysis in current research. In: *Bringing the state back in*. Edited by EVANS, Peter B.; RUESCHEMEYER, Dietrich, and SKOCPOL, Theda. Cambridge: Cambridge University Press. pp. 03-37.