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Financial innovations and sanitation services: the battle between low-income users and shareholders

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Abstract. This article aims to show how changes in the model for financing basic sanitation affect social inequality and urban segregation, and to discuss alternatives that minimise the impact these changes have on low-income populations. The investigation focuses on mediations between sanitation policy and general urban policies in the more ample process of valorising capital, involving different scales of geography and forms of state action. Widespread privatisation and public–private partnerships have altered the role that rates charged to users play in financing sanitation systems. This, in turn, has an impact on low-income populations' access to these systems. The study concludes that new models of financing tend to privilege spaces in the city that are attractive to private capital, and that investments in sanitation are supported by financial innovations that depend on the collective force of remunerating shareholders and maintaining investors' expectations. Finally, the article approaches solutions that ensure low-income families' access to public services, with special emphasis on subsidised rate systems based on the stratification of urban areas adopted in Colombia. The article concludes that this experiment presents both positive and negative aspects that may serve as starting points toward potential solutions for Brazil.

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1. Introduction

At the beginning stages of Europe's urbanisation, sanitation infrastructure was left to private capital. Services were restricted to high-income neighbourhoods that housed families with political influence and the means to afford service costs. Swyngedouw (2006) shows that the first steps toward the universalisation of sanitation took place in the nineteenth century, when these services began to be understood as part of public health policies. After World War II, the operation of essential services (such as energy, sanitation, communication, transportation, etc.) was already controlled by the public sector, in accordance with Fordist and Keynsian principles of policy. During the 1980s, the rebirth of orthodox economic thought opened a path toward reorganising the infrastructure sector. Those who defend market-based solutions argue that a lack of public resources and the state's inefficiency are the principal obstacles to expanding and modernising public services. Besides, those transformations have been accompanied by changes in the funding system, which includes private equity funds and other financial innovations. In this context, tariffs became the key to financial equilibrium of sanitation services. The question is: how do those changes affect low-income families?

The discussion that follows will show how changes in the model for financing basic sanitation affect social inequality and urban segregation, and will discuss alternatives to minimise their impact on low-income populations.

In terms of methodology, the first step is to explain why infrastructure is important to capital accumulation and what roles are played by both the public and the private sector. As a result of those changes, tariffs have become the key to the funding system in sanitation services. So, it is important to understand how the new model for sanitation funding affects social inequality and urban segregation. Finally, what are the alternatives for low-income families? In this context, the Colombian experience shows the risks and benefits of policies that stratify urban spaces to establish different rates for public service users in developing countries.

2. The role played by infrastructure in capital accumulation

Different forms of capital, especially incorporating capital, articulate themselves to transform a city in support of the valorisation of capital. Lefebvre (2001) explains that central areas of the city have been restructured so as to attend to market demands, thereby transforming suburbs into reserves of labour force and eliminating the use of collective spaces as catalysts for everyday political experiences. Lefebvre (1986) emphasises that the distribution of public resources has not accompanied the dislocation of the population, inasmuch as urban peripheries suffer from isolation and a lack of essential public services.

In this same direction, Smith (2002) argues that economic expansion occurs through the differentiation of spaces; thus, the essential nature of the production of space generates inequalities. Based on experiences in the United States, Smith demonstrates that the process of suburbanisation has come about through the search for better profit opportunities. In the United States, suburbanisation altered income differentials in urban space, as investments were directed toward the suburbs to the detriment of the inner city. In addition to the extraordinary income gained through suburban expansion, the reduction of the price of land in inner-city areas created future opportunities for capital through the so-called "rent gap". In other words, the rent gap results from differences between current and potential uses of the inner city. Urban deterioration has reduced the price of land in city centres, even though these spaces have characteristics that favour valorisation, such as privileged location and available infrastructure. Thus, gentrification and renovation are results of the same process of differentiation of geo-

graphic space utilised for obtaining income surpluses for urban land.

Maricato (2003) summarises the discussion, affirming that:

> […] urban or environmental segregation is one of the most important faces and promoters of social inequality. The difficulty of access to urban services and infrastructure (precarious transportation; deficient sanitation, inexistent drainage; supply difficulties; impeded access to health, education, and childcare services; greater exposure to flooding and landslides, etc) contribute to fewer work opportunities (especially for formal employment); fewer opportunities for professionalisation; greater exposure to violence (whether at the hands of criminals or police); racial discrimination; discrimination against women and children; difficult access to official means of justice; [and] difficult access to leisure activities.

In other words, the availability of public services is one of the elements defining the price of land and the pattern of population segregation. Maricato (2015) argues that urban inequality is related to social process of constructing space. The city and its physical and symbolic elements (such as infrastructure, cultural patrimony, etc.) are inserted into a process of valorisation of capital. Urban sprawl, the urbanism of speculation, the design of transport networks and infrastructure, as well as the configuration of urban legislation, are among the elements that explain differentiations in the price of land.

Smolka (1979) emphasises that land is different from other commodities inasmuch as assets capture value through territorial singularities. These singularities are constructed through interactions between incorporating capital, the financial sector, and public policy. Usually, incorporating capital utilises residential developments to capture ownership values. However, this valorisation depends on offers of credit so that middle- and high-income families can sustain the real-estate market's cycle of expansion. In addition, incorporating capital demands that public investments be steered toward areas that interest the market. Thus, the valorisation process of incorporating capital has a variety of different negative effects on low-income populations. These include: 1) the amplification of areas of incorporating capital that push poor populations to the fringes of the city; 2) low salaries and the lack of guarantees that exclude this population from accessing credit; and 3) the selective distribution of public investments in the city that reinforces the vicious cycle of urban segregation.

During the 1980s, the administration of the city of São Paulo created a legislation body known as *Operações interligadas* (Interconnected Operations) with the promise of transferring part of the valorisation of land in areas of interest to the real-estate market back to the population. These Interconnected Operations allowed landowners to exploit their property beyond the limitations of zoning laws in exchange for financial compensation. The resources obtained through these Interconnected Operations were then transferred to the Municipal Housing Fund with the objective of increasing housing available for low-income families. Fix (2004) argues that these Interconnected Operations did not attend to the interests of low-income populations inasmuch as the population density in areas of interest to the real-estate market made new public investments necessary. Thus, the liquid effects of this policy for low-income populations were negative, because the city's expenditures in high-income areas exceeded the resources obtained for social housing through Interconnected Operations.

In 2001, Brazil's Housing Statute created a new legislation known as *Operações Urbanas Consorciadas* (Urban Consortium Operations) to disseminate mechanisms for purchasing exact alterations in urban zoning. The Urban Consortium Operations were inspired by the Interconnected Operations. Additionally, the Housing Statute introduced innovations to financing models by creating new links between the real-estate market, the financial market, and urban policies. These Urban Consortium Operations reinforced urban segregation because the resources obtained through exact alterations in zoning could only be applied to the geographic limits of urban operations, thereby eliminating the transfer of income through land ownership valorisation to the city's less privileged neighbourhoods. Additionally the Urban Consortium Operations instituted the *Certificados de Potencial Adicional de Construção* – CEPAC (Certificates of Additional Construction Potential), which are financed titles

through which these exact alterations are negotiated on the market. Because investors' interest in CEPACs depends on expectations of land valorisation on the perimeter of Urban Consortium Operations, the state becomes pressured to increase its investments in specific areas of the city, once again reinforcing urban inequality.

Urban Consortium Operations – as well as the financing model based on CEPACs – were created with the justification that public resources are not sufficient to attend to the population's demands. However, concrete experiences show us exactly the opposite; that is to say, the investments necessary to sustain Urban Consortium Operations result from the transfer of wealth from the state to private capital. Rio de Janeiro's experience is illustrative: here, the emissions of CEPACs served to capitalise the Real Estate Investment Fund for the Porto Maravilha Program (FIIPM), the resources for which were intended to support investments for the renovation of the city's port district. However, Brazil's economic crisis and the exhaustion of city resources after hosting sporting mega-events reduced opportunities for real-estate deals in Rio de Janeiro. Only 10% of available CEPACs were ever purchased, and most of these were purchased by public entities. For example, the Caixa Econômica Federal (a public bank) acquired 5 billion *reais* in CEPACs through the social security fund, whereas Rio de Janeiro's municipal government acquired another 1 billion in FIIPM titles (Nogueira, 2017). Therefore, the use of financial innovations (CEPACs) only served to make the path toward the valorisation process of capital more sophisticated, without altering the state's role.

The theoretical references and experiences contained above demonstrate the importance of urban infrastructure investments in the process of capitalist accumulation. Bearing in mind that basic sanitation policies are included in a more ample grouping of actions that affect the relative price of land in urban space, it is important to understand how changes in basic sanitation financing models can have an impact on different portions of the population. The above discussion also demonstrates new financial instruments and the deepening of relations between the financial sector, non-financial private capital, and the state.

In short, the rise of market-based solutions for the expansion of a modernised sanitation system tends to privilege economically attractive areas of the city. These investments are supported by financial innovations that depend on the continued force of remunerating shareholders and maintaining urban and sanitation policies within a much more ample process of valorising capital which, in turn, involves other geographic scales and forms of state action.

3. The return of the private sector as basic sanitation provider

The United Kingdom and France were pioneers in processes of privatising and/or conceding sanitation services to the private sector. In the United Kingdom, the Thatcher administration reorganised the system through investments, financial sanitising, and the creation of regional sanitation companies through the grouping of local companies, all with the objective of making the sector attractive to private capital. In France, the public sector retained sanitation companies' property, but it did so while transferring an important part of operations to private capital by means of concessionary contracts. Currently, two major economic groups – the Suez and Vivendi companies – control sanitation services in France. The hegemony of these firms explains the benefits that they have obtained in restructuring France's sanitation sector (Dore, 2004; Chenoweth, 2004). The profitability of domestic markets in France and the United Kingdom has allowed private sanitation companies to expand their services to the international market. The restrictions imposed by regulation (especially in the United Kingdom) and the search for locations and activities with greater profit potential has led to the spatial and sectoral relocation of private companies' sanitation investments (Graham and Marvin, 1994).

According to Dore (2004), the privatisation of public sanitation companies has been accompanied by the expressive growth of rates. Even if some actors admit that service quality has improved after privatisation, this positive effect can be attributed to perfecting the state's oversight procedures (Graham and Marvin, 1994). The increase in service quality cannot be associated with competition, inasmuch as

the "natural monopoly" character of basic sanitation services restricts the possibility of competition between companies. Sanitation services operate within market limits derived from the necessity for an elevated mobilisation of capital and low operating costs. Bakker (2003) argues that rate increases also intensified inequalities in access to sanitation.

Those who defend market-based solutions to sanitation argue that privatisation and other mechanisms of transferring sanitation services to the private sector reduce the public sector's obligations, which in turn allows the public sector to transfer resources that would otherwise be spent on sanitation to other governmental activities such as social spending. However, privatisations and concessions do not eliminate the public sector's financial obligations, because: 1) the construction of infrastructure (which involves the greatest risks) tends to remain a responsibility of the state, while its operation (involving fewer risks) is transferred to the private sector; 2) the private sector can choose to take on only lucrative operations, whereas those that incur a deficit remain under the responsibility of the state; 3) concession contracts include protection clauses defining minimum profitability – in other words, when adverse events occur, the state may be obligated to cover gaps in expected profits through direct financial support, contractual change, or increased rates for users; and finally, 4) privatisations or concessions that are taken to be successful have been preceded by favourable public regulation policies and by the financial restructuring of public companies so as to make them attractive to private capital.

We can conclude that privatisations and concessions do not necessarily or automatically lead to a reduction in costs or in the state's responsibilities in providing public services. In fact, private operations of public sector services are financially unviable without the state's direct action, whether as a guarantor against unforeseen circumstances or as a regulator of private businesses. On the other hand, the development of financial innovations to pay for investments in infrastructure tends to reinforce the dependence on public service companies in relation to investors, which in turn implies conflicts of interest between the population's demands and shareholders' expectations. Additionally, the new model of financing has modified functions of the rates charged to users to support the sanitation system. Because the rise in rates excludes low-income families access to these services, the reflection on urban inequalities is now part of the discussion of methodologies for calculating sanitation rates.

4. The role of rates in basic sanitation financing infrastructure

Financing for infrastructure is composed of a combination of sources that usually include: government budget resources; donations or loans subsidised by multilateral agencies; financing obtained in the private financial system; the concession of public deeds linked to development; and rates charged to the system's users. In addition to public resources, private sanitation companies have the possibility of conceding private deeds (debenture bonds) and developing other financial instruments, such as securing received income and opening capital on the stock market (regarding securitisation, see Bezerra and Da Silva, 2008). In the model of sanitation based on private capital, the determination of rates occupies an important role in companies' financial equilibrium.

Significant amounts of credit and high risk discourage the private sector's involvement – without the state's direct or indirect participation – from investing in infrastructure. In order to work around these impediments, a set of juridical–financial instruments known as "Project Finance" was created. Project Finance serves to structure credit, construction and operations with the objective of distributing rights and responsibilities among different business partners (Silva Filho, 2014; Chong and Poole, 2013). Project Finance is distinguished from other financing models because its guarantees are based on the developers' own assets, thereby reducing risks to investors. In conventional developments, the investor must offer guarantees of his or her patrimony in order to obtain credit from banks or from other investors. The developer prepares goods to offer as a guarantee if development is not successful. Under Project Finance, an important part of the credit necessary for a given project is obtained through the securitisation of assets and from the development's future receipts. Thus,

the development's success depends on the correct estimate of risks, as well as on mutual dependency between participants. The infrastructure risks incurred by developers differ according to the nature of any given project, and the stage at which said project is occurring. During construction, the inadequate choice of technologies, judicial disputes, pressure from environmentalists, and building delays – among other factors – can substantially alter the costs of a project. During the operations phase, breaks in expectations of demand or restrictions on rising rates are examples of situations that can reduce developers' profits. However, Project Finance is unviable without the state's direct participation as a credit provider and as both systems regulator and legislator, especially in terms of defining rates.

Massarutto (2007) argues that sanitation rates ought to cover the cost of sanitation services completely (*full cost recovery*) in order to assure the rational and efficient use of natural resources. This reasoning is a direct application of the principals of economic orthodoxy, using prices as indicators of consumer preferences. Hypothetically – within this conceptual operation in which citizens are transformed into consumers – individuals can choose the quantity of sanitation necessary to maximise their level of personal satisfaction according to their income restrictions. In other words: those without income remain without access to sanitation. Along the same lines, Rogers (2002) argues that rates ought to be sufficient to cover the costs of services (in other words, maintenance and capital costs), as well as the costs of opportunity, and the environmental costs of providing sanitation services. Rogers insists that all costs be included in order to adjust the consumption of natural resources among different economic sectors (namely, the urban, industrial and agricultural sectors). To illustrate his argument, Rogers discusses the experiences of India's Subernarekha Basin. In this region, the industrial sector is charged the highest rates for water use, followed, in descending order, by urban users and, finally, by agricultural producers. For Rogers, this model of water rates transfers income from the industrial sector and urban consumers to the agricultural sector. Rogers affirms that this model of rates encourages agricultural producers to waste water and has a negative effect on the urban and industrial sectors, obligating sanitation companies to increase the production of water beyond necessary levels. Rogers defends raising water rates on the agricultural sector which, he maintains, will force the introduction of more efficient irrigation technologies (thereby diminishing the sector's consumption) and reducing costs for industrial and urban sectors.

It is important to note that these arguments (Rogers 2002) regarding the case of the Subernarekha Basin are based on a sectoral analysis; therefore, they do not consider income differences between users in the urban, industrial and agricultural sectors. By bearing in mind the possibility that agricultural sector users do, in fact, represent substantially lower income levels compared to industrial and urban sector users, we could consider the transfer of income through subsidised rates to be socially justifiable. In other words, the definition of rates can lead us to consider facts beyond the limits of economic orthodoxy and its rationality.

Multilateral organisms like the World Bank, the OECD, and the European Council (Easter et al., 1993; European Council, 2000; OECD, 1999) defend the total recovery of costs as a reference for determining sanitation rates. Unnerstall (2007) argues that total cost recuperation of sanitation through rates charged to users is based on the *polluter pays principle*, which establishes that polluters ought to be responsible for the costs of repairing environmental damage. Thus, covering *true water value* serves to inform and orient users, as does financing all of the financial and supplemental costs of these services. However, Unnerstall (2007) points out that the imprecise meaning of "full cost recovery" in sanitation policy guidelines impedes the costs of water from being fully covered in European Union countries.

Methodologies for determining sanitation rates express the priorities established by legislators. Table 1 presents the principles of the water rate calculation methodologies adopted in most countries. Rate determination based on consumption blocs is the most widely utilised model. This model establishes two groups of users with different income levels and assumes that low-income families consume less water than other families. Thus, the first bloc defines the volume of consumption and the rates taken as adequate for low-income families. In other blocs, rates grow at a more intense pace of consumption so as to discourage waste.

Table 1. Models for covering water rates

RATE TYPES			
Rate Model	**Definition**	**Methodology**	**Characteristics**
Fixed rates	The rate is independent of the volume of water consumed.	Rates are defined by the service provider.	Does not require water meters; simplicity in generating charges; offers stable receipts; low economic efficiency and low social equity.
Uniform Rates	One fixed price is applied to the rates, according to the volume of water consumed.	Rates are charged by the cubic metre.	Simplicity in generating charges; discourages waste; signals the existence of water shortages.
Bloc Rates (ascending/ descending)	Water rates can increase (or decrease) based on pre-defined consumption blocs.	Rates charged by cubic metre. A specific rate is defined for each consumption bloc.	Discourages waste; signals water shortages; promotes equity. (May reflect costs and not discourage waste in areas of high water availability.)
Bloc Rates (fixed)	A fixed rate is covered to each consumption bloc.	A volume of water consumption is associated with each bloc. The amount charged corresponds to each bloc's maximum water volume.	Simplicity in generating charges; discourages waste; signals water shortages; promotes social equity.
MECHANISMS FOR RATE ADJUSTMENTS			
Type of adjustments	**Adjustment**	**Methodology**	**Justification**
Adjusted according to user characteristics	Rate differentiations are applied based on users' social conditions.	Inferences based on economic conditions can be established through indicators such as: income, family size, place of residence, etc.	Improves principles of efficiency and equity; creates incentives for focusing policies; generating charges is more complicated.
Seasonal adjustments	Rates increase during periods of high demand.	Differences in rates alter user demand.	Discourages waste during critical periods of water supply; contributes to cost reduction and to system growth; greater complexity in generating charges; stimulates rational water usage; low social equity.
Adjustments according to use time or peak hours	Rates change according to demand.	Rates increase during peak hours or during specific days of the week.	Discourages waste during critical periods of water supply; improves the efficiency of system.

Source: Adapted from Pinto and Marques (2015)

Whittington et al. (2015) show that crossed subsidies incorporated into bloc rate models do not reach low-income families because of the low correlation between family income and water consumption. Thus, Whittington recommends that rates be established according to the costs of production (a full cost recovery model), and that programmes for *means-tested subsidies* be established so as to ensure that potable water is supplied to low-income populations. In Brazil, Andrade and Lobão (1996) arrive at similar results. They compare two methods of subsidising low-income families: Method One (bloc rates with implicit subsidies), and Method Two (individualised rates based on individual user income). Andrade and Lobão conclude that Method Two produces more benefits for low-income families than the model based on bloc rates.

The "polluter pays" principle – and the establishment of rates capable of accounting for all the costs of sanitation – transfer the responsibility for sanitation systems' financial stability to users from all sectors (urban, industrial and agricultural). At the same time, new models of financing increase the financial sector's influence on the process of dic-

tating sanitation prices, inasmuch as the expansion and modernisation of basic sanitation depend on investors' financial interests. In other words, the sanitation sector's remuneration (profits) must surpass the opportunities for gains that other sectors of the economy offer to investors. Thus, the key question is: how can we define rates that are sufficient to preserve financial equilibrium for financial companies while, at the same time, assuring equity of access to these services? The World Bank's response is to adopt direct transfer programmes (see Foster et al., 2000; Coady et al., 2004). But how can we create incentives for direct income transfer programmes when faced with growing pressures – from multilateral agencies, orthodox economists, and representatives of private capital – to reduce public spending?

5. Territorial policies on sanitation rate subsidies: the Colombian experiment

Colombia's experiment in subsidising sanitation rates was presented to the World Bank as an example of an income transfer policy. In fact, the fund that supports rate subsidies in low-income areas is supplied through taxes charged in high-income areas of Colombian cities. However, this fund is complimented by budgetary resources derived from different levels of government. Therefore, this mechanism of income distribution combines two different paths: first, through transferences by means of cross subsidies from middle- and high-income families to low-income populations; and second, through income transfers through state-sponsored social programmes. Theoretically, income transfers through social programmes should be more vulnerable to interruptions and reductions when compared to the model based on cross subsidies, inasmuch as these social programmes depend on the financial health of public funds and on the government's priorities, all of which can change over time.

However, it is important to be clear that the most relevant aspect of the Colombian experiment is fundamentally connected to the model based on territorial samples, rather than on financing instruments. Although social programs ought to occupy a standout position among governmental priorities, pressures to reduce public spending are strong. Thus, income transfers by means of cross subsidies form an alternative that assures at least minimal conditions for low-income families to access sanitation services. However, cross subsidies must not be understood as offering a definitive solution or strategy for reducing public spending. On the contrary, transfers through cross subsidies must be inserted into a more ample arrangement of social programmes that attend to the demands of low-income populations.

Gómez-Lobo & Contreras (2003) show that Colombia's system of rate subsidisation is based on the classification of geographic areas according to real-estate characteristics. Accordingly, cities are divided into six strata, ranked on a hierarchical scale: residents of the fifth and sixth strata pay increased rates of up to 20% in order to subsidise residents between strata one and three. Residents of the geographical area classified as stratum four neither pay increased rates, nor are their own rates subsidised. Although Colombia's model for providing sanitation adopts market-based principles, the experiment's merit lies in the force of legal support that sustains rate subsidy programmes. This is laid out in the country's 1991 Constitution (Gobierno Federal de Colombia, 1991), which transforms these programmes into state policy, thereby reducing the risks associated with changes of government. Article 367 of Colombia's 1991 Constitution determines that rate structures must consider principles of solidarity and income redistribution as well as the criteria of the cost of services provided. Article 366, meanwhile, emphasises the importance of integrating actions linked to education, public health, sanitation and the supply of potable water, in addition to requiring that public spending prioritise social objectives. Finally, Article 368 establishes that different levels of government must reserve sufficient budgetary resources in order to grant subsidies to low-income families.

In 1994, Colombia's Law 142 regulated the supply of public services to households, including sanitation, potable water, electric energy, and natural gas, in accordance with principles established in the 1991 Constitution. Law 142 reaffirmed that private companies may supply services to households, but it defined the criteria and the mechanisms for subsidising such services for low-income families.

The law also established parameters for developing methodologies for the socio-economic stratification used to distribute subsidies. Law 142 brings together relative norms for different aspects of providing services, such as operators' rights and obligations; administrative measures and personnel administration; disappropriations; inspection; and social participation, among other aspects. For the purposes of this article, we will present aspects of Law 142 that relate to subsidy concession.

- Item 2.2 of Article 2 determines that the amplification of services covered must include a system to compensate for users' inability to pay.
- Item 2.9 of Article 2 establishes a proportional rate structure for low-income families in accordance with the principles of equity and solidarity defined in the 1991 Constitution.
- Article 87 establishes that rate structures must be ordered by criteria of economic efficiency, neutrality, solidarity, redistribution, financial sufficiency, simplicity, and transparency. Regarding questions of solidarity and redistribution, item 87.3 of Article 87 establishes that high-income users – as well as commercial and industrial users – ought to contribute toward funds that subsidise rates for low-income families' basic necessities.
- Article 89 establishes that funds raised and subsidised must be explicitly earmarked for paying the cost of services. Money raised is considered to be public and is meant to serve the "fund for solidarity and redistribution". Item 89.8 stipulates that if the fund's resources become insufficient to attend to low-income families, the state must complement it with budgetary resources. The state's participation must be at least 50% of the concession's total.
- Item 99.5 of Article 99 establishes that subsidies must not exceed the value of basic consumption or subsistence. Meanwhile, Item 99.6, also in Article 99, determines that users must supply administration, operation and maintenance costs for services provided. The subsidy supplied by the state must cover the investments necessary for providing services. The text of Law 142 does not establish the nature of these investments, but it is possible to interpret them as pertaining to the resources necessary for amplifying and modernising services for households.
- Item 99.5 of Article 99 also establishes a growing scale of subsidies for families living in areas classified as socially vulnerable. The maximum subsidy is 15% for stratum 3, 40% for stratum 2, and 50% for stratum 1.

The discussion of obstacles in constructing methodologies to define social stratification is present in various studies of subsidy models. Many scholars point out the limitations of stratification based on characteristics of territory and household (Ceballos et al., 2006; Alzate, 2006; Nunez, 2010). The Colombian model establishes a direct relation between quality of life, household quality and insufficient income among respective residents. This methodological choice is justified for the following reasons: 1) the nature of services provided; 2) the distribution of income within these geographic areas; and 3) the correlation between household situation and family income.

Vélez (1996) maintains that problems in stratification methodology distort the distribution of benefits in the subsidies programme for public services for households. He shows that only 18% of subsidies reach the fifth of the population with the lowest income, whereas 10% of the population with the highest income receives 35% of the subsidies. In this same sense, Ceballos et al. (2006) affirm that the exclusive use of territorial variables in defining stratification may compromise the social objective of Colombia's constitution. Public investments in specific parts of the city may raise the quality of public services without altering the income levels of those who live in these areas. Because territorial conditions interfere in the classification of different strata, subsidies may be reduced even if residents' income levels have not changed. Because of this, Vélez recommends that the subsidy stratification system include economic and social variables, such as income, unemployment and education levels, among others.

Alzate (2006) argues that advances in market policy and in the competitiveness in providing services for households contribute toward reducing differences between rates in different territori-

al strata. Thus, the stratification model has lost its function of recognising social differences and reinforcing principles of solidarity; instead, it has become a bureaucratic instrument for identifying the geography of poverty. Thus, a side effect of the stratification policy has been worsened spatial segregation. According to an article published in the *Jornal El País* newspaper (Marcos, 2018):

> [...] three decades of stratification in Colombia has constructed a collective imaginary dispossessing the citizen of any attribute aside from the place in which he lives. "The strata have become part of the Colombian language. They classify you socially, and even ideologically: poor or rich; good or bad; left or right," explains Antonio Avendaño, of the Bogotá Planning Secretariat.

In short, the territorial stratification model adopted in Colombia is subject to critiques and, possibly, could be improved to attend to the "solidarity" and "redistribution" defined in Colombia's 1991 Constitution. However, this does not diminish the importance of this experiment as a counterpoint to other systems of managing sanitation rates which, for their part, are also subject to questioning. Like other public policies, the choice of models depends on the equilibrium of political forces in a society that will determine the priorities of its government's agenda.

6. Conclusion

The abandonment of Fordist and Keynesian policies has forced the public sector to search for alternatives to sustain investments for modernising and amplifying public services. Privatisation policies and the concessions of public services bring two advantages to private capital: 1) new investment opportunities derive from breaking the state's monopoly on the sanitation sector, and; 2) channelling public resources to areas or activities that interest the market. In the context of Keynesian policies, user rates only cover the system's maintenance costs, given that investments have been made with governmental resources for public health policies. Thus, resources for investments have been covered by the public debt, and respective costs depend on each country's fiscal situation. In Brazil, the Fundo de Garantia por Tempo de Serviço – FGTS (a social security fund) and the resources of the financial system for housing are low-cost sources when compared to taxes on the credit market.

The ascension of economic orthodoxy in government policies aims to make reducing public spending and stabilising the economy into priorities for the state. As such, public resources have been channelled to attend to the market's determinations, much to the detriment of the population's demands. Privatisation, the concession of services, and public–private partnerships transfer responsibility for the financial equilibrium of sanitation systems to users, as attested to by the explosive growth of rates in countries that have privatised their sanitation companies. In addition, the new model of financing increases sanitation companies' dependence on the conditions of the financial market, laying bare the conflict of interest between shareholders and users.

The experience of central countries demonstrates that raising rates on users has been accompanied by the creation of obstacles to low-income populations' access to sanitation services. In countries like Brazil, where access to these services is chronically unequal, the introduction of market-based services may intensify social exclusion from sanitation. Besides, the solutions proposed by market adepts are contradictory: on the one hand, orthodox theoreticians propose expanding income transfer programmes in order to attend to low-income populations while, on the other hand, these same theoreticians defend reducing public spending and the size of the state. How can social programmes be expanded if several governments have pressured to reduce public spending?

The paper demonstrated that the market-based approach may not achieve the goals claimed by its defenders because: i) the private capital investments in infrastructure are mainly supported by governmental funding sources; ii) investments based exclusively on private equity funds may increase the uncertainty, the instability and the geographical selectivity in the expansion of urban sanitation systems; and iii) there are no logical elements to support the idea that private operations may reduce

public expenditures in sanitation, except in case of the population services' coverage being reduced.

In several cases, the discussion is contaminated by superficial assumptions that all problems in the sanitation sector are related to inefficiency in public administration or corruption. First, there is no evidence that corruption problems can be solved only by privatisation (Hall, 2012). Besides, privatisation experiences showed that the decline in operational costs in privatised sanitation companies was attained thanks to reductions in employees, which may put at risk the quality of its services (Lobina & Hall, 2003).

The discussion in regard to sanitation sector strategies must overcome the private-versus-public dichotomy. A research agenda has to focus on how to design funding mechanisms that ensure affordable rates to low-income users and stability in the flows of investments to sanitation services. This can only be achieved by a combination of different sources of funding, such as fiscal resources and cross subsidies systems.

The discussion about the accountability and improvement of the public administration should be included in a research plan too. Inojosa (2001) emphasises that the fragmentation along political party lines, derived from the formation of coalition governments, reinforces barriers to well-articulated state actions. Integrating the state's activities (such as health, education, sanitation, individual and family sectors) in geographic bases may consistently generate positive impacts in transforming the living conditions of socially vulnerable populations. Experiments with subsidy programmes based on territory, as in Colombia – with all their errors and successes – can serve as references in building a model of social policy based on neighbourhoods that articulates resources and forces from different sectors and levels of government.

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