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Concession of transport infrastructure: the Brazilian case

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Abstract

The present paper presents a critical analysis of the recent concession policies undertaken to foster transport infrastructure investment in Brazil. As fiscal restrictions have increased in severity, public infrastructure investment has dwindled below the levels necessary to maintain the existing network, not to mention below the levels required to develop and expand it at the required rate for the modernization of the economy. Consequently, private investment has become an attractive, and indeed, mandatory option. This paper analyses the concession and partnership policies and contracts implemented in Brazil and highlights the limitations of this option, leading to a discussion on possible alternatives to overcome the funding gap. The paper reveals that the loss of capacity for the planning, design, and management of complex contracts has led to the government's growing dependence on the private sector, whereby contracts are designed and performed according to the financial interests at the expense of public ones. By analyzing the issues of transport funding, the paper addresses a circularity problem: regional growth requires infrastructure investment, the viability of which depends on regional growth. As a response to the described shortfalls in transport infrastructure investment, the paper concludes by proposing an innovative institutional framework that foresees a more integrative planning and investment programme in infrastructure, industry, and public services. However, the implementation of this type of programme requires institutional innovations with respect to contracting out to the private sector.

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1. Introduction

The limits of the ability of countries and their governments to implement the necessary investments in infrastructure are a relevant issue for public policy but also for research. In recent decades, the option of attracting private capital to take on a more sizable part of the investments has led to the emergence of several public-private partnership schemes. In the transport sector, concession contracts have been enjoying increasing popularity in emerging economies, partly

due to the exhaustion of fiscal space caused by high indebtedness, but their limits have been recognized, both in terms of transaction costs and contingency risks for public finances.

This said, the paper highlights following issues:

- Investment needs in transport infrastructure in emerging economies.
- Shortcomings of transportation planning in these economies.
- The financial gap in transport infrastructure investment.
- The limits of concessions and public-private partnerships to overcome the gap.
- Search for innovative investment and partnership approaches.
- Integration of infrastructure investment with regional development strategies.

This article focuses on the Brazilian experience of transport infrastructure concessions. Preliminarily, any study of Brazilian transport policy cannot begin without considering its main territorial characteristics. Brazil is the fifth-largest country by area (8.5 million square meters). The maximum north-south distance is 4,320 km, whereas the maximum east-west is 4,328 km. The lack of a transportation infrastructure that adequately connects this territory is, therefore, a major challenge for the country's economic development.

However, the Brazilian transport infrastructure network presents considerable shortfalls in terms of spatial blanks not only in the Amazon Region, whose protection may limit the construction of dense networks but also in the North and Northeast regions. Such network imbalance reinforces the disparity of the economic development and transportation flows of this “periphery”. Another imbalance concerns the absolute predominance of road transport compared to rail and water transport. The shortfalls are not limited to the lack of infrastructure, but also encompass its poor quality, especially in insufficiently served regions.

Until now, transport policies and plans have been unable to fill these gaps and reinforce the use of more productive transportation means, such as rail and water transport. The main problems stem from; a) the lack of comprehensive territorial development strategy and planning; b) the shortfalls in the administrative capacity to develop quality projects as well as to design and manage complex partnership contracts; and c) the lack of sufficient funding sources. Meeting international standards regarding network density and connectivity will require investment efforts still beyond the present fiscal capacities.

Following international practice, concession and partnership policies have been implemented and have brought some relief to the most used trunks. However, as the attraction of private investment requires the prospect of profitability, contracts have been concentrated in the more developed South and Southeast regions, reinforcing the spatial disparities of infrastructure provision and quality. The concession pipelines presently offered by the government are well below the requirements of a network that connects the national territory equitably. Moreover, the implementation of the contracts has brought conflicts and administrative difficulties that have even further restricted the proposed achievements.

The objective of the present paper is to discuss the Brazilian concession experience related to interregional transport infrastructure investment. The main flaws in the design and implementation of the contracts are examined. Finally, a reform strategy for concession policy is outlined to foster its effectiveness and fiscal efficiency.

The paper is structured as follows: A brief review of the literature sums up the critical issues of the infrastructure investment gap and of the public-private schemes. Following this review, the objective and methodology of the case study (Brazil) are presented. Subsequently, sections present the situation of the Brazilian transport network, the planning practice, the fiscal restrictions, and the concession policies, where the pitfalls of the present infrastructure funding, especially of the concession contracts, are highlighted. The result of this description and analysis is discussed in the following section, where alternative solutions to the limitations are searched for, leading to a more integrative planning and investment approach, binding infrastructure investment to regional growth policies. The final section brings the conclusion.

2. Infrastructure financing needs and the role of public-private partnerships

Concerning the need for investment in infrastructure, there is a rich and detailed literature on the real and concrete impacts of investment in infrastructure in various sectors and instances of society, which has been systematically reviewed since the 1980s (Walter, 2016; Agrawal, 2017; Kumari; Sharma, 2017; Srinivaso; Rao, 2013). From this

literature, it emerges that, even if infrastructures, notably transport, energy, water, and sewage, telecommunications, and social ones, are not direct drivers of growth, they are recognized as an important path for economic and social progress.

The literature also discusses the volumes of investment required to meet growth needs and for the general modernization of the economy, pointing to a growing deficit on all continents, despite its substantial increase over the last few decades (Walter, *op. cit.*, Marsh & McLennan Companies; Asia Pacific Risk Center, 2017; Fioravanti et al., 2019; Agrawal, *op. cit.*; FAY et al., 2021). The situation is particularly critical in emerging economies, where investments compete with debt payments and essential public spending, with a large part of the population unable to pay for services (Walter *op.cit.*; Fay et al., *op. cit.*; Rezende, 2017).

In general, funding channels have been diversifying over the last few decades, as have the financial agents involved. In the public sector, the role of the Treasury has been complemented by Agrawal, *op.cit.*; Rezende, *op.cit.*; Poole et al., 2014; Chan et al., 2009): a) earmarked public funds; b) public companies; c) development banks/agencies; d) infrastructure financing companies; as well as e) public guarantee and trust funds. National resources are complemented by international or regional multilateral entities; national development banks and entities operating abroad (e.g., KFW); infrastructure investment funds (offshore institutional and direct investment); and international capital markets (*ibid.*).

Traditionally seen as a basic function of the State, fiscal resources have increasingly faced restrictions, imposing inclusion of private investment in financing. Technological innovations and improvement of regulatory techniques have also opened spaces for greater participation by the private sector, which has been accompanied by a vast literature, systematized in bibliometric studies (Kumari; Sharma, *op.cit.*; Chan et al., *op.cit.*; Rezende, *op.cit.*).

However, a central issue of investment in infrastructure is the unfavorable structure of the cash flows, where the significant initial costs of implementing the projects are counterbalanced by insecure revenue streams over the long life of the project, full of uncertainties. It is this flow pattern that imposes the government's inexorable presence. These conditions are reinforced by the high complexity of the projects and the demand for a large quantity of difficult-to-gather information, which increases the risk rate.

Despite the ability of the private sector to present greater transparency and cost efficiency, its increased attraction results in onerous conditions for the Treasury and for users, who are required to pay for the use of infrastructure. The design and awarding of contracts additionally impose high administrative costs, lengthy preparation, and negotiation times (Kumari; Sharma, *op. cit.*; Chan et al., *op. cit.*; Rezende, *op. cit.*).

A central issue of partnership contracts is the allocation of the various risks inherent to partnership projects. Given this centrality, risk management has become more sophisticated. The literature proposes a variety of ways to catalog the risks, that spread through the most diverse phases of each project, as well as the most diverse forms of respective mitigation (OECD, 2015; Poole et al, 2014; Schwartz et al., 2014; Yescombe, 2014). Often, the instruments require a large amount of information that is not always available, which is a source of uncertainty. In any case, even the involvement of the private sector does not exempt the state from functioning as the last refuge in the allocation of risks.

However, it is this allocation that is pushed to the center of the discussion when concession and partnership models are implemented, where the private party, the government (i.e., the taxpayer), and users are at the table. The acceptance or not of the rules and payment conditions by the user or the community are sources of disagreements that lead to other uncertainties, which are political and judicial decisions. These disputes ultimately make the settlement process more expensive.

3. Research objectives and methodology

This paper discusses the case of transport infrastructure investment in Brazil. The research issues are:

- 1) What are the investment needs in overland transport infrastructure in Brazil and how is it defined by the transport policy and planning?
- 2) What are the financial difficulties that hinder the implementation of the foreseen investments, and how is the government coping with them?
- 3) How has the private sector been involved in transport infrastructure investment through concession policies?

4) What are the results and limits of the concession policies?

To answer these questions, detailed research on national documentation has been conducted by exploring datasets of publications on Google Scholar and Scopus, as well as on Brazilian legislation, governmental transport policy, planning documentation, and concession contracts.

The presentation of the results is followed by a discussion of possible alternatives to overcome the deadlock of investment in transport infrastructure. For this purpose, different problems pointed out in the analysis of road infrastructure concession policies in Brazil are correlated into a flow of causalities, culminating, by the Cumulative Circular Causality approach developed by Myrdal (1968), in the basic principles of a policy of road investment, which should combine this investment with broader policies for territorial development and growth.

4. The shortfalls of the transport network in Brazil

The following facts highlight the poor conditions of the Brazilian transport infrastructure network (Yasimoto et al., 2016):

- There is a significant imbalance between transport modes whereby: 61% of the freight volume is transported by road, 21%, by railroad, 14% by water, and 0.4% by air.
- The spatial imbalance is striking, and a network “hole” emerges in the mid-Northeast Region, where agribusiness is growing.
- The State of Sao Paulo presents a denser network of multi-lane highways that concentrates the best roads and railroads.
- The network imbalance reinforces the territorial imbalance between the industrial geography and the geography of transport flows.
- Subsequently, regions outside the industrial core do not produce transport flows that are sufficient to make the (private) investment in railway infrastructure break even.
- The waterways with higher transport capacities are, in their turn, concentrated in the Northern region, which is peripheral to the core industrial regions, whereby this transport mode only has a major role along the Amazon River and its main tributary rivers.
- The long coast leads to high dispersion of the harbour infrastructure, which comprises a network of minor ports highly specialised in exporting specific commodities.
- The air transport market is essentially a passenger transport market, equally concentrated in the flows between major capitals. Although the size of the country requires more frequent and distributed services, many important cities outside the reduced set of capitals are served by infrequent and expensive flights.

Ferreira (2006) highlighted significant differences between regions. On the one hand, the South and Southeast regions are better served, and the Northeast is still reasonably served. On the other hand, the Midwest region, which has seen a considerable rise in economic growth, is still ill-served. The same picture can be observed with respect to maintaining quality. In general, the entire Brazilian territory is interconnected, except for the North-Western part of Amazon State and the whole of Amapa State. The connection quality depends on the density of the network, which is higher in the South, Southeast, and Northeast regions. However, the poorer connectivity in other regions negatively affects the connection of the better-served regions to the less-served ones.

Similar results with respect to network quality are found by Souza et al. (2010), who compared logistics costs, transport costs, and accessibility indicators among regions. The authors indicated that Sao Paulo municipality and state have exceptional standing compared to other larger cities.

5. The planning practices

Brazil’s history of transport planning began in the 1930s. These plans have always envisaged the strategic occupation of the immense national territory. A brief contextualisation of this history is presented below:

- i) an all-modes embracing National Transport Plan was issued in 1973; ii) the crisis of the 1980s brought road investments and planning to a halt (Lima Neto, 2001); iii) a resumption of national transport planning practice had to wait until the middle of the 2000s when the National Transport and Logistics Plan (PNLT) was produced (Ministério

dos Transportes, 2012); iv) in 2011, a long-term Plan (the National Transport System) was implemented by Law no. 12.379, replacing the National Transport Plan of 1973 (DNIT, 2013). This plan gave priority to investment in the North, Northeast, and Midwest regions. In sequence, the National Plans for Waterways, Ports, and Intermodal Transport (“Integrated Logistics”) were issued, but incomplete and tended to favour the more developed regions. v) 2018 saw a new mid-term plan produced, the National Logistics Plan (EPL, 2018). It reflected the urgency to resume infrastructure investment, beginning with projects to be concluded in the short term and the investment interests of the private sector. Long-term strategic necessities lost out to these priorities. The concrete investment plans are still far from meeting the requirements for building up a network that would provide the country with a reasonable level of connectivity.

6. The fiscal restriction and the private option

In 2018, infrastructure investment remained at around 1% of GDP, and there is no expectation that this shortage can be essentially modified in the short term, mainly due to the global crisis of Covid-19. Total investment in the economy has reached 15.8% of GDP, far below the threshold of 20% recommended as a critical condition for a sustainable growth path (ABDIB; EY, 2019).

This situation has been ongoing for over a decade. The ABDIB/EY report also states that for the last 15 years, Brazil has never invested more than 2.5% of its GDP on infrastructure, whereas a value of 4.3% across a decade, without interruption, is necessary to remove the main bottlenecks that impair productivity and economic and social development.

However, the lack of government capacity to sustain infrastructure investment has made it increasingly dependent on the private sector. The motivation for this was not only the fiscal shortage but also structural policy, frequently initiated under pressure by the international financial markets and multilateral organizations (The World Bank et al., 2014). Concession policies were observed for all types of transport infrastructure, including railways, highways, airports, ports, and waterways, as summarized in Table 1.

Table 1 - Concession policies observed for all types of transport infrastructure

Highways	Airports
<ul style="list-style-type: none"> Initially, roads already duplicated were auctioned for the lowest toll price. Nearly 20,000 km of the 200,000-long network of paved federal roads are under private administration. Most of the concessioned highways are in the Southeast and South regions, where the traffic density is sufficient to be explored by the private sector. Attempts to introduce more significant investment obligations, as the duplication of long stretches, have failed as a result of the increased risks in the course of the economic crisis. The financial hardships of concessionaires have been followed by the devolution of their contracts The unequal spatial distribution of road quality has been reinforced by the concession policy. 	<ul style="list-style-type: none"> The World Cup and Olympic Games compelled the Brazilian government to modernise and amplify the main airports, which could only be done by concession to the private sector. A second wave, after the games, extended the concession policy. The public corporation INFRAERO, which until then had constructed, operated and maintained a mixed network of profitable and non-profitable airports put forward 49% of their capital to continue the provision of the non-profitable ones. In 2019, the third phase was launched, this time without the participation of INFRAERO. To ensure the operation of deficit running airports, the airports were conceded in three regional blocks.
Ports and Waterways	Railways
<ul style="list-style-type: none"> Until 1990, the main seaports were maintained by a public corporation (PORTOBRÁS). After its collapse in 1990 and the enactment of the Law of Modernization of the Ports (Law no. 8.630/1993), ports were reorganised into single port companies (Companhias de Docas) belonging to the Federal Government. In 2008, a Decree (no. 6.620) was enacted which allowed for the construction of private terminals, without use by third parties. In 2013, Law no. 12.815 allowed the private sector to freely explore private terminals in public ports or entirely private ports. 	<ul style="list-style-type: none"> The network was decomposed into six regional networks, all of which were privatised. The concession conditions were low demanding, as the priority of the government was primarily to disentangle itself from any responsibility with respect to its maintenance and operation. The contracts did not establish investment duties but only broad productivity targets and fare price ceilings (Pinheiro and Azevedo, 2017). A major part of the network has been abandoned. Between 2002 and 2016, regulatory reforms were attempted, involving: a) the opening up of the tracks for independent operators; and b) an innovative funding model

<ul style="list-style-type: none"> • With respect to the waterways, the adaptation of natural rivers to water transport also requires heavy investment in locks, dredging, rock removal, signalisation, stretching and other works to ensure stable shipping channels. Therefore, private investment has confined itself to the construction of ports and terminals along the rivers (CNT, 2013b). 	<ul style="list-style-type: none"> • for new railways, whereby the concessionaire would construct and maintain the tracks, and the government would separately concede the operation rights to independent operators, entirely assuming the demand risks. However, both attempts have shown no results and were rejected by the incumbent operators.
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The reaction of the private sector to this reinforced private investment policy has been positive but also cautious. The main associations linked to the infrastructure sector have raised doubts as to what extent a comprehensive and robust infrastructure investment programme can be implemented without a significant share of public investment (ABDIB; EY, 2019). Reliance on private investment should imply, however, that investment projects are contained in their volume and responsibilities and timely spaced out. Regarding highway investment, the government cannot expect that the concessionaires will duplicate long stretches in the short term. Furthermore, it is desired that they remain focused on maintenance work during the first five years and that capacity increases only occur where and when they are urgently needed (CNT, 2018). With respect to railway investment, in turn, the associations require that the government assumes a counterpart share of 70–80% of the investment (Gusmão, 2019).

7. Concessions: Governance and regulatory practice

Table 2 summarizes the main aspects of the concession contracts for transport infrastructure in Brazil.

Table 2 - Key facts of the concession contracts for transport infrastructure in Brazil	
Highways	
First wave contracts	
<ul style="list-style-type: none"> • The bidders were selected based on the lowest toll price, and the contract duration varied between 20 and 25 years. • Some state governments used as selection criteria the largest road length assumed by the bidder or the highest payment for the award. • The introduction of toll charging depended on the accomplishment of initial investment duties. • The toll price should be annually adjusted, and unforeseen expenses could give rise to extraordinary “revisions”. 	
Second wave contracts	
<ul style="list-style-type: none"> • If the predictions of costs and traffic fell short, the contract should be reviewed. 	
Third wave contracts	
<ul style="list-style-type: none"> • Heavier investment duties, for instance, the duplication of larger stretches (500–1,000 km), and productivity target clauses were imposed. When targets are not met, toll prices should be reduced. • A revision of the toll price could be effective if investment obligations were anticipated. • Extraordinary incomes should be shared with the government. • Cost increases would be passed along to the user only at the proportion of the increased marginal costs inflicted on the cash flow of the contract. • The concession period could be extended by up to 30 years. • Renegotiations took place where traffic provisions did not materialise. 	
Railways	
<ul style="list-style-type: none"> • The concessionaires achieved high productivity levels and invested in the modernisation of their fleet and operations (IPEA, 2010). • The tracks received extremely reduced investment and continued with poor maintenance and operation conditions, implying that trains run at very low speeds. • Of the 30 thousand km of conceded tracks, 18 thousand km are currently abandoned (Gusmão, 2019). • The whole Northeast region lost all its networks (Maciel Junior, 2012), and the rail link between the Northeast and the Southeast regions had its operation paralysed. • Introduction of contracting out to third parties for inherent, accessory, and complementary activities (CNT, 2013). • If a third party offered to restore and operate an abandoned track on his own initiative, the contracts permitted the incumbent concessionaire to use these tracks for free (CNI, 2018). • The poor results of the concessions did not impede the concessionaries from imposing a premature renewal of their contracts in exchange for investments that will be spread out along the new contract period (Assis et al., 2017). • These reviews have been questioned by the parliament and the audit courts, posing additional legal risks for the contracts (Câmara dos Deputados, 2019). 	
Airports	
<ul style="list-style-type: none"> • All investment projects have been brownfield, except for Natal Airport. • Major investments have concerned the airport terminals, which have been considerably extended and modernised. 	

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- The airport areas are very restricted as the urban expansion around them has not been halted by the municipalities, disregarding the importance of airport development for their own economy.
 - Therefore, the conceded airports have a very limited expansion capacity.
 - The contracts stipulate that all demand risk is to be assumed by the concessionaire, even if a new airport is built in the vicinity.
-

The legal framework for administrative contracts in general (Law no. 8.666/93), on concession contracts (Law no. 8.987/95), and public–private partnerships (Law no. 11.079/04) prescribes that the Government prepares in advance a preliminary draft so that the bidders can develop their respective technical and financial proposals. It poses an initial difficulty when the Administration has weak information about the project and its economic and financial data. The present economic and political instability only makes the outlook worse.

In this situation, the contracted companies benefit from information asymmetry. For instance, every fact has been used by the concessionaires to apply for toll reviews, e.g., additional construction works (pedestrian overpasses, bus stops, reinforcement of the pavement, short variants and duplications, and the like). It was estimated that between 1994 and 2016, all extraordinary reviews caused a rise in the toll price that varied from 97% to 248% above the inflation rate during the same period (Campos Neto et al., 2018).

On top of this, the government has transferred to private consultants the responsibilities of developing the projects, contracting design, and conducting the analyses. More recently, Decree no. 8.428/15 introduced expression of interest procedures, shifting to the private sector the full preparation of the project proposals and the respective contracts. To accelerate public works for the international games, Law no. 12.462/11 streamlined the procurement procedures with respect to the order of the steps, so that the proposals are selected first, and only after the selection are the qualification conditions of the winning bidder checked. The widespread use of the expression of interest procedures has resulted in new operational difficulties, as officials must analyse an overflow of data and information and decide on an avalanche of proposals with different and almost incomparable characteristics.

With respect to the governance of the concession policy, Gomide; Pereira (2018) undertook a deep analysis of the Brazilian governance conditions. The main aspects that heavily impact concession practice are:

- a) The conflicts between the federal, state, and municipal governments with respect to policy and the distribution of tax receipts. Institutional conflicts also reach the prosecutor and audit offices and interrupt investment projects at the least suspicion of irregularity.
- b) The lack of an overall strategic development plan: the decisions are fragmented by administrative authorities, resulting in a loss of efficiency.
- c) Changes in ministerial positions to ensure a majority in a politically unstable parliament lead to the discontinuity of plans and project teams, impeding the government from developing quality plans and projects.
- d) The legal and regulatory framework with respect to administrative contracts and their interpretation are in a state of permanent change and are constantly amended. The adjustments of incomplete regulations are a battlefield between public interests and the invested interests of incumbents.
- e) These concerns are particularly critical for infrastructure investment contracts, which have high costs and risks, and whose projects are individually differentiated regarding their geography, market, and cost structure. The high risks involved also restrict the number of interested bidders and the competitiveness of the procurement procedures.
- f) The increasing dependence on private investment requires efficient financial markets. The use of project finance and special purpose vehicles does not address the shortage of funding sources for investment. The market for infrastructure bonds is still in its early stages, and for road concession investments, it has been applied to invest in capitalising the concessionaires for complementary works.
- g) The lack of administrative capacity to develop complex infrastructure projects and contract design increases the government's dependency on private consultancy, whose interests are deeply entangled with those of the concessionaires.
- h) In line with the bad practices observed worldwide (Flyvberg, 2018), the preparation of projects usually underestimates costs and overestimates benefits and receipts. Other common problems are: a) lack of quality data for projects that are unique; b) the high economic and financial risks and uncertainties involved; c) political pressure to force through their approval; d) the multiplicity of agents and the subsequent transaction

costs involved; and e) the defensive stance assumed by the government once the contract is signed, which forces it to indulge all revision requests by the concessionaires and partners, such as the reduction or delay of investments, the increase of fare prices etc., to prevent contract abandonment.

8. Discussion: The search for solutions to the limitations of concession policy

This section offers a synthesis of the discussed problems, identifying the general relationships between economic growth and transport infrastructure investment that show a circular causality pattern. The Circular and Cumulative Causality (CCC) approach is then used to sketch the key points of a new concession policy that shall ensure that the contracts continue to work as the main investment strategy and therefore remain attractive but also fulfil major policy goals such as building up a territorially extensive network of high quality.

All the shortcomings discussed in this paper show a circular pattern of causality:

- a) Brazil is urgently searching for a way back to stable growth that should encompass not only the already dense, industrialised regions but also peripheral regions that bear important growth opportunities.
- b) The full inclusion of these prospective territories into the national economic dynamism requires that they be served by a sufficiently dense and connected network of transportation infrastructure.
- c) The government must overcome its poor capacity for strategically planning territorial development and developing infrastructure investment projects.
- d) Insofar as fiscal resources will not flow generously even in the medium term to swiftly fulfil the investment needs, transport infrastructure projects must be sufficiently attractive to the private sector through demand and revenues.
- e) The option of private investment raises new problems: investment priorities are subject to a bias towards attractive projects to investors, to the detriment of strategic considerations with respect to territorial development. In addition, the government is forced to assume responsibilities regarding risks, guarantees, and legal security, leading to fiscal risks through the back door. Design, procurement, and management of complex contracts require sweeping capacity-building efforts, otherwise, the weak position of the government is aggravated.
- f) The primary concern of satisfying the interests of the private sector may lead to conflicts with impacted social groups and even with courts and audit offices, raising legal and political risks to the contracts, which are burdened with high costs and risks. Fluctuations in the economic situation may worsen the situation. Disadvantaged regions face notable difficulties in overcoming their economic backlog.
- g) The lack of fiscal resources and the limits of the scope for concessions consolidate the shortfall in the transportation infrastructure, as well as the competitiveness and growth of the economy.

The circularity of the set of listed syllogisms is clear: regional growth requires infrastructure investment, the viability of which depends on regional growth. In addition, the ability of the investment in transport infrastructure to satisfy the demand depends on the sufficient maturity of the logistics market. Figure 1 reproduces the vicious cycle of the infrastructure investment problem in Brazil.

The treatment of problem complexes that exhibit circular causality has been an issue that has been addressed abundantly in the literature. In particular, the contributions of Myrdal, Kapp, and Kaldor were foundational (Myrdal 1957, 1968; Kapp, 1961, 1968; Kaldor, 1970). Although poverty and exclusion problems were the focus of most of these works. The CCC approach has been deployed to solve more reduced economic problems, such as growth (Kaldor, op.cit).

An initial conclusion of this circular causality is that transport investment, whether it be realised by private or public, or by both private and public resources, cannot occur at the necessary pace if territorial development and infrastructure development are not tied together. The logistics market and the economic dynamic of a region should be sufficient to make it attractive for the private sector.

The second conclusion concerns the role of public investment: If private investment still does not discharge the relevant participation of public resources, to be used either in payments to the private partner or to execute previous and complementary investments and fund guarantees, then the projects must demonstrate the capacity to produce

sufficient growth and multiplier effects, including fiscal ones, to ensure fiscal balance with respect to all the public expenditures involved.

The detected circular causality flow, therefore, requires an integrative solution package, represented in Figure 2. It distinguishes two action (project) levels, that of infrastructure investment and that of territorial development, which must work in an integrative manner.

However, the mere preparation of plans, programs, and projects will be insufficient to resolve the investment bottleneck: the loop will only be closed if the economic flows (growth, traffic generation, multiplier effects, and the financial/fiscal feasibility of the investments) are assured. Moreover, such results are not automatic: they require institutional arrangements that force the economic agents, both public and private, to yield them. These arrangements must highlight the responsibilities of the different agents to produce the necessary amount of growth, flows, fiscal multiplier effects, and positive cash flows for the investments.

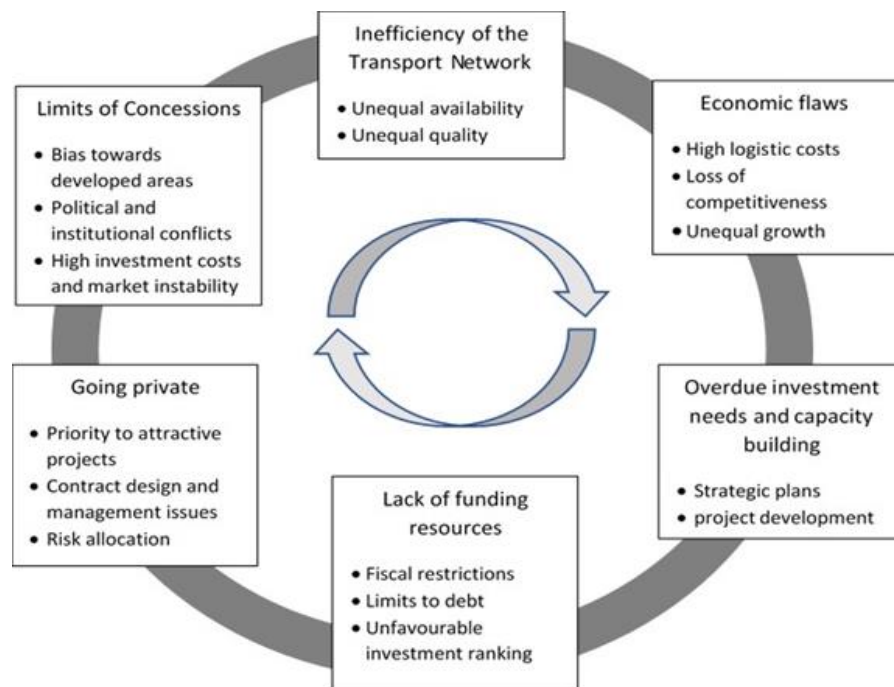


Fig. 1. The vicious cycle of the concession policy in transport infrastructure investment challenge

The CCC approach requires, therefore, an enlargement of the problem scope, bringing in social, political, and environmental issues, as well as the need to clarify the targets and procedures of social policies. Human needs, values, decision-making procedures, life quality, and social costs cannot be left aside.

As Figure 2 makes clear, the application of the suggested approach requires a reference to broader societal problems, e.g. comprehensive planning, territorial justice, equitable growth, economic flows, fiscal sustainability, institutional reforms, and others. Thus, the risk of reductionism that could impoverish the analysis and lead to incomplete solutions, as well as produce severe social costs, can be avoided.

A full sequencing of the methodological procedures proposed by Myrdal (1968), Kapp (1968), and O’Hara (2008) led to the following action areas of integrative infrastructure planning and policy:

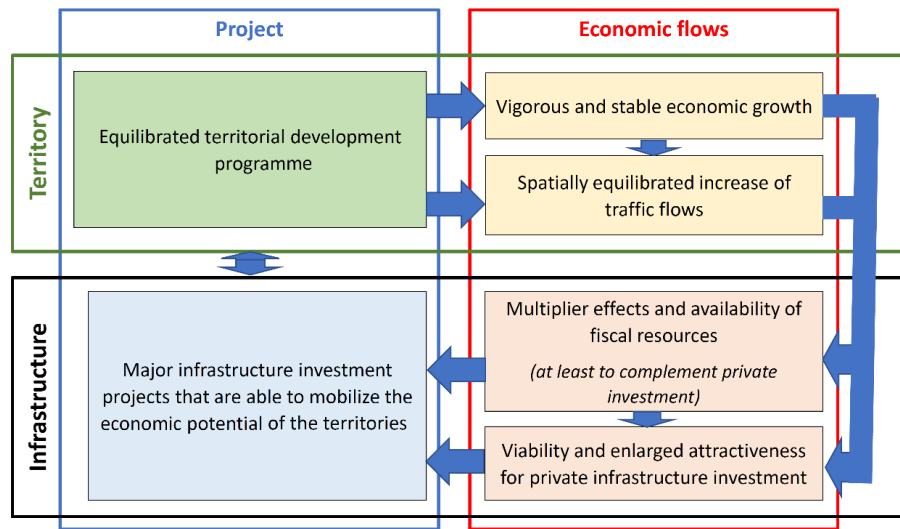


Fig. 2. Circular causal flow of measures to tackle the infrastructure investment

1. Design and the implementation of an integrated investment programme that foresees infrastructure and industrial investment inserted into regional value chains as well as complementary public services (economic corridor).
2. Ensuring investment attraction, growth and income effects, the maturing of infrastructure markets, and the production of multiplier effects, both fiscal and economic.
3. Reform of the State and of public and private relationships.
4. Capacity building for strategic planning and for the elaboration of comprehensive and attractive investment programmes and projects that encompass the public as well as the private sector.
5. Political management and the strengthening of functional values across society towards the participation of the private sector, safeguarding social and environmental concerns.
6. Innovative regulatory and contract frameworks, which require no single investment objects but rather broader economic performance targets.
7. New, more comprehensive business models, whose focus is not concentrated on singular business objects but on a more general entrepreneurial development that may produce the needed multiplier effects.
8. Innovation initiatives comprise funding and strategic market information.

9. Conclusions

The present paper begins with a general overview of the issues regarding the funding of infrastructure and public-private partnership schemes brought forward by the literature. This panorama has served as a background for understanding the particular situation of transport infrastructure investment in Brazil and its pitfalls. Presently, the government is incapable of meeting the needs in the medium term due to the acute restrictions on fiscal resources and planning capacities.

The recourse to private investment has been almost a mandatory option, independent of the different ideological and programmatic profiles of the administrations. This dependency has led to investments that have prioritized projects particularly attractive to investors to the detriment of strategic trunks that could promote the fuller integration of those regions that still produce insufficient flows to attract private investment but could foster economic growth.

The primary option of concessions and partnerships has a second disadvantage in that the private sector is empowered to explore information asymmetries against the government, imposing on it constant rises in tolls and tariffs, as well as the kind and timeline of investments, and even the abandonment of infrastructure or contracts no longer of interest. The shortage of bidders for riskier investments such as railways and duplicated highways covering longer distances reinforces this imbalance of power, leading the government to anticipate the renewal of contracts of concessionaires that did not fully comply with their investment duties.

The analysis of the network, the investment needs, the plans, the fiscal situation, and the concession contracts has shed light on a framework of issues that present a circular and cumulative causality: the full mobilization of the national growth potential requires a denser and well-connected network of transportation infrastructure to be set up which addresses the needs of the different regions. However, the funding of this network suffers from a scarcity of financial resources and the lack of attractiveness of the respective investments for the private sector, as large parts of this immense territory still produce insufficient flows to make private investment break even. However, at their present development stage, they would not be able to produce sufficient fiscal multiplier effects to cover the involved government expenditures. Therefore, economic growth requires investments that, in their turn, are dependent on economic growth.

This problem framework has subsequently undergone an application of the CCC approach, which led to an integrative solution hypothesis composed of territorial programmes and a set of policies regarding: a) the strategic repositioning of the relationships between public and private sectors; b) a subsequent capacity building effort for the public as well as for the private sector; c) political management and values building across society; d) innovative regulatory and contract frameworks; e) the set-up of comprehensive business models for industrial and infrastructure investment; f) innovation policies for funding and fostering entrepreneurship. This combination of measures shall ensure, via contract and regulation, the attractiveness of investment, the production of flows, income generation, and sufficient multiplier effects to cover the government's expenditure. The development of this integrative solution is still in a hypothetical stage and is the subject of further research.

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