

CONCEIVING COMPETITIVE ARRANGEMENTS FOR PUBLIC TRANSPORT

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INTRODUCTION

Despite the existing awareness with regard to the sustainable planning necessary to reduce the environmental, social and economic impacts of transportation, current planning and policies continue to stimulate the roadway capacity expansion and to induce automobile dependence, consequently provoking urban sprawl. The uneven horizontal urban expansion leads to an inefficient transportation network, wherein public transport is unable to be competitive. The usual approach adopted by the public authorities when authorizing the concession of public transport operations is quite detached from this reality. Previous work, presented by the Mobile research group at the 8th Thredbo and published by Elsevier, has introduced the concept of effectively integrating the transport-land use relationship, with a real potential to achieve efficiency in public transport and urban development. The Brazilian Development Bank (BNDES) financed the Mobile group's study proposing water transport services in a multimodal format as a strategy for sustainable urban development, exploring the local potential and analyzing its viability for ten major Brazilian metropolitan areas.

This study considered consumer preferences and the participation of indirect stakeholders (real-estate, commercial and service companies) in financing the system, through the integration of transport services in the area adjacent to the terminals and the exploitation of the building potential by developers, with a view to reducing the cost of public transport. This concept incorporated public and private projects that converged to integrate land-use and transport proposals, in which it was necessary for micro-accessibility policies (on the local scale) to fit in with macro-accessibility (on the city-wide or metropolitan scale).

The main purpose of this contribution is to broaden the discussion of transport competition issues from a single transport mode focus to an integrated one, comprising transport integrated with land-use, as the main way of ensuring public transport efficiency and effectiveness. This concept implies the adoption of new contracts that could be managed by exploring public-private partnerships, involving urban developers and transport operators, and thereby opening up the possibility of promoting sustainable development.

Examining the evolution of Thredbo conference themes, as presented by Hensher (2005), it was seen that these started by focusing on bus and coach market competition (Hensher *et al.*, 1991). Later, they addressed the issues of deregulation and privatization (Beesley *et*

al.,1992), including rail transport and considering externalities such as congestion, safety, use and non-use values, the environment and the impacts of urban form and lifestyles. At the 3rd conference, embracing other modes (taxis, light railways and guided buses), competition policy and competitive tendering continued to be explored (Love, 1994 *apud* Hensher, 2005). Overemphasis on cost-minimization and the cost of meeting user demands, as well as deregulation and privatization issues, were the subjects of the following conference (Hensher, Knight, 1996 *apud* Hensher, 2005). During the following conferences, from 1998 to 2003, (Preston and Nash, 1998, Hensher, 2005), the emphasis continued to focus on competitive forms adopted by different countries and the assessment of new developments and trends in tendering and competition in public transport, but the funding of public transport and infrastructure and the themes of quality, performance measurement and institutional frameworks also come into play.

From this short review, one can see that the approach adopted in discussing competition is restricted to public transport matters and that the burning questions are those of efficiency, on one hand, and effectiveness, on the other. The first involves a suitable combination of factors in public transport production leading to the optimization of operations and costs, according to performance indicators defined in the contracts. The second is derived from citizen-customer¹ desires and needs and implies a quality of service to guarantee their satisfaction. With pressure on their funding and financing, neither depends on the transport sector alone. Public transport and infrastructure represent an integral part of a city and the service provided is totally influenced by the urban environment. Both public transport efficiency and effectiveness depend on the urban structure and on the actors interacting with the transport and infrastructure.

Recognizing this relationship means that public transport competitiveness needs to be reinforced by the social and economic activities that are the indirect beneficiaries of the transport infrastructure, particularly developers. The key element, “*competition*”, should be achieved through “*sustainable transport and development*”, which calls for the urgent and effective integration of transport and land use.

Spatially diffused and functionally segregated settlement structures tend to cause growth in traffic volume, as well as increased pressures on the environment. Measures to promote sustainable transport modes in isolation are inhibited by these trends, which still dominate settlement planning concepts and their implementation (Ecocity, 2005). Developing sustainable transport systems, according to the OECD (2002), is one of the biggest challenges

¹ This term, originally called “client-citizen” by Martins and Bodmer (2000b), is used to deal with epistemological and political consequences of the Mobile concept, once it integrates the citizen’s and customer’s concerns and needs. In the context of a new economic cycle – which has already started – the citizenship must to comprise access to urban facilities with acceptable levels of the environmental quality. For that, the Mobile concept proposes the Integrated mobility management (IMM), formulated with the elements of relationship marketing, based on the concept “Expanded Product-Service”, originally formulated by Kotler (2000) *apud* Martins and Bodmer (2000a, 2000b).

for many countries and innovative solutions that go beyond “business-as-usual” must be sought and implemented. That is also the main purpose of proposals introduced in this work.

DEFINING THE PROBLEM

In Brazilian towns and cities, investment in road transport service infrastructure has led to urban sprawl and a disengagement from the traditional navigable waterways.

Despite this urban expansion, there is an increasing concentration of economic opportunities (work, commerce and services) that reinforces social-spatial segregation. On the one hand, urban centers with macro-accessibility, whose environmental quality is compromised, continue to attract large-scale real-estate ventures (traffic generating centers), while on the other hand, isolated urban communities that are densely populated but have no significant attractions, in terms of location, receive no investment.

Martins (1996) and *apud* Martins *et al.* (2005b) talk about the phenomena of the economics of agglomeration and the economics of location, in which they describe a two part mechanism relating to the production and management of urban space: one, the inducement to usage value, is the responsibility of the State; the other, the exploitation of exchange value, depends on real-estate capital (developer-constructor-financier). It is the interaction of these two gears that drives the mechanism that is at the center of the urban environment problem: transport/location policy. Thus, if the exchange value depends on the usage value, in the production of urban space, the success of real-estate capital depends on public policy and investment (accessibility and the building legislation, which determine the building potential and the right to build), the value of which is captured by the real-estate capital, but is not reinvested in public assets or the financing of transport policy. This mechanism is defined by Soja and Hadjimichalis (Soja, 1983, *apud* Martins, 1991) as the "geographical transfer of direct value" that underlies unequal geographical development.

For three decades, the idea has been spreading of integrating policies for the use and occupation of land, yet the building legislation in Brazil retains for the automobile the exclusive right of access to urban buildings, by tying the building license to the construction of parking space (Silva *et al.*, 2004). A shopping center, for example, may have almost 50% of its total construction area given over to parking space, a level of productivity that is 44 times less than if the area were used commercially (Martins and Bodmer, 2000, 2002 and Martins *et al.*, 2005a).

From a financial point of view, the transport user and the State end up bearing the direct cost of urban accessibility, despite the existence of other beneficiaries (the real-estate market, for example). Such a situation is neither environmentally nor financially sustainable.

STUDY ORIENTED TO JOINT INVESTMENTS IN TRANSPORT AND DEVELOPMENT

The aim of the study, as detailed in Martins and Bodmer (2000a, 2002), was to propose multimodal waterway transport services as a strategy for self-sustainable urban development,

based on a survey of the local potential and a technical-economic-financial feasibility study. Ten metropolitan areas were looked at: Belém, Natal, Maceió, Aracaju, Salvador, Vitória, Rio de Janeiro, Santos, Florianópolis and Porto Alegre.

In the final analysis, it would seek to propose improvements in the urban transport conditions within these metropolitan areas, with waterway infrastructure as the principal element, that would minimize the cost to the citizen-customer. To this end, the idea was considered of having the participation of indirect beneficiaries (the real-estate market and commerce) in financing the system, through the integration of undertakings in the area of influence of the terminals using transport feeder services, as well as through the exploitation of the building potential (which was quantified) by the system's operators, with a view to generating cross subsidies.

A working structure was set up, comprising a coordinating group from the Federal University of Rio de Janeiro - UFRJ (Mobile Research Group) and seven teams for the regional coordination, in which were represented, technically and politically, the respective municipal and state governments, so as to identify the strengths and weaknesses of the urban activities and services.

Public and private projects at UFRJ and adopted by BNDES that converged with the Mobile concept were identified and assimilated into the preliminary studies (proposed urbanistic guidelines and transport systems). In the case of Rio de Janeiro, for example, there were proposed development rings, already introduced by Martins and Bodmer (2002, 2003b).

Research into travel habits and the attributes of modal choice associated with urban activities (work, study, consumption and leisure) enabled UFRJ to generate models to estimate the demand in each metropolitan area, which, when checked against the real situation, showed a maximum error rate of 4.9% (more details can be seen in Martins and Bodmer, 2003a).

Before the presentation of the results of this study, that demonstrate the feasibility of the proposal for multimodal transport and sustained development, it is necessary to introduce some important features of the Mobile concept adopted in this study, particularly those relating to urban logistics.

MOBILE CONCEPT COMPRISING URBAN LOGISTICS

The excessive technical and functional specialization of modern life has impeded the synthesis of certain disciplines. In transport engineering, for example, it prevails over the need to guarantee modal split (or multimodality); In urban planning, over the need to integrate policies for collective transport and land use. However, we do not build a single square meter in our urban centers without tying this to compulsory parking spaces. It is the modernist paradigm that has given priority to automobile technology and to its production chain, creating complex dependence such as, that of vehicles and petroleum and of buildings and garage space. As humans insisted on adapting cities for automobile use, they unlearned (forgot) the rule that maintaining a balance between transportation supply and demand,

without commitment to environmental capacity, limits financial sustainability (Martins *et al.*, 2004).

According to the Brazilian Federal Constitution, an urban property must fulfil a socio-environmental function, and yet the greatest obstacle to its fulfilling its environmental function is the fact that it still has to fulfill its social function. There is a huge concentration of urban opportunities in the more central areas and an explicit social-spatial segregation that works against the self-sustainability of the businesses, which, in the long term, need to be founded on the “triple bottom line” of the economy, the environment and society (Elquington *apud* Vinha, 2000).

According to Martins and Bodmer (2005b), the urban legislation is itself responsible for the gap between the policies governing land use and transport. It is not possible to build in Brazilian towns and cities without a commitment to provide parking space within the area of the building, yet no commitment at all is required from the entrepreneur regarding the dynamic capacity, which is the need for sufficient road capacity to handle the expected demand. That becomes a burden for the public authorities, as each automobile on the Brazilian streets carries an average of just under 1.5 people, while taking away the opportunity for 12 people to travel seated on a collective mode of transport, due to the space it occupies; Martins *et al.*, 2002).

Maintaining huge areas for parking was one of the Ford-inspired pillars of an earlier post-war economic cycle that is long gone, except in its continuing influence on urban policy. However, one cannot introduce competitiveness in urban planning if the urban centers are still governed by the rules and thinking of a bygone era; that have no place in the current designs for the future.

The sustainable mobility concept, developed by the Mobile group (Martins and Bodmer, 2000a, 2002b, and Martins *et al.*, 2004, 2005a, 2000b), has the goal of making it possible for towns and cities to enjoy environmental quality, social inclusion, and the effective participation of their citizens. Some of deployments of this concept, introduced by Silva (2005), who deals with corporate citizenship, and by Lentino (2005), simulating decision making process of developers, help to joint the favourable arguments to its application. With regard to transport planning, sustainable mobility calls for the demand management as an effective strategy for the Integrated Mobility Management (IMM), through three central themes: *Integrated transport and land use planning; Public transport management; and Transport and traffic management.*

Having defined the three central themes, there are six strategies or commitments that the urban centers should make for the future, with the goal of achieving Sustainable Mobility:

- *Multi-sectoriality* – putting circulation and transport into the real-estate production chain, to make *real-estate clusters* (i.e.: chains of enterprises or activities integrated by a system of transport for their users, such as consumers, employees, or local residents);
- *Structuring Networks* – the building must not be treated as an independent element within the urban structure, but as a node in a network, and therefore linked to flows that insert it within the citizens' activities chain, making the *real-estate clusters* possible;

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- *Distribution of trip generating activities* – when MM improves the accessibility by collective modes it also redefines the location attributes for attracting private investments in urban activities that will stimulate the *real-estate clusters*;
- *Social responsibility* – the urban property should accomplish its social function so that traffic generators can take care of themselves, promoting MM plans for their own users, respecting the environmental capacity limits (with regard to the circulation and air quality);
- *Integration and social inclusion* - different market niches for collective services should be stimulated, so as to encourage the exercising of social responsibility by large urban enterprises and make micro and macro accessibility by different social classes to their respective *real estate clusters* feasible, with acceptable transport and environmental quality standards for all;
- *Proximity* – integrated transport and land use planning, to preserve the human scale of living and enhance the value of community life.

The six paradigms or commitments for sustainable mobility, focusing on environmental zones, leads to the following six planning or project principles:

1. *Environmental zones vs. traffic right of way* – according to Buchanan's classic *Traffic Towns (1963)*, an environmental zone can be defined as a territorial unit whose access connection or point with the structural transport network protects it from motorized trips and, particularly, from any through traffic;
2. *Integration of Macro and Micro levels* – the densification limits of an environmental zone are linked to the limits of environmental capacity and transportation inside and outside this zone, i.e., providing conditions for internal circulation (micro-accessibility) and external circulation (macro-accessibility);
3. *Integration of transport and land use* – each traffic generator should be engaged in its own MM plan, facilitating its users' entry and exit, as well as providing information concerning the transport system and selling vouchers or tickets;
4. *Promotion of non-motorized transport* – individual micro-accessibility ought, as much as possible, to be based not on motorized displacement (walking or cycling), which implies technical compatibility between urban planning, *traffic calming* measures and the landscaping of the urban environment;
5. *Strategic location and densification with mixed use* – definition of strategic locations for activities linked to densification around the collective transport stations and terminals, to better explore economies of location and agglomeration. Inside the environmental zone, mixed use should be encouraged, with integration of complementary activities, avoiding specialization of land use, but respecting the activity's location in relation to its impact on circulation, following principles mentioned above, since it withdraws automobiles from streets, as well as possibly encouraging cross subsidies among different social segments;

6. *Integration and social inclusion* – promotion of an equal access of different social segments to the urban opportunities implies to emphasize in the city what is of public use or concern; however, on the contrary of orientation to standardisation (of products and services), it has to be admitted that comfort attributes could be provided for differentiation of spaces and services; this represents the manner of revenue capture for cross investments in spaces and services of social interests, with acceptable environmental quality indicators; this way the social equity could be achieved.

Hence, the aim of the study was to integrate the policies for land use and occupation with the policies for transport and micro-accessibility (on a local or community scale), and with macro-accessibility (on a city-wide or metropolitan scale), as figure 1 is intended to illustrate.

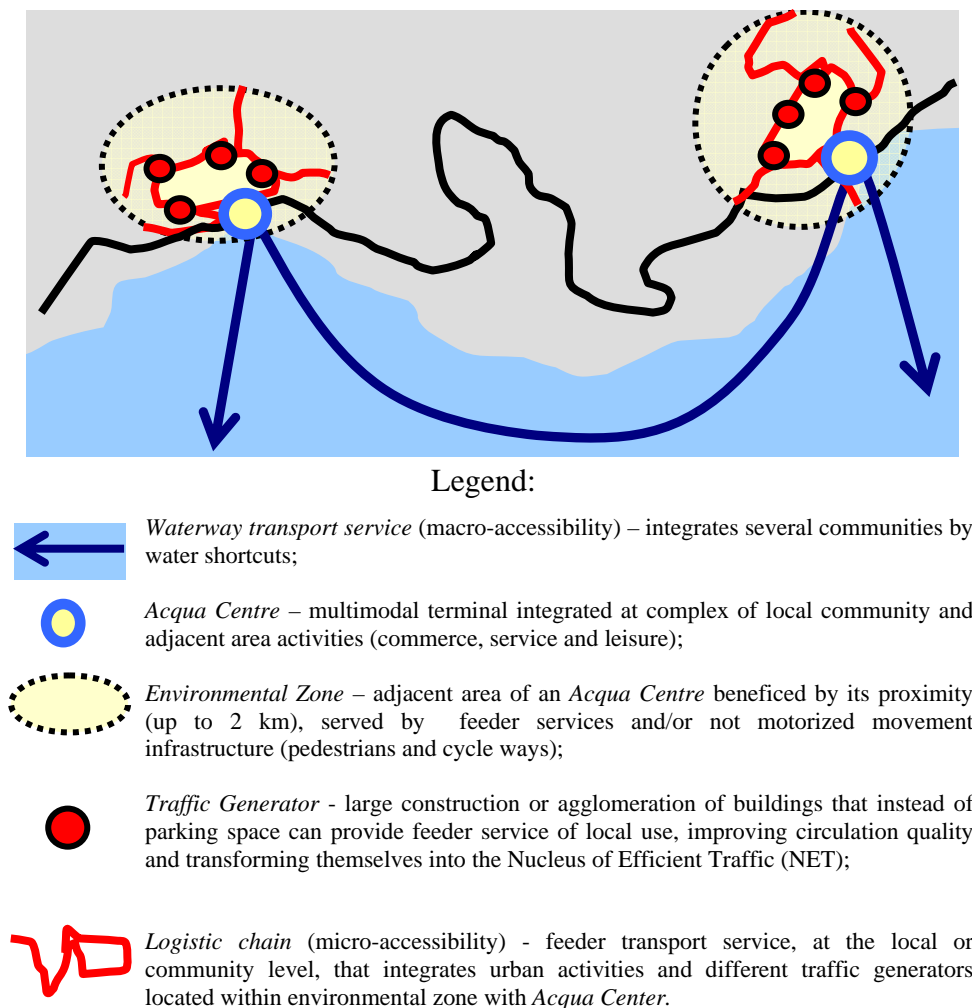


Figure 1 Urban logistics adopted in the study ordered by BNDES

The municipal districts interested in financing this kind of project should adapt the urban legislation with regard to the induction policy of traffic generators location in the adjacent areas of *Acqua Centre*, giving them possibility to replace a part of the parking space by collective transport connected to that terminal. The *Acqua Centre* operator, as compensation, would explore constructive potential at the same location or transfer it to other place inside of the environmental zone. This way could be formed a public-private partnership providing sustainability for the system as a whole. The same approach can be adopted in any urban area, where different configurations of public transport modes exist.

SERVICE CONCESSION PROPOSAL

The “*Acqua Mobile System (Water Mobility System)*” proposed by the study is a multimodal transport concept whereby the waterway infrastructure provides a foundation for inducing the location/attraction of urban activities within the immediate area of influence of the terminals, as well as having a positive impact on the shipbuilding and boatbuilding industries. Preliminary studies have been carried out to see whether there is sufficient potential scale to warrant placing orders with manufacturers in the region (Martins and Bodmer., 2002).

In relation to the strategy of bringing about urban development, the study offers the “*Acqua Center (Waterway Center)*” concept, derived from the Mobile concept (discussed at length in Martins *et al.* 2000a, 2000b, 2002, 2005, Bodmer *et al.* 2005a), which is: building potential for supplying attractive infrastructure in order to benefit the operator in a privileged location regarding the multimodal terminal, as it combines on one site both micro-accessibility (in the terminal’s area of influence) and macro-accessibility (in a metropolitan context, through waterway transport modes).

The self-sustainability of the *Water Mobility System* derives from the need of the interested municipalities to adapt the urban legislation in accordance with a policy of inducing the establishment of traffic generating centers in the area of the waterway terminals, offering the possibility of substituting part of the obligatory accessibility for automobiles (garage space) with collective transport modes connecting the undertaking with the *Waterway Center*.

Real-estate developments that have a strong impact on local circulation or on the location of urban activities (hypermarkets, shopping and service centers, leisure centers, universities etc.) that already exist or are to be built can liaise among themselves, in the form of a network, and request municipal approval to replace garage space with feeder or community transport services, while making better use of that space. The municipality can retain ample control over the planning, operation and expansion of these transport services, which, because they are restricted to the area of influence of the *Waterway Center* and have a captive demand (related undertakings), can achieve an excellent boarding/exiting ratio, significantly increasing the Index of Passengers per Kilometer (IPK) and reducing the fare, as confirmed in the feasibility study. Such a network of integrated urban activities or undertakings constitutes a privileged location within the urban context (centralized location theory of Christaller).

A model for the concession of services is therefore offered to BNDES and interested states and municipalities, that can, in the medium term (up to 10 years), bring about this network of integrated urban activities or undertakings and interact with and integrate the specific interests of the various public administration bodies, in accordance with their constitutional responsibilities, as follows:

- To the state, the concession of waterway transport services (*Acqua Mobile Routes*) to waterway transport operators (in partnership or not with producers of technology), exempting them from the costs of constructing, maintaining and operating the terminal infrastructure;
- To the municipality –
 - the concession of the terminals (*Waterway Centers*) to real-estate developers, who in return assume the cost of the construction, maintenance and operation of the terminal infrastructure, since they are the target group most interested in exploiting the building potential granted;
 - the concession of feeder or community transport services to road transport operators who, through collective transport modes (buses and minibuses), can provide accessibility to traffic generating centers, improving the environmental quality and increasing the building potential in the area of influence of the *Water Centers* by making better use of the area presently devoted to parking space.

The sustainability of the proposed system lies not only in the provision of places for the citizen-customer on collective modes of transport, but, above all, in the offer of accessibility that provides the justification to implement real-estate ventures of various different kinds within the areas of influence of the *Waterway Centers*.

Taking into consideration the issues of urban legislation raised in the conceptual review (Martins *et al.* 2000a), and with a view to enabling the states and municipalities to adequately fulfill the roles prescribed for them in the constitution, it is proposed that concession of the waterway transport services be conducted separately from the concession of the waterway terminals (and/or multimodal terminals) and that of the feeder and/or community transport services.

Hence, three kinds of concession are proposed, as follows:

- concession of the commercial exploitation of waterway transport services (responsibility of the state government);
- concession of the commercial exploitation of the terminals (responsibility of the municipal government – waterway or multimodal systems); and
- concession of the commercial exploitation of feeder or community overland transport services (responsibility of the municipal government – road or rail services, where applicable²).

Waterway transport concession

² In the case of the city of Rio de Janeiro, the municipal government has already applied to BNDES for resources to conduct a feasibility study on the introduction of six routes for light vehicles running on tracks connecting the dock area with the city center.

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The state concession of the commercial exploitation of the waterway transport services should address only those routes of a social nature (of public interest). The state will offer the interested parties the concession for a single waterway route or bundle of routes.

The desired concession-holder profile would be for a waterway transport operator with at least 5 years' practical experience. Shipbuilders and boatbuilders with a minimum of 10 years' proven experience would also be allowed to tender for the concession, as long as it is in partnership with an urban transport operator with the same amount of experience in Brazil.

The concession holder must use the vessels defined in the call-to-tender document on its routes that are of social interest, in accordance with the operational parameters defined in this study (maximum fare, maximum headway at peak and off-peak hours, minimum commercial speed, minimum boarding capacity, or maximum, in the case of the "*Acqua Mini*"- option of technology introduced by Martins and Bodmer, 2002).

The concession holder could be given the opportunity to augment its overall revenue by providing special new waterway transport services (chartered), as long as these are authorized by the competent authority.

Hence, the only concession holders who will be able to apply to the state for the right to operate new charter services will be those who have fulfilled their social function; in other words, who in the previous period met all the minimum operational requirements determined under this project for the routes that are the object of the public concession.

Consequently, the technical-economic feasibility study of the waterway transport services carried out under this project considers only the investments in the fleet necessary to meet the expected demand (based on the morning rush hour peak). It does not include the costs relating to the waterway infrastructure (dredging and signage for the pier and passenger terminal). It considers that, as has traditionally been the case with the urban roadway system, the waterway infrastructure costs should be borne by the granting body, i.e.: the state.

However, the cost of the terminal, as it fulfils a strategic location function and adds value to the nearby real estate, was included in the technical-economic feasibility study of the commercial exploitation of the terminals.

As a result, there is an opportunity to introduce viable waterway transport of good quality at a lower cost to the end user: the citizen-customer.

The concession to a company or consortium of the right to commercially exploit a given route or bundle of routes will be based, as suggested by the study, on the following considerations:

- The highest bid, in relation to a minimum value determined in the call to tender; and
- The lowest fare, in relation to a maximum value (a reference rate established in this study) determined in the call to tender.

The duration of the concession to provide waterway transport services that was considered in the technical-economic feasibility study coincides with the useful life of the vessels, that is, 20 (twenty) years, renewable for an equal period.

Concession of the terminals

The municipal concession of the commercial exploitation of the waterway or multimodal terminals should relate exclusively to the installations built to handle the passengers and to the infrastructure for boarding and exiting the vessels (pier) and feeder vehicles (bus platforms). The municipality should offer the interested parties the concession of the terminals as laid down in the “*Plano Participativo de Transporte Aquaviário (Waterway Transport Participation Plan)*”. Allowing the same concession holder for more than one terminal is not recommended.

The desired concession-holder profile would be for a real-estate developer with considerable experience in Brazil of planning, constructing and managing commercial and service undertakings (a minimum of 10 years).

The concession holder must construct, maintain and exploit commercially the physical space of the waterway and multimodal terminals and their annexes, with gross leaseable area (including the malls and areas for circulation, as these can be used for installing kiosks) as defined in this study. The concession holder’s (developer’s) potential revenue, calculated to provide a minimum return of 20%, took into consideration the normal market rent (1% of the property’s sale value) and *res separata* (60% Commercial Fund contribution). The concession holder must make space available for the mooring of vessels (pier) and for bus stops (platforms), in exchange for the right to exploit the building potential relating to the terminal and other revenues deriving from a share in the undertaking itself, in the commercial establishments or in the rendering of services.

The concession holder will be free to determine the activities it wishes to exploit within the physical space that is the object of the concession, within the limitations imposed by the urban legislation. Use of the area for the parking of automobiles, beyond the building potential defined in the call to tender, will not be permitted, since it is not in the public interest to encourage the use of this mode of transport. However, the concession holder will be given the right to build up its clientel in whichever way is most convenient to fulfilling its social function (providing boarding and exit facilities for the passengers of waterway and overland transport services). In these circumstances, the area given over to parking space should be included in the building potential defined in the call to tender (gross leaseable area), with the

concession holder bearing the cost of the work necessary to minimize the impact on the free flow of vehicles and pedestrians in the parking access areas.

Potential costs relating to “special works” (dredging, footbridges) and augmenting the building potential needed to ensure a profitability level of 15% were included as an optional extra in the feasibility study, so that the municipalities could evaluate the possibility of these costs being borne by the granting body.

As the potential revenue of the terminals is based on the commercial exploitation of the activities installed therein, it is expected that the developer will promote the incorporation of urban enterprises, by coordinating the interests of the operators of the waterway transport services (state concession) and the operators of the land-based feeder or community services (municipal concession) in chartering, and thereby increasing the number of people circulating through the undertaking.

Thus, both the waterway transport and the overland feeder transport should be looked upon by the real-estate developer as media outlets to be exploited, in order to gain the loyalty of the potential clientel (expanded product-service), and hence justifying the exemption of their operators from bearing the costs of the terminal.

The concession to a company or consortium of the right to commercially exploit a given terminal will be based on the highest bid or capital holding, in relation to a minimum value determined in the call to tender.

The duration of the concession for the commercial exploitation of a terminal that was considered in the technical-economic feasibility study was half the useful life (40 years) of the building, that is, 20 (twenty) years, renewable for an equal period.

Concession of feeder services

The municipal concession of the commercial exploitation of the overland transport services (roadway and/or railway) should relate to routes within the areas of influence of the terminals that are of a social and community nature (of public interest). The municipality should offer the interested parties (legal entities based in Brazil) the concession of community road routes that feed structural transport modes (waterways, railways and subways).

The desired concession-holder profile would be for a road transport operator with at least 5 years’ proven experience in Brazil.

The concession holder must provide the fleet defined in the call to tender for operating the social and community routes, in accordance with the operational parameters defined in this

study (maximum fares, maximum headway at peak and off-peak hours, minimum commercial speed and capacity).

The technical-economic feasibility study of the road transport services, carried out under this project, considers only those investments in the fleet that are necessary to meet the expected demand (based on the morning rush hour peak).

The feeder service fare is the reference rate provided by this study to the municipal and state decision makers, so that they can coordinate the interests of the various parties involved in the proposal. In order to connect the waterway services and terminals with their areas of influence (minimum of 2 km), whether considering integration with the existing system of urban transport or considering the provision (concession) of new services, it is essential that the cost of such an operation is known.

Under the hypothesis that one uses the existing transport system, the reference rate for the planned feeder services can be used so that the granting body can promote the integration of the fares, incorporating within the price of the door-to-door transport to be charged by the concession holder for the waterway transport services the portion that should be transferred to the integrated road transport operators, whether at the terminal of origin or at the terminal of destination.

Under the hypothesis that the concept of expanded product-service (Martin and Bodmer, 2000, 2002) is applied to the integrated production of transport-land use, through the opportunity to introduce new public transport services - as long as the alterations to the urban legislation are made, in order to convert part of the obligatory construction of parking space into a supply of seats on collective transport modes - the calculation of the cost of the feeder or community service could provide a basis for the municipal granting authority to define the requirements of the call to tender.

However, it is necessary to stress how strategically important it is that BNDES makes the results of this study public, so that decision makers can be aware of the significance of the concept of this project to the citizens and to urban development, since it allows the generation of revenue for the concession holders from the demand for their feeder or community services (they assume the role of agent for development and for the integration of policies for the use and occupation of the land with those for transport), since they should be able to offer as an effective alternative for urban undertakings located within the area of influence of the terminals a fuller utilization of the total building area defined in the urban legislation, substituting part of the compulsory parking space with equivalent places on their community transport services (see Mobile concept/UFRJ), provided that the municipalities interested in integrating their policies for the use and occupation of the land make the necessary alterations to the urban legislation.

In this way, so long as the urban legislation promotes the production of new transport services linked to the production of land use, the concession holder that fulfills their social function, in other words, that in the previous year met all the minimum operational requirements determined under this project for the routes that are the object of the public concession, will be able to apply to the municipal authorities for new charter services for enterprises interested

in developing an urban enterprise network (directly linked to the structural transport terminals).

In the case of the municipalities that are interested in making the alterations in the urban legislation that are necessary to promote integrated policies for transport and land use, alterations can be made in the following three areas of urban planning regulations:

- Urban systemization – relating to the planning and the organization of land use;
- Urban intervention – relating to property and building rights;
- Urban control – relating to the instruments for approvals, licenses and authorizations.

Hence, if an urban developer in the area of influence of a terminal shows interest in converting part of the parking space legally defined for his/her project, when it is submitted for municipal approval in order to obtain a building license, from the moment that the building is authorized for use, the IPTU (municipal rates) will incorporate an improvements tax to cover the costs borne by the municipality involving the concession of the community or special transport service routes.

In this way, the municipality will collect the value corresponding to the improvements tax and pass it on to the operator. Therefore, the concession to a company or consortium of the right to commercially exploit the community routes will be based on the following:

- The highest bid or capital holding, in relation to a minimum value determined in the call to tender: and
- The lowest fare that should be passed on by the municipality to the operator, in relation to a maximum value (a reference rate established in this study) determined in the call to tender.

One should point out the tendency to obtain a lower fare for the community services in comparison with the normal level of fares in the municipality, since there is a greater renewal of demand for these routes, while the total round trip journey is shorter, and thus the fleet requirement is smaller.

It is recommended that the duration of the concession of the community road transport services also be for 20 (twenty) years, renewable just once.

SOCIAL AND ECONOMIC IMPACTS

In this context, public transport vehicles (buses) and construction have a very positive influence on the shipbuilding industry, given the synergies between these three sectors that the Mobile concept promotes. There are both direct and indirect impacts.

Nearly 300,000 people would benefit directly from the services proposed, which would become the transport option of choice in their areas, as they would offer maximum utility (Martins and Bodmer, 2002).

The direct social impacts can be interpreted, for instance, by the number of people benefitted by the proposed services and the number of direct jobs generated in the production, management and operation of the shipbuilding and construction industries, as a result of adopting the proposed technology, both for the *Acqua Mobile Routes* and for the *Waterway Centers*.

The indirect impacts are, for example, the increased generation of jobs and of urban productivity and the generation of taxes, when converting part of the parking space requirement into transport services for traffic generating centers to be set up in the area of influence of transport terminals. Considering, for example, that the municipalities allow the conversion of up to one third of the parking spaces determined in the urban legislation into an equivalent in seats (proportion 1:12) on the community or feeder services proposed here, there will be an almost 20% increase in the area utilizable for commercial establishments, without any increase in the total building area, thus generating a proportional increase in the total revenue of the enterprises benefiting from this and, consequently, in all the ensuing social benefits.

It is estimated that a total of 5,400 jobs would be generated by the administration, construction and operation of the vessels on the UFRJ's *Water Mobility Route*, 1,351 of them direct (Martins and Bodmer, 2002).

It is estimated that a total of **97,416 jobs** would be generated by the administration, construction and operation of the proposed *Waterway Centers*, **24,354** of them direct (Martins and Bodmer, 2002).

With respect to economic and financial viability, *Water centers* represent the feasible strategy, that help to make viable some of routes of social interest. Bodmer and Martins (2005b) demonstrate this through data referring to the 38 Water Centers in 10 metropolitan areas. Considering aggregated data, the total building area of these centers represents 175,841m², total cost of constructing - 50.8 million (U\$); monthly potential revenue – 308.7 million (U\$); minimum potential revenue for developers is 21.5 million (U\$).

More detailed data are presented by Martins and Bodmer (2002). The technical-economic-financial feasibility study of the commercial exploitation of the proposed waterway transport services and terminals took into consideration: net present value; internal rate of return; cost-benefit ratio and time to reach break-even point (in all the cases, the time to achieve break-even point ranges from 7 to 9 years).

CONCLUSIONS

The purpose of this work was to present more concrete proposals to broaden the range of possibilities for formulating policies capable of injecting greater efficiency and effectiveness into the transport systems, in harmony with urban policy.

The study confirmed the technical-economic feasibility of proposals that could be implemented, so as to provide methodological guidance or serve as a model for sustainable urban development that demonstrates how to integrate policies on transport and the use and occupation of the land, thereby generating jobs and improving the quality of life for cities and their citizens.

The Federal, State and Municipal governments have fundamental roles to play in inducing an increase in urban productivity, since the public authorities are the largest owners of vacant land or land given over to parking space in the Brazilian metropolitan centers (in Rio de Janeiro it accounts for more than 50% of the existent empty space).

The proposal that the production of urban space is linked to the production of transport, offering large-scale urban undertakings the possibility of liaising in networks with other enterprises (stakeholders), to provide special urban logistics services, instead of the compulsory provision of parking space, has the capacity to promote development and involves a rethinking of the traditional forms of concession.

The core idea is to stimulate the creation of networks of activities (stakeholders) that form part of the citizen's chain of daily activities, so that an activity or urban undertaking will continue to focus on the good or service that it produces (core activity), while broadening it considerably by offering the citizen access to the other related activities, effectively integrating them, in such a way that each activity or enterprise in the network offers the citizen an expanded product-service (urban logistics).

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