

## **VIABILITY OF INTEGRATED LAND USE AND TRANSPORT PROJECT ORDERED BY BNDES IN ATTENTION TO THE REAL ESTATE<sup>1</sup>**

### **VIABILIDADE DE PROJETO INTEGRADO DE USO DO SOLO E TRANSPORTE ENCOMENDADO PELO BNDES EM ATENÇÃO AO MERCADO IMOBILIÁRIO**

### **VIABILIDAD DE PROYECTO INTEGRADO DEL USO DEL SUELO Y DEL TRANSPORTE PEDIDO POR EL BNDES EN LA ATENCIÓN A LO MERCADO INMOBILIARIO**

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#### **THEMATIC AREA: THE REAL ESTATE COMPONENT IN MASTER PLANS**

#### **ABSTRACT**

Despite of existing consciousness related to sustainable planning necessary to reduce environmental, social and economic impacts, current planning and policies continue to stimulate roadway capacity expansion automobile dependent and, consequently, provoke urban sprawl. Horizontal and uneven expansion of urban structure leads to an inefficient transportation network, where the public transport is unable to be competitive. The usual approach adopted by public authorities when contracting public transport operators abstracts from this reality. Previous work, developed by *Mobile Group/UFRJ* and published by Elsevier, has introduced concept of integrating effectively transport-land use relationship with actual potential to achieve efficiency of public transport and urban development. National Bank of Economic and Social Development (BNDES) financed a *Mobile's* study, based on its concept (the "*Mobile Concept*"), to propose water transport services in multimodal perspective assuming strategy to sustainable urban development, exploring the local potentialities, and to analyze its viability for ten Brazilian metropolises.

This study considered consumer preferences and participation of indirect stakeholders (real estate, commercial and service companies) in the system financing, through the enterprises integration in the adjacent area of the terminals by transport service feeders, and by the exploration of constructive potential by the developers with sights to reduce the cost of public transport. This conception incorporated public and private projects that converged to integrated land-use and transport proposals, in which was necessary to articulate micro-accessibility policies (at the local scale) with macro-accessibility (at the urban or metropolitan scale).

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.

It may be concluded that the adoption of the "*Mobile Concept*" by large-scale undertakings is financially a good investment, given that, as has been shown, replacing 50% of the parking space, in exchange for collective transport services, and occupying this space with stores raises the accessibility cost from 2.1% to 2.4% of the total monthly cost of the undertaking, while increasing the potential monthly revenue by 29%. Hence the superior performance in all the viability criteria: Present liquid value 81% higher; Cost/benefit ratio 28% higher, Internal rate of return 4% higher and pay-back range 25% lower.

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<sup>1</sup> The V LARES presents other paper (MARTINS & BODMER, 2005b) that are complementary reading to this one.

## INTRODUCTION: DEFINING THE PROBLEM OF URBAN MOBILITY IN BRAZIL

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 hubs), 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) 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 the mais valia is not captured to reinvesting in public assets or the financing of public transport. 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 transport and land use policies, but the land use 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 (MARTINS & BODMER, 2000a, 2002 and MARTINS *et al.*, 2005a). Replacing 50% of this parking space of shopping centers in Brazillian cities, it could produce an increase of up to 20% of the their useful area, without any expansion of the total building area, increasing land revenue around 44 times and job generation by 76 times, as the **Table 1** presents.

**Table 1 – The differences between revenue and jobs of a shopping center with parking and a shopping center that substitute 50% of the parking space for collective services and stores**

RESULTS	REVENUE (US\$/m <sup>2</sup> )		JOBS (N°/m <sup>2</sup> )	
	PARKING	COLLECTIVE SERVICES	PARKING	COLLECTIVE SERVICES
<b>WORST</b>	2.71	117.47	0.000727	0.065387
<b>AVERAGE</b>	<b>4.26</b>	<b>172.20</b>	<b>0.000833</b>	<b>0.065510</b>
<b>BEST</b>	5.80	226.94	0.000975	0.065675

Note: US\$ 1.00 = R\$ 2.50 (May/2005).

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.

## THE STUDY ORDERED BY BNDES: JOINT INVESTMENTS IN TRANSPORT AND DEVELOPMENT

The aim of the study prdered by BNDES, as detailed in MARTINS & 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 & 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 & 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 AND THE REAL ESTATE'S INTERESTS TO INTEGRATE TRANSPORT-LAND USE POLICIES**

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 the Brazilian public administrators 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 *et al.* (2005a,b), 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).

#### 4 V LARES International Meeting

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 & 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:

1. *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 and local residents);
2. *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;
3. *Distribution of trip generating activities* – when IMM 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";
4. *Social responsibility* – the urban property should accomplish its social function so that traffic generators can take care of themselves, promoting IMM plans for their own users, respecting the environmental capacity limits (with regard to the circulation and air quality);
5. *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 accessibilities by different social classes to their respective "real estate clusters" feasible, with acceptable transport and environmental quality standards for all;
6. *Proximity* – integrated transport and land use planning, to preserve the human scale of living and enhance the value of community life.

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

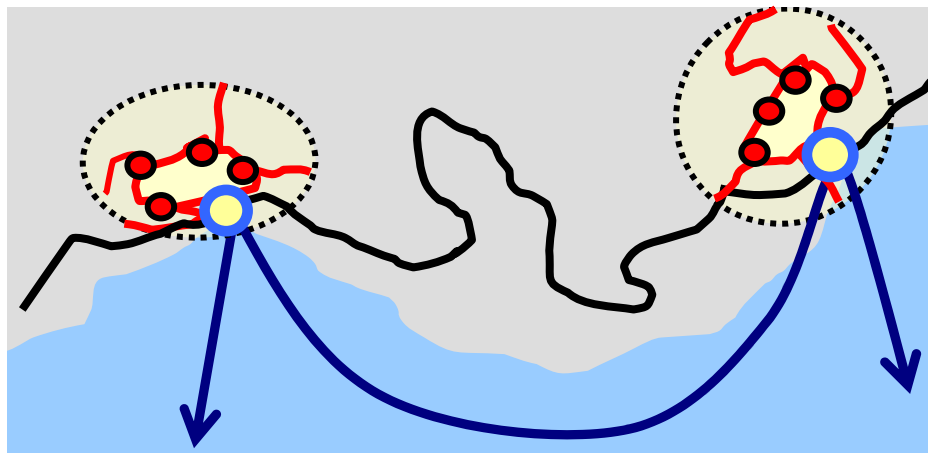
1. *Environmental zones vs. traffic right of way* – according to Buchanan's classic *Traffic in Towns* (1963), an environmental zone can be defined as a territorial unit whose access connection or point with the structural transport network protects it from motorized trips and, particularly, from any 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 IMM 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**, in the next page, is intended to illustrate.

**Figure 1: Urban logistics adopted in the study ordered by BNDES**



Legend:

-  Waterway transport service (macro-accessibility) – integrates several communities by water shortcuts;
-  Acqua Center – multimodal terminal integrated at complex of local community and adjacent area activities (commerce, service and leisure);
-  Environmental Zone – adjacent area of an Acqua Center benefited by its proximity (up to 2 km), served by feeder services and/or not motorized movement infrastructure (pedestrians and cycle ways);
-  Traffic Generator Hubs - large construction or agglomeration of buildings that instead of parking space can provide feeder service of local use, improving circulation quality and transforming themselves into the Nucleus of Efficient Traffic (NET);
-  Logistic chain (micro-accessibility) - feeder transport service, at the local or community level, that integrates urban activities and different traffic generators located within environmental zone with Acqua Center.

The municipal districts interested in financing this kind of project should adapt the urban legislation with regard to the induction policy of traffic generators hubs location in the adjacent areas of Acqua Center (Waterway center or multimodal terminal integrated at complex of local community and adjacent area activities of commerce, service and leisure), giving them possibility to replace a part of the parking space by collective transport connected to that terminal. The Acqua Center 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 ordered by BNDES 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 & 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, 2005a,b, 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 a 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 “*Acqua Center (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.

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 –
  1. 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;
  2. 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 hubs, 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*.

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 (*Waterway Centers*).

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.

### ***Concession of the terminals (Waterway Centers) to the Real Estate***

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 "*Waterway Transport Master 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 the metropolitan regions 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 there in, 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.

### THE ECONOMIC AND FINANTIAL VIABILITY OF THE WATERWAY CENTERS

With respect to economic and financial viability, the "*Acqua Centers*" (*Waterway centers*) represent the feasible strategy, that help to make viable some of routes of social interest. BODMER & MARTINS (2005b) demonstrate this through data referring to the 38 Water Centers in 10 metropolitan areas. Considering aggregated data, the total building potential to be exploited by the Waterway Centers' concession holder (real-estate developers) at the terminal or transferred to another undertaking, represents 175,841m<sup>2</sup>, 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\$).

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). More detailed data are presented by MARTINS & BODMER (2002).

#### **Comparison of the economic-financial analysis of undertakings integrated to the "Waterway Centers"(by community transport services) with single undertakings (with parking)**

A comparison was made of two different alternatives for an existing development (a shopping center nearby Botafogo Water Way, in Rio de Janeiro); namely, "*Shopping Center with Parking Space*" and the "*Shopping Center with Mobile Concept*". The difference between them is, essentially, the opportunity to a "*Shopping Center with Parking Space*" to:

- change 50% of its parking space for stores (exploiting the building potential offered to the *Waterway Centers'* concession holder) and
- implement, operate and maintain the community transport services

A summary of the characteristics of the undertaking, as simple "*Shopping Center with Parking Space*" or modified to a "*Shopping Center with Mobile Concept*" is presented in *Table 2*.

**Table 2 – Comparison between the alternatives “parking space” and “Mobile Concept”**

	"SHOPPING WITH PARKING SPACE"	"SHOPPING WITH MOBILE CONCEPT"
Total Building Area	106,275 m <sup>2</sup>	106,275 m <sup>2</sup>
Productive Area	45,000 m <sup>2</sup>	58,847 m <sup>2</sup>
Number of Parking Spaces	1,500	981
Seats on Collective Transport Modes	-	11,591
Total Parking Space	50,025 m <sup>2</sup>	32,716 m <sup>2</sup>
Shopping Center Area	56,250 m <sup>2</sup>	73,559 m <sup>2</sup>

The parameters adopted for calculating the total costs and revenues for the two alternatives are presented in **Table 3**.



**Table 3 – Costs and revenue for the undertaking adopted in the financial viability analysis**

ITEM	"PARKING SPACE" (US\$ 1,000)	"MOBILE CONCEPT" (US\$ 1,000)
Monthly Operating & Maintenance Costs (3.0% of Implementation Cost)	727.36	774.38
Monthly Admin. & Marketing Costs (5.0% of Implementation Cost)	1,212.26	1,290.64
Monthly Cost of Personnel and Payroll Charges (including stores)	2,693.61	3,679.68
Monthly Cost of the Accessibility Alternative	100.54	139.11
Total Monthly Cost	4,733.76	5,883.81
Gross Monthly Potential Revenue	9,899.54	12,806.33
Monthly Net Revenue	5,165.78	6,922.53
Investment (Implementation Cost)	24,245.16	25,812.71

Note: US\$ 1.00 = R\$ 2.50 (May/2005)

For the financial viability analysis, the financing term was considered to be 20 years, the useful life of the undertaking to be 40 years, the rate of interest to be 0.5% per month and a discount rate of 12% per year. The performance results for the two alternatives in each of the financial viability criteria can be seen in **Table 4**.

**Table 4 – Performance of the two alternatives under the financial viability analysis criteria**

FINANCIAL VIABILITY CRITERIA	"PARKING SPACE"	"MOBILE CONCEPT"
Present liquid value (US\$)	35,850.86	64,736.84
Benefit / cost ratio	2.09	2.18
Internal rate of return (%)	21	27
Pay-back (years)	8	6

It may be concluded, then, that the adoption of the "Mobile Concept" by large-scale undertakings is financially the best alternative, given that, as has been shown, replacing 50% of the parking space, in exchange for collective transport services, and occupying this space with stores raises the accessibility cost from 2.1% to 2.4% of the total monthly cost of the undertaking, while increasing the potential monthly revenue by 29%. Hence the superior performance in all the viability criteria: Present liquid value 81% higher; Cost/benefit ratio 28% higher, Internal rate of return 4% higher and pay-back range 25% lower.

## CONCLUSIONS

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. It was the *principia* of the study ordered by BNDES.

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).

As has been demonstrated, converting 50% of the parking space to the use of collective transport services and filling this space with stores leads to an increase in accessibility cost, from 2.1% to 2.4% of the total monthly cost of the undertaking, but to a 29% increase in the monthly potential revenue. Consequently, we see the alternative perform better under all the viability criteria: Present liquid value 81% higher; Benefit / cost ratio 28% higher, Internal rate of return 4% higher and pay-back range 25% lower. The "Acqua Centers" and its building potential represent the feasible strategy, that help to make viable some of water way routes of social interest.

Therefore, it is confirmed that if the municipal authorities were to induce the legislation governing land use and occupation to allow the conversion of parking space in traffic generating centers into a network of special collective services nearby transport terminals, this would augment the capacity for renewal of these undertakings by 25%, given the greater revenue flow and the reduction of the investment pay-back period. As these establishments become inter-linked by the network of collective transport services, there is a tendency towards an urban renewal also, over a 6-year cycle. There is, among the consumers within their area of influence, the prospect of developing loyalty towards the network of activities, as a result of both the increased number of stores and the image of a socially responsible undertaking, due to the investment in urban micro accessibility.

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