Mobility Management Plan for Traffic Generator Buildings

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Introduction

The main focus of this work is on land-use and transport management based on the research results of Mobile Group concerned with urban development and mobility issues. The present paper reports an experience of strategic plan development for mobility management (MM) of a traffic generator building – a Shopping center in Rio de Janeiro, called Rio Sul.

There are signs that the real-state capital is starting to perceive that expansion of infrastructure for cars with the same intensity as the increase of demand cannot be financially sustainable because of the high costs to mitigate negative externalities (social, immobilization, and environmental costs). With the concession of mass transport infrastructure to private initiative, new projects appear and propose transport integrated to the land-use activities. If, on the one hand, financial capital seems to draw its attention to new models of land transformation, on the other hand, the increase of the number of civil inquiries in Rio de Janeiro in last three years reveals also the development of social consciousness in relation to the urban diseconomies and need for new transport management models. This is a trend that cannot be ignored by the building business, which has been questioned during last years in relation to the environmental impacts, mainly these, caused by traffic-generators on circulation.

Once the urban space is limited, traffic generators, such as shopping centres, for instance, are not able to attend to handle the demand increase. The dilemma for the shopping centres’
administration with respect to impacts on the economy of the city is how to enlarge the space available deciding between two options: for shops or for parking. After all, it is observed, taking into account the Brazilian reality, that shopping centres require about 50% of the shopping area for parking. Once the parking productivity is significantly lower than that of an area designed for shopping, subtraction of the number of garage spaces in benefit of commercial area is considered as a better alternative to satisfy the political pressure for the establishments’ expansion. In this case, it is verified that, in spite of the increase of the number of cars attracted, the only compromise with the attainment of immediate profits prevails and aggravates the parking deficit. On the other hand, the consequences of the troubles provoked, in short-term, in the neighbourhood go against the transport-generators interests. When this occurs, it is evident that the solution of the access problem is connected to the development of new forms of accessibility and mobility management.

Shopping centre problems

The Shopping center Rio Sul is located in the south zone of Rio de Janeiro, a strategic position (see Figure 1) between the Copacabana and Botafogo Districts, where about 240 thousand inhabitants reside with an average family income of 12.7 times the minimum wage. Shopping has 430 stores, approximately 4,600 employees, and attracts on average 60,000 trips/day (Martins et al 1999).
Figure 1 Spatial distribution of consumers by district

Legend
- Below 2.5%
- From 2.5 to 5%
- From 5 to 10%
- Above 15%
- Max = 17.47%
The great volume of traffic generated by that polar region causes impact problems in the circulation of the spill area, interfering in the inhabitants’ quality of life in the surroundings of Shopping.

That impact was worsened after the expansion initiated in 1990 enlarged the useful area for the referred Shopping by approximately 5% (passing from 49,159m² to 51,708m²) and reduced the number of parking places by 57% (from 2,674 to 1,700). Considering the original urban parameters, Shopping had to dispose, nowadays, of 2,813 places (Martins et Al, 1999). The deficit of 1,113 parking places enlarged the congestion periods and the parking dispute in the public streets. Facing this situation, the residents in the adjacent area, represented by their Community association, moved a civil inquiry against the Shopping.

However, besides this Shopping does not have space to build the necessary parking places to compensate the deficit; the added parking supply increase would encourage even more the use of the private car, which would be reinforcing the problem, and, in short time, would be increasing the perspective of the environmental damages.

To solve the problem, the Public Ministry, guided by the Mobile Group, proposed to the interested parties (Community association and Shopping center administrator) the parking space deficit conversion, in seats of collective transport, according to the equation below:

\[ L = D \times R \times F, \]

Where:

L = Number of seats necessary to provide in collective modalities;
D = Space deficit verified by the Public Ministry (1,113);
R = Replacement factor of the parking (6.37); and
F = Equivalence factor between the space occupied by bus and automobile (2.53).

Shopping should provide a service of collective transport able to reduce the surplus of trips attracted by car. The interested parties and Public Ministry decided signing an agreement, which might offer collective transport service by bus (with estimate of seats equivalency), guaranteeing this way the original urban parameters of the area. The Mobile not only
developed a transport system that can satisfy interests of the involved parties, as well as (together with the local community) might monitor (since it will be implemented) for a five years period its performance. *Shopping*, on the other hand, should support the research on mobility management at the University, making this way feasible the *Mobility management laboratory* development (still not implemented), where new approaches should be tested. The concept here introduced is called *Integrated Mobility Management (IMM)*, since its main contribution is exploring interaction between land use and transport.

The *Shopping* parking space deficit conversion to the bus was estimated in approximately 7,400 seats. Thus, the *Rio Sul* transport service should have the capacity of 7,400 passengers/ day (round trips). This service should attend not only a part of the captive demand, as well as the community directly impacted by the traffic generated by the shopping.

**Clients and their habits**

To develop the service of collective transport for the visitors of *Rio Sul* (clients), specifically for the users of automobile, there were carried out two surveys (revealed and declared preference) using the interviews on typical days, determined based on data provided by shopping (data collection between April and August, 1999).

In the first survey, using the revealed preference approach, with level statistical significance of 95% and standard error of 5%, were identified the travels habits and the attributes considered in the modal choice. The goal was to identify the needs to displacement and the socioeconomic profile of the *Rio Sul* visitors. Based on the obtained information, it was defined the demand segmentation, aiming as a target group the car users; for them the services were projected.

The survey main results (Martins et Al, 1999) are the following:

- Modal split: Automobile, 41%; Bus, 33% and another, 26%;
- Frequency traveling to *Shopping centre*: 52% of the customers of *Rio Sul* visit *Shopping* at least once a week;
- The same transport mode is used for a round trip: 90% of the customers;
Trips origin: the districts situated up to 2.5 Km from Shopping are the most frequent origins, representing 39% of Rio Sul customers. The downtown also was indicated by 12% of the customers as being travel origin (most of them occurring after the work);

Main travel purpose: 55% shopping trips and 30% leisure trips (ride, gymnastics, cinema, bar, meal and another);

Family income of the customers that use the car and are Shopping's weekly visitors: 68% above 20 times the minimum wage and 28% from 6 to 20 times the minimum wage. With regard to the definition of the target customers superior limit, it was considered that the customers whose monthly family income is above 30 times the minimum wage (39%) are captive car users and, probably, would not adopt collective transport alternative;

These data permit to identify the target clients' group for the transport service: the citizens that live in the Shopping's neighborhood, going there by car one or more times a week and having income from 6 to 30 times the minimum wage.

With that target group it was carried out the second survey applying the stated preference technique with the purpose of knowing the customers' preferences with regard to the possible alternatives for transport service. This might be defined taking into account their specific demands with respect to their displacements.

The applied questionnaire presented two options of itinerary and three alternatives of vehicles technology to be analyzed by the interviewees, as well as the operational characteristics of the service (frequency, operation schedule, service level). There were also used associative tests of ideas which were useful for composition of the product-service-package.

Through the product-service-package developed for Shopping's customers expectation regarding the modal transfer, there estimated approximately 1,900 passengers/day (Martins et Al, 1999) computed by the following equation:

\[ D = D_1 \times F_1 \times F_2 \times F_3 \times F_4 \times F_5 \]
Where:

\[ D = \text{target public (people/day)}; \]
\[ D_1 = \text{total public (60,000 people/day)}; \]
\[ F_1 = \text{Adjustment factor for car users (0.41)}; \]
\[ F_2 = \text{Adjustment factor for origin district (0.31)}; \]
\[ F_3 = \text{Adjustment factor for weekly frequency (0.53)}; \]
\[ F_4 = \text{Adjustment factor for monthly family income (0.57)}; \]
\[ F_5 = \text{Adjustment factor for trip purpose (0.82)}. \]

**Proposal for mobility management**

The *Mobile Group’s* proposal for urban development policies sustained by new transport services assumes the concept of *Product-Service Package* together with Transport-Undertaking. In this case, in the private sphere of decision making, both location of urban economic activities and transport system are treated jointly as an urban *logistic chain*. In order to incorporate transport to the core activities of the real state Urban Undertaking (shopping, leisure, business, etc.), the supply chain has to be managed strategically and integrated with profitable urban activities gaining this way competitive advantage.

By using the concept de *Product-Service Package*, transport can be not only a part of commercial *Product-Services*, but also could work as a consumption facilitator, making the communities loyal to their local business, and at the same time integrating communities and urban activities in a network. The idea is to assure, through the transport services integrated to transit-generators, economies of localization and agglomeration for two types of urban situation:

1. Urban expansion zones as strategy to stimulate the attraction of new opportunities of employment, leisure and consumption, better distributing them equitably in the urban space, and
2. Existing areas that already reveal negative externalities (immobilization cost, pollution, etc.). In this case, one deals to incorporate urban environmental quality, by defining new
plans of circulation and services of transport integrated to urban projects (urban design, traffic calming, demand and mobility management).

The main idea of this approach is to provide a proper transport system to business network, engaging the actors, whose take a part of transport production and urban activities (real-state building, commerce, services and leisure). Thus, one expects to foster the synergy of the logistic chain of transport-land use with the purpose of communities’ revitalization. The transport will be made available to the communities as a complementary service to the most frequent activities and perceived as a free, since it is designed within a Shopping’s bundle of products and services or benefits for clients associated to the network of activities whose expectancy is to get some privileges. The adoption of this option characterizes a relatively advanced stage of creating the client’s loyalty, which Kotler (1999) calls “associated customer”.

Thus, a Product-Service Package model is defined, which, besides the traditional offers of urban activities, provides accessibility through the collective or greening transport for the special clients (immediate influence area’s community) associated to a Program of benefits. That Program enables their providers to make closer relationship with clients (local communities), offering rewards to them, when they remain as the customers at this network. As consumption in network shops and the preference for collective transport is going to increase, the associated clients, holders of affinity cards, receive a series of benefits, from whose could be pointed out the discounts on the purchase and special treatment in all shops associated to the Program. This approach, sustained on the strategy, which considers the accessibility as aggregated value to the urban business core activities, enables to join together interests of several agents that establish partnerships and develop laboratories of urban development policies, comprising whole production cycle: planning, implementation and monitoring of the Product-Service Package. With the Mobile approach, an emphasis is given on relationship marketing and urban MM research referring to this concept.

A proposed managerial model, based on strategic partnerships and relationship marketing was developed. The main agents involved in this model are: client-citizen (requiring and active consumer, taking part of the production and consumption process of urban private and
public services); production and accessibility agents of urban activities (providers of additional value through the services efficiently produced and sold in a differentiated way) and managerial entity (board or agency focused on social, economical and environmental equity, being in charge of the management, planning and development of whole transport-undertaking). Specific goals of the Product-Service Package developed for a Shopping Rio Sul are the following:

1. Bus service (development and operation) for Shopping clients (living on the adjacent area) with capacity of 7,400 passengers/day;
2. Stimulus to consume in shopping and looking for new business opportunities;
3. Encouragement of using transit or other greening alternatives against the single-occupant vehicle, because of parking capacity saturation inside of Shopping and outside, traffic impacts on the adjacent streets;
4. Pollution reduction in atmosphere; and
5. Economy of energy.

Considering services for clients and employees, the shopping could, in two year’s period, withdraw 980 private cars per day from its parking space. This is equivalent to the 10% of its parking capacity.

With respect to the air pollution, the Shopping Rio Sul shall withdraw, in the second year, approximately 38 tons of carbon monoxide per year from the Rio de Janeiro’s atmosphere.

**Conclusion**

The MM concept, applied to this case (Shopping), adopted as premise the reciprocal influence between local collective transport and economic activities. In other words, if on one side the transport provides accessibility to the companies, increasing its attractiveness and contributing to expand its market, on another side, the activities’ increase generates greater demand for transport.

The central idea presented in this work is based on the thesis of IMM, which incorporates the concept of the Product-Service Package and requires a new management model of
interactive nature, built following the principles of relationship marketing, in which all agents attempt to identify the common interests and negotiate the divergences. In this model the normative and prescriptive approach is abandoned, prevailing a dynamics or process, in which the balance is searched and conflicts are mitigated.

The adoption of this model in the urban environment enables partners to manage in a sustainable way not only the micro-accessibility of traffic-generators as well as the macro-accessibility, in which the private real-state investments are associated to the public urban projects and the enterprises start to articulate themselves in network fostered by the greening transport, with emphasis on transit. Thus, it is expected to promote the synergy of the logistic chain of transport-land use that leads to urban communities' revitalization.

In developing countries, given lack of resources of sustainable transport policies, programs regarding to the MM are important, especially when they involve different parties whose assume a part of the accessibility costs. Particularly great travel generators, whose economic viability is directly related to communication facilities and transport availability, should not depend on scarce public investments.