Extended Abstract


This research is on urban mobility solutions in favelas (slums) on hills as an integral part of urban planning. With a focus on the implementation of cable cars as transport systems, this research examines the cable car of the Complexo do Alemão as a case study which is located on the north side of the city of Rio de Janeiro.

Chapter 1

In Chapter 1, the research outlines the problem of poverty and absence of urban planning in Brazilian cities, which has intensified since the 1950s because of the rapid influx of migrants in search for work in the great economic city centers.

Currently in Rio de Janeiro, 22% of the population lives in favelas. The population of the favelas grew disproportionally in the last two decades, four times more than the population of the officially recognized areas of the city.

The problem of housing in the favelization process of the city is aggravated by poor sanitation, violent conflicts, problems with security and safety, a lack of public services, poor access, precarious urban mobility, irregular services like illegal connections to electricity, among other problems. Additionally, there is the overarching problem of urban mobility. Spatial segregation makes it difficult for low-income populations to move from one place to another and is mainly due to the historical selection of occupations in isolated and peripheral areas of the city. The problem of mobility is further aggravated by underdeveloped transitional areas between the rural and urban parts of the city especially when, like in the case of this research, those populations occupy areas with steep hills.

The chapter continues by tracing a history of public policies affecting the favelas of Rio de Janeiro, from the first removal of tenement houses in the city center in the nineteenth century, to the developmental policies of today. The chapter follows the formation of the first favelas with an occupation organized by the people
who were removed from tenement houses and who needed to live near the economic city centers, the eventual expansion to other areas, the first removal policies for temporary housing and subsequently a more rigid posture of the state in regard to favelas.

The 1960's and 1970's were periods marked by the removal and political denial of favelas, it was only in the 1980's that the state began to provide public policies to improve favelas. Thus, there has been a gradual acceptance of these occupations in the landscape of the city.

Chapter 2

Beyond the social problems aforementioned, Chapter 2 points more specifically to the problems of mobility in favelas on hills because of high building density, risks of landslides and precarious road access.

In Rio de Janeiro, the state started to intervene in regard to the issue of mobility in favelas during the first term of Leonel Brizola (1983-1987), with the construction of the “Inclined Plane” in the Pavão Pavãozinho favela. But it was not until the “Favela Bairro” program that mobility initiatives were executed on a much wider scale, the program initiated walkways and improved stairs which greatly increased accessibility and the flow of traffic on road networks.

With an urbanization policy for favelas in motion, other urban mobility transport systems were established, like the inclined plane on the Hill of Santa Marta in 2008 and the elevator of Cantagalo in 2010.

While these transport systems assert the presence of the state in marginal communities, the daily transportation of the residents are mainly local options like vans and motorcycle taxis which continue to play a fundamental role and also contribute to the local economy. This generates income for residents because many of the people working with this type of transport also live in the favelas.

The chapter then describes cable car technology and looks at specific examples of cable cars built or planning to be built in the favelas of Latin America. The lines of Medellin are used as an example because they inspired so many others like San Agustín in Caracas, Complexo do Alemão in Rio de Janeiro, Providencia in Rio de Janeiro and the cable car project of Rocinha in Rio de Janeiro.

The city of Medellin for many years suffered from violence generated by drug trafficking and came to be known in the early 90's as one of the most violent
cities in the world. The high murder rate and violence receded after a series of investments that occurred in the city, mainly investments towards urbanization, education and security.

The urban planning of Medellin was based on major public interventions through specific projects in the poorest sectors of the city. Initially structured around the cable cars, called Metrocables, and spatially articulated with other projects extended to formal sectors of the city, known as Urban Integral Projects (Proyectos Urbanos Integrales-PUIs), the aim of these initiatives was to connect various urban spaces.

One of the characteristics of these projects was the emphasis on aesthetics as an engine for social change. This aesthetic quality to the new cable cars resulted in an increase of residents' self-esteem but was also criticized for its stark contrast with poor local reality.

In 2004, the Line K of the cable car was constructed in Comunas 1 and 2, and initiated an urban planning of the city based on the theory of Social Urbanism, with several projects aimed at improving infrastructure and education in favelas. In 2010, Line K was supplemented by a transfer to the Line L, which goes to the Arvi Park, an ecological park created on the border of a green area to Comuna 1, stimulating tourism. There is also Line J which meets Comunas 7 and 13, inaugurated in 2008.

Medellín has become a model for other cities to adopt the cable car system for transportation in favelas. One example was the cable car of San Agustín in Caracas, designed as an important integrator between the favela and the rest of the city. In January 2010, the system started was connected to the subway.

In contrast to Medellin, the Metrocable system in Caracas is characterized with large stations that integrate cultural facilities, sports arenas, and shopping centers together in one convenient location.

The estimated daily demand during the planning stages of the project was 15 thousand passengers. Approximately 40,000 people live in San Augustin which means that the demand estimate would amount to 37.5% of the residents. The data in 2012 showed that only 4,500 passengers use the system daily, about three times less than expected, showing that the cable car, which cost 318 million dollars, is being underutilized.

In Rio de Janeiro, in the favela Morro da Providência, there is a cable car
built and because the *favela* is considered the first *favela* in Rio, current projects by the municipal government show that there is interest in promoting tourism and to integrate it with the dynamics of cultural and historical revitalization of the port area and the cable car is the vehicle proposed for this purpose. However, the *Hill of Providence (Morro da Providência)* is suffering from forced evictions, mainly due to the Morar Carioca project, an urban program of the city government.

These interventions have not been discussed with the residents and involve the demolition of nearly half of the residences. The idea is to replace the residences with a historical and cultural center in the *favela*. According to the city administration, about 42 houses block, in the context of urban landscape, the view of the chapel located at the highest point of the hill and thus those 42 houses would have to be removed. Although the construction of the cable car has also caused the removal of a few houses, its implementation is linked more with tourism in the *favela*.

Various resident led protests organized with activists and supported by critical news sources released in Brazil and abroad, put the Hill of Providence in the spotlight as an example of the negative impact of mega-events on the poor. Consequently, after the injunction obtained in a lawsuit, the projects in the community are at a standstill and the houses that were scheduled to be removed remain standing.

In Rocinha, the PAC 2 (Accelerating Growth Program is a federal program that has as the main objective the development of the country through the planning and execution of large urban infrastructure, works in the transportation sector and the energy sector) provides for the cable car installation, an elevator, escalators, and other mobility infrastructure. This project is very controversial because the cable car project has an estimated budget of 700 million reais, an amount that would consume approximately 44% of the total amount available for the PAC 2. Most debate is on the residents' priorities, which if considered would require that the funds be applied to the sanitation of the *favela*, which the current project does not guarantee.

In the project under study, the cable car will connect to the future subway station of Line 4 in São Conrado to the top of the *favela* and have 6 stations distributed in two lines, 2,500 meters long. This would be the third cable car built in the *favelas* of the city, reflecting a state trend to adopt this transportation method
in favelas. It seems that cable cars are more than a modal of mass transport, but also as a way to enter favelas as a new tourist attraction of the city.

Chapter 3

In Chapter 3, the case study is presented about the cable car of Complexo do Alemão, an integral part of PAC. The cable car was built with 3.4 km in length, 152 cabins half of which are in regular operation, while the other half is parked. The system has six stations and the capacity to carry 30,000 passengers daily. The path between the first transfer station with the train, the Bonsucesso Station, and the last stop, the Palmeiras Station, is traversed in about 20 minutes. Using other means of transport, the time to travel the distance between these two places is about 40 minutes.

The six stations are located on the tops of hills that form the intricacies of the favelas and therefore, many residents complain about the accessibility of the system. For those who live far away and do not see advantage in climbing the hill to use the system, it is more common to use van or motorcycle taxis to move around. This is the main reason that the cable car is underused even though residents are entitled to two free trips per day. According to the Supervia, which operates the system, the daily movement of people is about 10,000 to 11,000 people, but, as we reported, the equipment has been design for a capacity of 30,000 passengers per day.

The construction of the cable car cost the government R$ 210 million, equivalent to 22.35% of the total PAC work in Complexo do Alemão, and the operating cost is about R$ 50.1 million a year. What we can conclude is that the cable car has a relatively high operating cost for low use by residents, and it is also expensive to build.

The high investment in the cable car is not justified when there are still major problems to be solved in favelas. One of the main complaints made by residents is the lack of investments in priority areas, such as basic sanitation. As part of this research a survey was given to 50 residents. When asked if the resources used to cable car execution, being very high, could be implemented in other areas, 74% said yes. Among the responses on areas where resources should be invested, they pointed mainly to sanitation, health and education.

Some health problems in the favelas worsened while tourism has increased
with the use of the cable car. Also according to the data from the Supervia, the percentage of passengers with gratuities, i.e. registered residents using the cable car during the week is 75% and the percentage of those who paid the fare, mostly tourists, is 25%. On weekends, the number of visitors almost doubled: 54% of gratuities and 46% of tourists. The cable car has always had a tourist appeal due to its comfort and excitement by offering the experience of getting a suspended adventure of great heights with a privileged view of the *favela* landscape. This also happens with the cable car of the Complexo do Alemão, but in another context, within a patrimonialization effort of those spaces.

**Chapter 4**

The research makes clear that even with the difficulties within a space precariously built, mobility solutions that were initially created by the residents are still the most used, for example, the alternative transport system like vans and motorcycle taxis.

To establish that the cable car is the solution for urban mobility on slopes of slums is quite questionable, as each case requires a specific and detailed study. In the case of the Complexo do Alemão, for example, both positive and negative factors were found. On the one hand the cable car considerably reduced the Bonsucesso travel time to some community points and provided connection with the train, on the other, the number of users contained does not justify its high cost. It is also clear that the general population in *favelas* want more primary rights met like access to health care, the installation of sewer systems, and competent schools as their priority.

**Keywords**

Cable car; Complexo do Alemão; slums of Rio de Janeiro; urban mobility; social impacts; urban planning.