

A STUDY OF THE PEDESTRIAN PUBLIC WAYS IN SÃO PAULO CITY CENTRE, BRASIL, FOCUSING ON WHEELCHAIR USERS

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ABSTRACT

There are today some 600 million people in the world with some kind of locomotion restriction. Of these, 25 million live in Brazil. The concepts of appropriate accessibility and universal design are intended to promote the social integration of the handicapped. This paper examines pedestrian public circulation ways in the downtown area of the city of São Paulo, including the accesses to the main combined transport system – bus and subway – by wheelchair users. Sidewalks should fulfil their circulation function with comfort and safety. Limiting or excluding specific users from these public spaces displaces a part of the social function of the city – the rights of any citizen to come and go as they please. The National Public Transport Association of Brazil aims to improve the accessibility of the public transport system and pedestrian ways. This paper's objective is to evaluate the accessibility conditions not only from the technical point of view, but also mainly concentrating on the behavioral aspect, using the Post-Occupancy Evaluation (POE) method. The focus is on the evaluation of wheelchair users and their needs as they interact with these spaces. POE is the process of the actual evaluation of the performance of buildings or spaces as they are used by humans. A POE involves assessing psychological needs, attitudes, organisational goals, changes and human perceptions. A POE measures the functionality and appropriateness of the environment and establishes conformance with the performance requirements as stated in the functional programme. This paper therefore studies the effects of public circulation spaces and their transport accessibility on users. Walking safely and comfortably has to be treated as a basic human right.

KEYWORDS: Post-Occupancy Evaluation; accessibility; wheelchair; downtown São Paulo

1. INTRODUCTION

Inadequate accessibility to, and the minor concern shown for the universal design of São Paulo's public open spaces, makes it difficult for wheelchair-bound citizens to achieve social integration. Besides the user functions, e.g. circulation and leisure, public spaces have a social relationship aspect, and by limiting or excluding certain users from these spaces, the city fails to accomplish its social function. In this context, *accessibility* is defined as the ability to use, safely and independently, buildings, spaces, furniture and urban facilities (Associação Nacional de Normas Técnicas, 1994); and *universal design* is the creation of places and products that can be used with to their maximum (www.rotadaliberdade.com.br 2004).

The basic rules of universal design involve not only technical and design issues, but also behaviour: how to accommodate a large anthropometrical range, in other words, people of different physiques and in different positions (tall, short, standing, seated, etc.); how to reduce the effort needed to use products and the environment; how to change the environment and make it more understandable (signs, colours, etc.); and how to integrate products and the environment so that they become part of a system.

The performance of an activity depends on the interaction between the user and the environment. Integration of the users' needs with the architecture and traditional design programmes plays an important role in reaching the universal design principles. According to Jacobs (2000), the sidewalks, the uses that limit them and their users are active protagonists in urban life. Urban safety is a fundamental function of the city's streets and their sidewalks. Trust in the street is created over time, starting with countless small public contacts on the sidewalks. Public contact and safety in the streets together have a direct relationship with the social problems of segregation and racial discrimination. "Seemingly unpretentious, useless and aleatory, the contacts in the streets constitute the small change starting from which exuberant public life of the city can blossom" (Jacobs, 2000).

Public space can join or segregate, and to accomplish its social function, it is necessary to provide not only social integration of several groups or communities, but also accessibility for all of them. An *alive* sidewalk has continuous use due to the functional physical diversity of uses and the consequent diversity of users and their schedules.

The urban free space system can be divided into: a) public roads: pedestrians and vehicle circulation – sidewalks and streets; b) public leisure and recreation free spaces: cultural functions, recreational and contemplative, such as squares and urban parks; c) free spaces (public or private): environmental conservation and preservation – parks and reservations; and d) private free spaces: gardens, back yards, lawns, terrains, parking areas, private parks (Menneh, 2002).

Pedestrians are gradually having their right to come and go eroded while other players in the traffic system and the urban environment are increasing. According to a document published by the National Association of Public Transportation (Associação Nacional de Transporte Público, 2003), in Brazil insufficient attention has been given to the need of pedestrians to walk in comfort and safety. Traffic engineering has the technology and appropriate tools to solve flow and vehicle safety problems and to prioritise public transport, but does not devote adequate attention to pedestrian movement.

The main objective of this research was to analyse pedestrian movement in the public space of São Paulo's downtown area mainly from the perspective of the wheelchair user. Within the whole system of pedestrian circulation, the research focused on the sidewalk, pedestrian streets and the ways of squares.

The methodology consisted of researching laws, norms, references and the field of research based on Post-Occupation Evaluation (POE). The following methods were used:

- a) walkthrough (where previous research is recognised, to identify the main physical characteristics related to the research),
- b) survey of the users of the urban space to make a qualitative assessment of the use of the space,
- c) setting up a photographic register,
- d) kerb ramp mapping.

In the social sciences, evaluation research aims to systematically collect, analyse and understand information regarding the implementation and efficiency of any human intervention so as to optimise the social and communal conditions. Post-Occupation Evaluation is regarded as an efficient feedback mechanism for similar projects and global quality control of the built environment.

According to the 2000 Census, the number of disabled people in São Paulo is one million. Throughout Brazil there are 24,5 million, representing 14,5% of the population (www.ibge.org.br 2005). The types of disability are shown in Table 1.

Table 1: Percentages of people with some type of disability or difficulty

Total population of Brazil	169 872 856
Some disability	24 600 256
Mental retardation	2 844 937
Tetraplegia / paraplegia / hemiplegia	937 463
Lack of a limb	478 597
Sight impairment	16 644 842
Hearing impairment	5 735 099
Locomotion difficulty	7 939 784

Source: IBGE, 2000.

In 2003, research by the National Association of Public Transportation estimated the average sampling values of the costs associated with traffic accidents involving pedestrians and cyclists, but not motorised vehicles (Table 2).

Table 2: Pedestrian and cyclist accidents in the urban area of São Paulo

Description	Value
Homes visited	354
Residents interviewed	1 426
Pedestrian and cyclist accidents per 1 000 people	11,2

Source: ANTP, 2003

The pedestrian circulation system is used by several types of people, including people with mobility difficulties, such as people dependent on wheelchairs or crutches, people with temporary or permanent disabilities, senior citizens, pregnant women, obese people and short people.

2. AREA DELIMITATION - SÉ AND REPÚBLICA DISTRICTS

São Paulo's surrounding downtown area comprises 10 districts: Sé, República, Bom Retiro, Santa Cecília, Bela Vista, Consolação, Liberdade, Cambuci, Brás and Pari. The city's immediate downtown area is made up of two districts, Sé and República.

Activities in the downtown areas by day are intense and contradictory, and the transitory population is much larger than the residential population. Two types of uses are perceptible: the formality of services versus the casualness of the streets (Figure 1). The presence of basic public services in the area is well known, but the weakness in the residents' protection has caused a reduction of the downtown population. Figure 2 shows an example of an architectural barrier – no kerb ramp.



Figure 1: Veridiana street - sidewalk space reduced by street vendors in front of the Santa Casa de Misericórdia de SP Hospital. Photo: SHTV/2003



Figure 2: Route from the hospital to the subway station of Santa Cecília – without kerb ramps close to the pedestrian crossing. Photo: SHTV/2003

Sé and República district information:

- Total area: 4,4 km²
- 69 977 inhabitants (0,7% of the population of São Paulo)
- 50% of the residential population at an economically active age
- 65% of the population earn up to 10 minimum wages
- 17% of the population above 40 years of age
- 30% of the population lives in the streets of the city (10 500 people)
- Destination of 29% of the public transport of the city
- 2 million transient people/day
- 8% of the formal employees of the city

Source: PMSP

3. WALKTHROUGH – PHYSICAL ASSESSMENT OF THE STUDY AREA

Figures 3 and 4 and show examples of the poor conditions in the area, such as the surfaces of the sidewalks and the pedestrian streets.



Figure 3: Gutter in poor state. Photo: SHTV/2004



Figure 4: Sé square, loose granite slabs. Photo: SHTV/2004

In some cases it could be verified that there had been an attempt to eliminate the barrier of the different levels of the ground with kerb ramps; however, as shown in Figures 5 and 6, it is not enough to build a ramp if the interface between the ramp and the street is still a large obstacle due to the water puddles accumulating through inadequate drainage, or due to a surface full of holes.



Figure 5: Kerb ramp not aligned with the street. Photo: SHTV/2004



Figure 6: Kerb ramp according to the norms, but the street surface is full of holes. Photo: SHTV/2004

The kinds of sidewalks identified in downtown São Paulo are: cemented, ceramic, granite, tiled, mixed (concrete slab and granite), mixed (Portuguese mosaic and granite), Portuguese mosaic, and paving slabs and stones. 128 pedestrians ways were visited (streets, avenues and bridges) to evaluate, besides the surface type, their state of repair. An evaluation was done of both sides of the road to give a total of 256 sidewalks. Of the 128 streets, 11,7% of the length had sidewalks in good condition, and the remainder were classified as regular and bad, needing repair and improvement.

4. BEHAVIORAL EVALUATION OF THE PEDESTRIAN CIRCULATION SYSTEM

According to the 2000 Census for the State of São Paulo (there is no information on the disability category per city in 2000 Census), 37 035 456 people were interviewed, of whom 18 139 662 were men and 18 895 793 were women. Of these, 193 401 had tetraplegia, paraplegia or hemiplegia. Of this group, 55,53% were men and 44,47% women.

During September, October and November of 2003, test questionnaires were applied to pedestrians (wheelchair users and non-wheelchair users) in the area of Sé and República. In all, 55 questionnaires were applied: 21 to wheelchair users and 34 to non-wheelchair users. The final questionnaire was applied from April to November of 2004 in the same study area. There were 159 questionnaires: 73 for wheelchair users and 86 for non-wheelchair users. Some results of the questionnaires are presented in this paper.

The results of the questionnaires reveal that in the group of wheelchair users, only 21,9% were women, while of the non-wheelchair users, 51,8% were women. Comparing this information with the 2000 Census, where there is no significant difference between disability in females and males, it was found that in downtown São Paulo, a difference does exist, i.e. for various reasons, very few woman wheelchair users go to downtown São Paulo as shown in Figure 7.

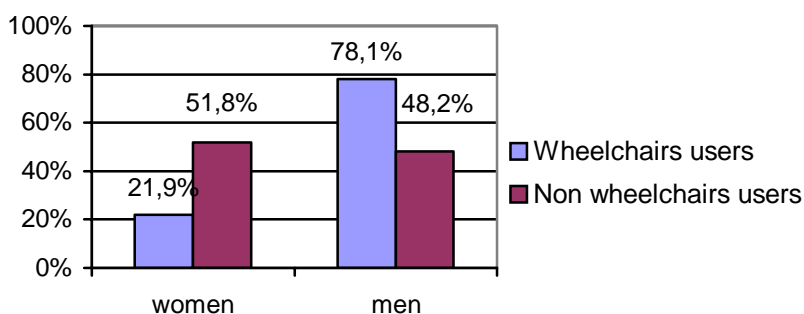


Figure 7: Wheelchair users' gender profile

According to the verified profile, the wheelchair users who utilise downtown São Paulo belong to a lower socio-economic category than the non-wheelchair users who were interviewed (Figure 8). The numbers shown in Figures 7 and 8 prove that the circulation spaces of the study area cannot be included in the concept of universal design: women wheelchair users do not risk going to the downtown area and the wheelchair users group with a family income above 3 on the minimum national salaries scale is small, that is, they do not use the sidewalks of downtown São Paulo. The answers showed a combination of factors, but it can be stated that there are certain groups that do not use the downtown circulation spaces.

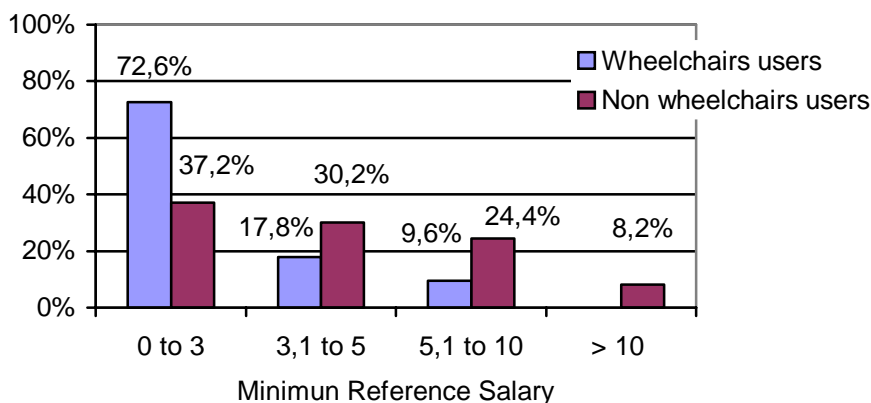


Figure 8: Family income per month

The questionnaire results showed that both the wheelchair and non-wheelchair users considered that the holes and level differences were the main obstacles in the circulation space (Figure 9). It was assumed that the wheelchair users would regard as obstacles on the sidewalks the street furniture or the stands of the street vendors due to the small free space available for wheelchairs. However, the numbers show that other details, e.g surface maintenance (loose slabs, holes, drain grills) are more important factors for pedestrians, whether wheelchair users or not. The results of the users' satisfaction regarding the number of kerb ramps in downtown São Paulo for both groups were not entirely negative.

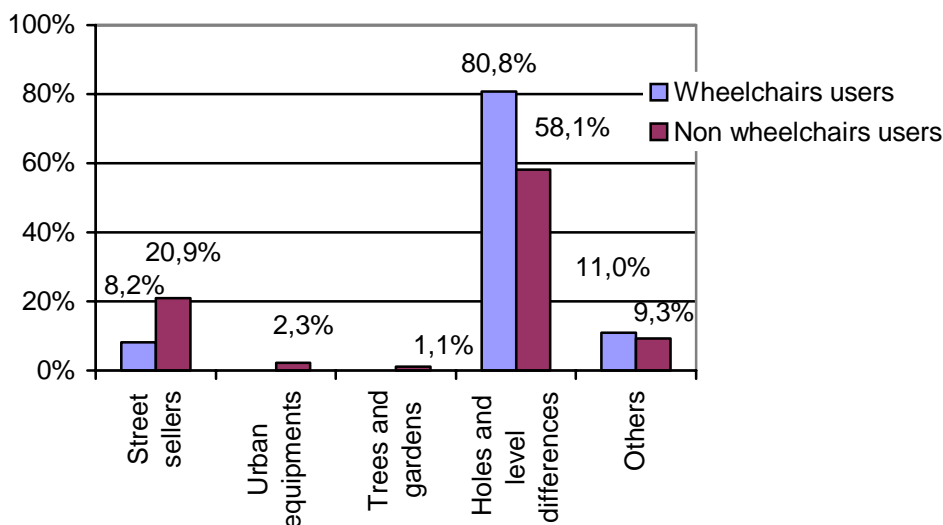


Figure 9: Main obstacles on the sidewalks

5. PUBLIC TRANSPORTATION ACCESS – INTERVENTION REFERENCES

In the second semester of 2000, the São Paulo Metropolitan Transport Department (STM) (Associação Nacional de Transporte Público, 2003) created a programme to include people with physical disabilities in the metropolitan public transportation system. The objective is to improve the general accessibility conditions by the year 2020.

Although the assessment focus is the wheelchair user, the concept of universal design is accessibility for all, including those with other impairments such as sight impairment. In this sense, it is worth pointing out that the pilot programme of accessibility in the São Paulo subway initially focused on sight impaired people and the first station in the programme was Marechal Deodoro. The norms of the ABNT (Associação Nacional de Normas Técnicas, 1995) were followed, and improvements were made including warnings on the floors using different textures and colours for route orientation between the station access and the boarding platform - a pioneering initiative in Brazil.

Projects such as these are pilots, and it is still necessary to make a lot of adaptations for the wheelchair user to use the subway in all stations. Although stations such as Santa Cecília and Barra Funda have special elevators for disabled people (Figure 10) as well as ramps with warnings, stations such as Sé, which connect two of the main subway lines, are not accessible to wheelchair users, as they have neither elevators nor ramps. Contradictions exist: in a station with an elevator, the gap between the train and the boarding platform is larger than the front wheel diameter of a wheelchair, which denies unaided access as shown in Figure 11.



Figure 10: Elevator in subway station for disabled people. Photo: SHTV/2003



Figure 11: Gap between the train and the platform. Photo: SHTV/2003

The renovation of the bus stops, which was done together with the paving of the sidewalks of Av. 9 de Julho, shows how it is possible to make a space more accessible. There were two main alterations regarding accessibility: the pedestrian crossing is continuous, i.e. the sidewalk that separates the tracks was lowered and warning signs were put up, and the bus stops are higher with platforms (with access ramps) on the same level as the first step of the bus door. Initiatives such as these are new in São Paulo and should be extended to the rest of the city.

6. MAIN RULES AND NORMS

The main norms and rules that refer to accessibility in Brazil are: NBR 9050/94–ABNT, the building code (Código de Obras e Edificações) (Bloch and Botelho, 1999), kerb/sidewalk

ramps: Act no. 9.803/84, Act no. 12.117/96, Decree 37.031/97 (regulates Act 12.117/96); kerb ramp execution norm (CET / CPA).

The Permanent Accessibility Commission (CPA) in São Paulo was created in 1996. It is directly subordinate to the House and Urban Development Department (SEHAB). The main objective of the CPA is to provide access for disabled or people with reduced mobility to public and private buildings, roads and public spaces, transportation and urban facilities. The CPA's work consists of eliminating the architectural barriers by applying the universal design concepts to ensure social inclusion.

Ordinance no. 27.505 of 1988 regulates the following articles of Act 10.508/88: article 17 - "those responsible for property, built or not, bordering on public roads and streets with kerbs have to build sidewalks along the length of the property"; article 18 - "the sidewalks should be maintained in perfect order, to provide pedestrians with safety and protection, and also to comply with aesthetic or harmonious aspects"; article 23 - "the sidewalks should be continuous, without abrupt changes of level or inclinations that may hinder pedestrians' safe travel, and observe, whenever possible, the levels of the immediately adjacent sidewalks that have already been built."

7. PROPOSED ACTIONS

In 2004 in São Paulo, there were many works of "revitalisation" of urban spaces, among them the Municipal Theatre which had the pavement re-built. Many kerb ramps were also built in a broad extension of the area, as shown in Figure 12. Another case was the alteration of the surface of the sidewalks and the installation of pre-molded kerb ramps in João Cachoeira Street carried out by a partnership between private and public enterprises (Municipal City Hall, the Brazilian Association of Portland Cement and the merchants of the neighborhood). These actions should be followed by the other administrative areas as well as by architects and professional engineers.



Figure 12: Crosswalk at the same level of the road in front of the Municipal Theatre.
Photo: SHTV/2005



Figure 13: João Cachoeira Street. Pilot project with pre-molded kerb ramps.
Picture: SHTV/2005

Despite the fact that Ordinance no. 27.505/88 (Bloch and Botelho, 1999) is clear regarding the owners' responsibilities concerning the sidewalk, the lack of maintenance of the surfaces and the unevenness were pointed out as major obstacles to pedestrians, both wheelchair users and otherwise. One possibility is to change the responsibility for pavement maintenance to the municipal district, which would result in continuous surfaces, as can be seen in the renovation projects of downtown São Paulo. Another possibility would be enforcement of the law.

Ferreira (2004) points out a lack in the Brazilian norm: accessibility without discrimination, based on NBR9050–ABNT, is restricted to the interior or useful area of houses or buildings. The norm contains few comments about accessibility and communication with external areas or the environs of the houses or buildings and completely disregards sidewalks. As a part of the system, the sidewalk should allow entry to all access points of the building. It is necessary to review the norms and to obtain financing for the accessibility construction work, because the questionnaires show that the main barrier to the wheelchair user is not the lack of kerb ramps, but the bad construction - once completed the spaces are considered accessible, whereas they are in fact not.

8. CONCLUSION

According to a United Nations report, Brazil is viewed as the country with the most advanced legislation regarding disabled people of all the Americas, followed by the United States and Canada. However, there is a great gap between the legislation and the day-to-day activities of disabled people. On the other hand, the fact that little attention is paid to pedestrian circulation issues is one of the reasons for the current situation. According to ANTP (Associação Nacional de Transporte Público, 2003), it is necessary to keep in mind that a project for a pedestrian system not only involves schemes that provide safe walking, but it is also necessary to consider the walking comfort, the time spent covering the distance and the energy required to use the proposed structure.

Caring about the displacement of pedestrians and including wheelchair users must be viewed not only as a traffic safety problem, but also as a welfare, health and life quality issue. It is necessary to make a commitment, guaranteed by public resources, regarding public sidewalks, which includes lighting, signage and signals and accessibility for those with any kind of disability.

9. REFERENCES

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