

# “Reasons for car use growing in the various population income segments”

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**ABSTRACT :** This paper presents an assessment about the socio-economic transformations taken place in São Paulo City, watched through the car use growing in the various population income segments.

In the 90s, car use growing took on an outstanding position in most Brazilian cities. Besides an official encouragement towards car purchasing, there was the fuel price stability which led to the externalities caused by the car use growing, such as congestion, pollution and traffic accidents.

The car use growing trend associated to public transport abandonment has been confirmed by the findings of the last Origin – Destination Survey carried out in São Paulo Metropolitan Region, every ten years. Not only is such increasing due to predominant car use by the highest income segments, but also by the lowest ones.

Taking into account that phenomenon, indicative of changes in population displacement pattern, this paper has as its purpose to go into deeper the reasons for car use evolution so that the transference from public to private transport can be better approached into the various income segments of the population.

For this assessment, we have considered the income as the most important determining factor for people to take trips. The data related to the trips by car, as the principal mode and their associated purposes. The users profile driving private cars classified into gender, age, level of education, condition and line of work, families and car ownership- have been assessed under the family income focus. In order to characterize “income”, the stratification in income quartiles has been adopted which are values that classifies the families into four stratum so that each quartiles represents 25% of families. Therefore, the first income quartile is representative of 25% of families having income up to the value of that quartile. The second one is also the average of the total household income surveyed.

In order to have a broader picture of the trips in the São Paulo Metropolitan Region, the findings of the Origin/Destination Surveys from 1967 to 1997 have been studied, as well as a comparative analysis of the car use in the 1987 and 1997 surveys, focusing São Paulo City.

The criteria adopted by the Metro / SP is defined as the displacement between an origin and a destination with a precise purpose. Many of the trips include the use of more than a one mode of transport, being regarded as the principal mode the one of greater “hierarchy” among all used for the same trip. The modes hierarchy is defined by the structure of each one of them. The public transport is represented by metro, suburban trains, bus and vans. As for private transport, by cars, motorcycles, taxi, bicycle, lorry and others.

## **1 PRIVATE TRANSPORT AND SOCIO-ECONOMIC TRANSFORMATIONS**

The analysis about the socioeconomic transformations taken place in the São Paulo metropolis, watched through the transport demand phenomenon and having as reference the findings of the Origin/Destination Survey, portray that from 1967 to 1977 most of the trips used to be taken through motorized modes – buses and cars mainly – whereas from 1977 on, the car use has increased and the public transport has decreased.

From 1967 to 1997, the motorised trips tripled from 7,1 to 20,6 million, with more moderate increasing over the last two decades. The most significant change occurred in the trips modal split, with a growing participation of the private transport, from 32% to 49%, mainly by the car use. Thus, the public transport participation decreased from 68% to 51% due to the less use of buses.

The automobile fleet increased sixfold , from 0,5 million to 3 million, such increasing was greater than the population one. As a result, the motorization rate also increased from 70 to 184 cars per each thousand inhabitant.

The metropolitan population, currently 16,6 million inhabitants, more than doubled, even presenting lower growing rates. Among the 39 municipalities which comprise the Metropolitan Region, São Paulo City, accounts for over than 60% of the total

metropolitan region and grew 0,4% per year , in the last decade.

Employment also registered upward tendency in the SPMR in the last decades, rising from 3,9 to 6,9 million over the period 1967/1997. The metropolis economy underwent changes due to the significant increasing of employment in the tertiary sector (commerce and services), rising from 68,6% in 1987 to 77,4% in 1997.

However, new occupations have been created with the advance of the services sector, the unemployment rate reached 9,2% in 1987, rising to 16% in 1997 according to the Employment and Unemployment Survey carried out by SEADE. The effects of such rates might have diminished the populations mobility and led to new forms of employment as well, mainly non-formal market.

The average family monthly income registered by O/D Surveys shows an increasing around 34%, from 1987 to 1997., The average family income evaluate from R\$ 1.186,00 to R\$ 1.593,00 in the SPMR and from R\$ 1.310,00 to R\$ 1.743,00 in São Paulo City. In spite of these values have reached to a similar income level presented in 1977, It has to be considered the greater participation of women in the job market, as a significant fact .

The population mobility in the metropolitan region has been decreasing since 1977, regarding motorised trips . The rate fell from 1,53 to 1,23 trips per person. When mobility according to cars ownership is analysed, we realise that it grows as the number of cars per family grows, however, the rate has been falling over the years.

Some hypothesis try to explain such fall on mobility disagreeing on the presumption of transport economy, which sets a positive relationship between income rising and mobility rising. Among them the impact of the economy of services on the population behaviour regarding the way of consumption of goods and services. “Delivery” services or shopping centers which concentrate a varied number of activities ( leisure, commerce and services) in a same place likewise many of the activities of workers in the services sector don’t imply in frequent displacement.

Another factor which might be “concealing” the population mobility is the methodology for trips checking. The case of people with an activity demanding many displacements, such as drivers and delivers, just the trips from home to the first place of work and trip back home were considered.

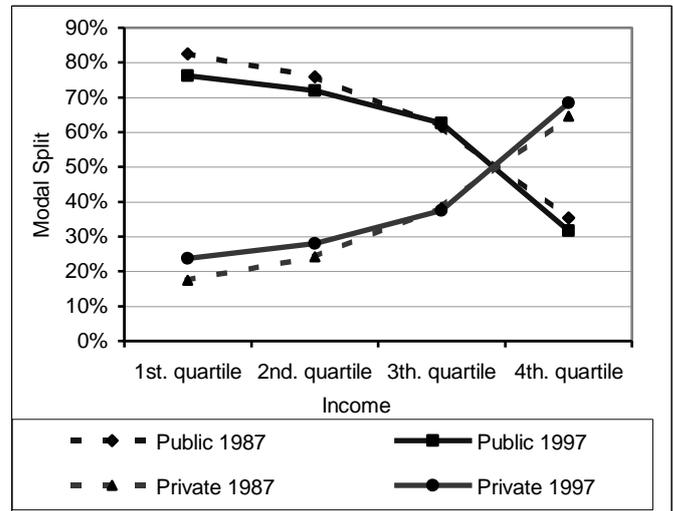
## 2 TRIPS BY CAR

For a comparative analysis between the Origin/Destination Surveys of 1987 and 1997, the

trips of the car drivers, as principal mode, in São Paulo City were considered.

By assessing modal split per income quartile over that period, an increasing in the private transportation and falling in public transport in the total motorization trips were realised, due to a little transference to the car use by the lowest income stratum (1<sup>st</sup> and 2<sup>nd</sup> quartiles).

### Modal Split per Income Quartile – São Paulo City – 1987/1997



The analysis of the number of trips and users per family income shows that both the trips and the number of car drivers are still predominant in the highest income group (67% of the trips, and 65% of users are in 4<sup>th</sup> quartile), however, such habit increased among the lowest income groups. Both the number of trips and users increased more among those in the second income quartile (from 7,6% to 9,8% trips and from 8,7% to 10,4% users), and among those who are in the first quartile (from 2,8% to 3,5% trips and from 3,1% to 3,8% users) according to Table 1.

**Table 1. Trips Percentual Distribution and Car Users per Income Quartile MSP - 1987 and 1997**

Income	(% ) Trips		(% ) Users	
	1987	1997	1987	1997
1st.quartile	2,8	3,5	3,1	3,8
2nd.quartile	7,6	9,8	8,7	10,4
3th.quartile	21,2	19,6	22,5	20,3
4th.quartile	68,4	67,1	65,6	65,4
<b>Total</b>	<b>100,0</b>	<b>100,0</b>	<b>100,0</b>	<b>100,0</b>
<b>Base</b>	<b>3.761.022</b>	<b>4.144.248</b>	<b>930.807</b>	<b>1.189.604</b>

Origin/Destination Survey - Metro - SP

However, the number of trips each car user takes daily was decreased for every income quartile. The general average decreased from 4,0 to 3,5 trips per user. That is to say, the number of users grew more than the number of trips. The traffic jam factor and the difficulties for parking may have led to a decreasing in the number of displacements.

Table 2. Number of Trips per Car users per Income Quartile - MSP

Income	Trips		Users		Trips/Users	
	1987	1997	1987	1997	1987	1997
1st.quartile	105.834	145.349	29.075	45.753	3,6	3,2
2nd.quartile	287.217	406.518	81.394	124.257	3,5	3,3
3th.quartile	795.717	812.083	209.396	241.582	3,8	3,4
4th.quartile	2.572.254	2.780.298	610.941	778.012	4,2	3,6
<b>Total</b>	<b>3.761.022</b>	<b>4.144.248</b>	<b>930.807</b>	<b>1.189.604</b>	<b>4,0</b>	<b>3,5</b>

Origin/Destination Survey - Metro - SP

Although the growing percentage in those two factors has been negative for every income quartile, it is smaller at the second one. Hence, the relationship between one factor (trips) and other (users) results in a negative increasing rate for all the income quartiles, being smaller at the 2<sup>nd</sup> quartile, the same group where the number of users grew more.

Table 3. Trips Percentage Growing and Car Users - MSP-

Income	Trips Growing	Users Growing	Trips/Users
	(%)	(%)	(%)
1st.quartile	37,3	57,4	-12,7
2nd.quartile	41,5	52,7	-7,3
3th.quartile	2,1	15,4	-11,5
4th.quartile	8,1	27,3	-15,1
<b>Total</b>	<b>10,2</b>	<b>27,8</b>	<b>-13,8</b>

Origin/Destination Survey - Metro - SP

When the trips and users percentage growing variation is analysed, it is possible to verify very high rates at the 4<sup>th</sup> quartile (54,3% of trips), and at the 2<sup>nd</sup> quartile (31,1% of trips). The lowest variation was verified among those at the 3<sup>rd</sup> quartile, group whose trip pattern was not altered substantially.

Table 4. Trips and Users Increasing and Participation per

Income	Income Quartile - MSP- 1987 a 1997			
	Trips		Users	
	Increasing	Δ %	Increasing	Δ %
1st.quartile	39.515	10,3	45.753	6,4
2nd.quartile	119.301	31,1	124.257	16,6
3th.quartile	16.366	4,3	241.582	12,4
4th.quartile	208.044	54,3	778.012	64,6
<b>Total</b>	<b>383.226</b>	<b>100,0</b>	<b>1.189.604</b>	<b>100,0</b>

If on the one hand the trips whose purpose is industry fell, on the other hand the service purpose ones rose dramatically in all income segments. Among those with family income at the 2<sup>nd</sup> quartile, the trips percentage per commerce, health and education purposes were also significant, what can be an indicative of social conditions improvement for this segment, even it is known that they are included among those who have lost their jobs in the

formal market and are now working in the informal sector, by selling goods in the streets.

Such hypothesis seems to confirm when the trips per purpose is analysed. This way, at the 2<sup>nd</sup> quartile, the commerce purpose trips had the biggest increasing (93,8%), and at the 1<sup>st</sup> quartile, the service purpose trips rose 64,4% higher when compared to the other quartiles.

Table 5. Trips Increasing per Purpose ar Income Quartile MSP - 1987 and 1997

Income	Industry	Commerce	Services	Education	Shopping	Others	Health	Leisure
	Δ%	Δ%	Δ%	Δ%	Δ%	Δ%	Δ%	Δ%
1st.	-48,3	13,6	64,4	46,7	17,6	23,9	191,2	30,8
2nd.	-25,3	93,8	48,7	103,2	24,5	13,0	118,6	5,6
3th.	-34,1	-9,3	35,9	16,7	22,9	-11,0	-22,1	-24,1
4th.	-32,1	32,8	27,7	38,2	-4,5	-0,7	17,6	-39,2
<b>Total</b>	<b>-32,2</b>	<b>25,7</b>	<b>32,0</b>	<b>37,5</b>	<b>3,9</b>	<b>-1,0</b>	<b>23,7</b>	<b>-31,2</b>

Origin/Destination Survey - Metro - SP

#### 4 CAR USERS PROFILE

In order to characterise the car users profile, the driver's data were taken as parameter, while the car passenger's were dismissed, whose purpose of trip is mostly associated with education.

Car users are mostly men, but women started driving more (from 27% to 30%), due to their greater participation in the job market.

Regarding the income, the percentage of car users aged 23 to 49 years old (working life) is significant (73%). The number of users is higher (29%), mainly, between 30 and 39 users, and lower at the youngest and oldest bandage.

As expected, the level of education of the car's user increases as the income gets higher. Users who have completed elementary school or college fall mainly into the highest income quartiles (65%). However, the level of education improved mainly in the first three income quartiles, from 1987 to 1997.

Mostly (83%) have regular professional occupation, increasing the number of the occupied gradually. Besides that, the presence of housewives diminished from 8% to 5%, what can be an indicative that they fell into the occupied category.

Both services and commerce are the sectors of economy where the car users work, whose performance demand more displacements, maybe. The percentage of industry workers reduced from 23% to 15%.

The car owner's families has creased. The lowest income families owing one car rose from 13% to 19% at the 1<sup>st</sup> quartile, and from 24% to 34% at the second one, but most of them continues not owning any. Among the higher income group (4th. quartile), the families who has more than 3 cars increased from 6% to 8%.

## 5 REASONS FOR CAR USE GROWING

Beyond any doubt, the automobile use has taken a special value in São Paulo City, as showed above. The reasons for such scenario are not restricted to credit facilities nor to the mere impulse for consumption and status or even the relative flexibility that cars can provide. Actually, over the last decades, the administrative management of our cities have not corresponded to an integrated urban policy, regarding habitation, health, education and transportation.

The investment history in São Paulo City has shown a great expansion in the roadway system. From 1967 to 1975, 27% of the whole budget were spent to build and maintain the system ( Vasconcellos, 1988). After 1980, the rate has decreased but roadway works of great dimension have still been built.

The growing in car use is also associated to the reduced participation of the high capacity public transport systems. The metro system was expanded from 16,7 Km in 1974 to 43,6 Km in 1992. Since then, only 6km have been put into operation.

Since the implementation of the automobile industry in Brazil in the 50's, the number of vehicles has grown significantly: from 987 thousand in 1960 to over than 25 million in 1996. In São Paulo City, the fleet has grown from 493 thousand to 3,0 million, mainly due to the implementation of a plan for economic stability and inflation controlling recently.

If on the one hand the public transport policy and its due compliance haven't resulted in improvement in urban mobility, on the other hand the changes in both productive structure and land use may have contributed towards significant changes in the urban transport trip patterns.

As the baseline conditions for that scenario, the following items are highlighted:

- The process of progressive industrial disconcentration to other regions of the country and the growing in economy outsourcing ( services and commerce) which lead to new forms of commercialization and services sophistication;
- Growing in unenemployment rates and economy informalization as new form of employment;
- Increasing in working bonds volatility, by changing from the "salary age" to the free-lancer one, with tendency towards worsening in the ocupacional structure;

- High patterns of occupational mobility of the job market, occuring low stability and high turn over;
- Maintenance of the urban growing expansion in the outskirts, reinforcing the shortages in public transport once the investments have

## 6 CONCLUSION

The fact of the São Paulo population seek more and more private alternatives, such as automobile and vans as a substitutive for the car , is also a reflection towards better social conditions and equity. An image survey carried out by ANTP – Public Transport National Association in July 1999 with transport users, portrayed that in their opinion, the existing transportation system, whose basis is BUS, does not meet the citizens needs, and what's more causes a feeling of humiliation and contempt. Besides the car, symbol of status and freedom, the general desire is to count on means of public transport serving the whole city, preferably rail – based systems. The Metro's case, considered positively by the transport users, is regarded insufficient for the size of the city.

Thus, the spread of the public transport railway, mainly rail-based as systems as metro, serving all the city, with institutionalised mechanisms of physical, operational and fare integration should be expected, and while it doesn't come true there's no perspective to introduce an intermodality system.

What still remains to be seen is whether or not "automobile", as model of support for the displacement strategies adopted by governments and population as well, is threatening the quality of urban life. By taking into account only the pollution analysis, cars are responsible for 90% of all pollutants in the air, and emissions are still greater at congestion situations.

In case of this situation has been maintained, the tendency is to increase the negatives externalities such as traffic jams, pollution and traffic accidents.

## 7 Bibliography

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