

Urban Transportation: Technology and Culture

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ABSTRACT

Transportation systems and issues in the United States and Mexico are analyzed and compared to show culture is more important than technology in policy issues.

INTRODUCTION

This paper is about the cultural differences in transportation between Mexico and the United States (US), and how transportation is changing according to national policies in both countries. Although some of the issues regarding the cultural part could be considered sensitive, I consider important to mention them to show how different the transportation cultures are and also how different the two countries really are.

U.S. and Mexico are a unique combination: one is the most developed and technologically advanced in the world, and the other is a still developing third world country. Despite this, they have something in common: the border. It is the border that binds the two countries and stimulates them to find opportunities for partnering. It is necessary to recognize the differences between them so once you cross the border, we can begin to smooth some of them and learn to respect each other.

Once you cross the border, the differences are evident. The first one is Anglo-Saxon – European heritage of the U.S. and Mexico's peculiar mix of Spanish and Indian syncretism. Following is the language since, the U.S. has the largest English speaking population. One starts with the structure of the cities and the respect each country men has to road signals and traffic lights. Even the schedule for meals is different!

Of course, the most notorious one is the economic difference; the peso has devaluated in respect with the dollar more than 10,000 times since the beginning of this century. More recently, the inflation in the U.S. has been controlled not the dramatic cyclic case of Mexico. Thus living in the U.S. is economically comfortable. For example, gasoline prices in the U.S. have not gone up, in 16 years, the 30% they have in Mexico in just the last seven months.

THE AUTOMOBILE CULTURE

In Mexico, but more in the United States there are examples that we are living in the automobile culture. As Schiller and Bruun [1] claim, our children learn how to ride in a car before they learn how to walk.

This is more noticeable in the United States. For example, a lot of services can be obtained by driving through in a car. If you need some money you go to a bank teller and withdraw money by just extending your arm to touch the bank machine. If you are hungry and eat fast food, there is no need to get out of your car. You can order pick up and eat your food in your car. If you need to go to the laundry, you can deliver your clothing from your car and pick it up in the same way. In these days the car is used as a dining room, a living room, and in some cases, even a bedroom. Obviously it can be a hotel, too, and for some homeless people it is a priceless home.

For land transportation, gasoline is the most important energy fuel. Mexico as well as the United States would like to use it more efficiently. In the US, gasoline is a very important issue of national security, because the United States imports oil. This was obvious in the war of the Persian Gulf, whose unstated main objective was to assure safe passage of the fuel across that region of the Middle East. In the US as well as in Mexico more than 44% of the energy is consumed in the transportation sector (Fig. 1). And it will be very difficult to curb the use of a car because driving is cheap (Fig. 2) and because of the necessity for people to move from one place to another. On the average, gasoline in the US costs around \$1/gallon, in Mexico it costs around \$1.5/gallon. Saving fuel is one of the main reason for developing better car technology, the other is to reduce pollution. It is obvious, however, that saving energy can not be achieved by using only technology. Since 1973, the year of the oil embargo, the efficiency of the cars has improved by a factor of two. Having more efficient cars probably has meant that more people spend more time in their cars. People can make more trips and ride longer distances spending the same amount of money on fuel, as few years ago for shorter distances (Fig. 3). The amount of quality time of the drivers with the family might not have increased but just transplanted from the home to the car.

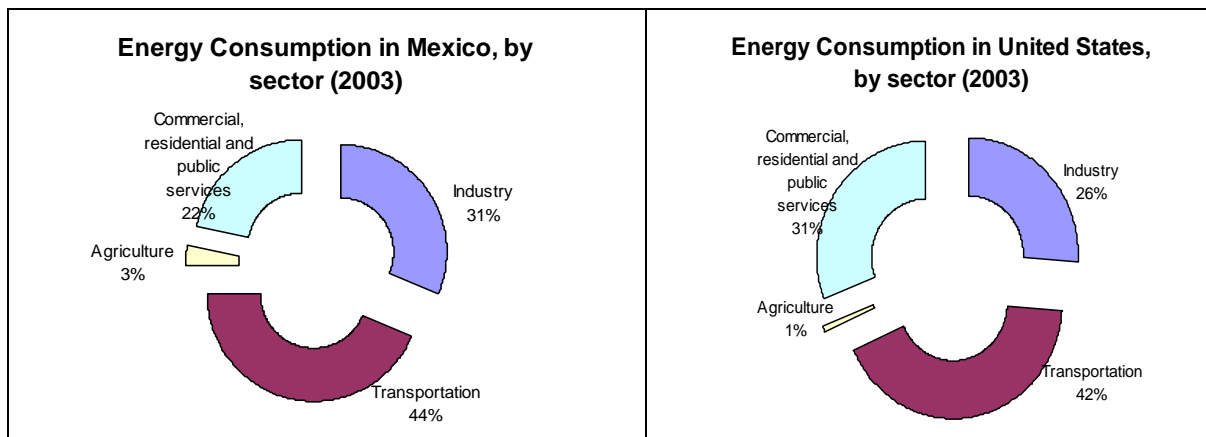


Figure 1. Energy consumption structure in Mexico and U.S. (IEA Energy Statistics, 2003).

Gasoline prices from 2003 to 2005

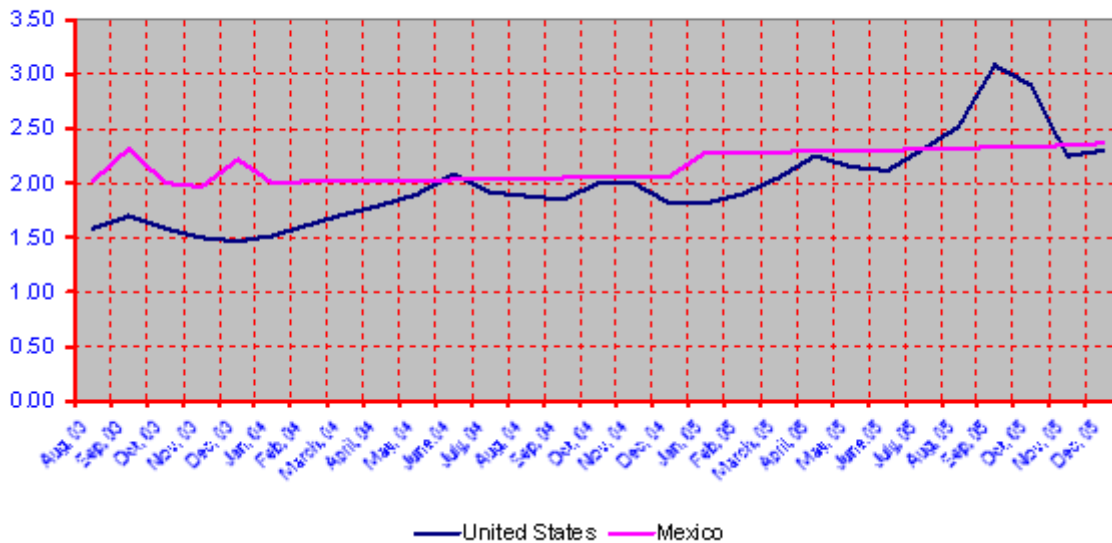


Figure 2. Gasoline prices in Mexico and the US (2003-2005).

Since the beginning of 2005, U.S. retail gasoline prices have been generally increasing, with the average price of regular gasoline rising from \$1.78 per gallon on January 3 to as high as \$3.07 per gallon on September 5, as Hurricane Katrina further tightened gasoline supplies. But the hurricane is only one factor, albeit a dramatic one, which has caused gasoline prices to rise in 2005.

A major factor influencing gasoline prices in 2005 was the increase in crude oil prices. The price of West Texas Intermediate (WTI) crude oil, which started the year at about \$42 per barrel, reached \$70 per barrel in early September. Crude oil prices rose through-out 2004 and 2005, as global oil demand increased dramatically, stretching capacity along the entire oil market system, from crude oil production to transportation (tankers and pipelines) to refinery capacity, nearly to its limits. With minimal spare capacity in the face of the potential for significant supply disruptions from numerous sources, oil prices were high throughout 2005.

In addition, Hurricane Katrina had a devastating impact on U.S. gasoline markets, initially taking out more than 25 percent of U.S. crude oil production and 10-15 percent of U.S. refinery capacity. On top of that, major oil pipelines that feed the Midwest and the East Coast from the Gulf of Mexico area were shut down or forced to operate at reduced rates for a significant period. With such a large drop in supply, prices spiked dramatically. Because two pipelines that carry gasoline were down initially, some stations actually ran out of gasoline temporarily. However, once the pipelines were restored to full capacity and some of the refineries were restarted, retail prices began to fall. Increased gasoline imports in the fall of 2005, in part stemming from the International Energy Agency's emergency release, also added downward pressure to gasoline prices. However, retail prices are likely to

remain elevated as long as some refineries remain shut down and the U.S. gasoline market continues to stretch supplies to their limit¹.

Evolution of Gasoline Consumption

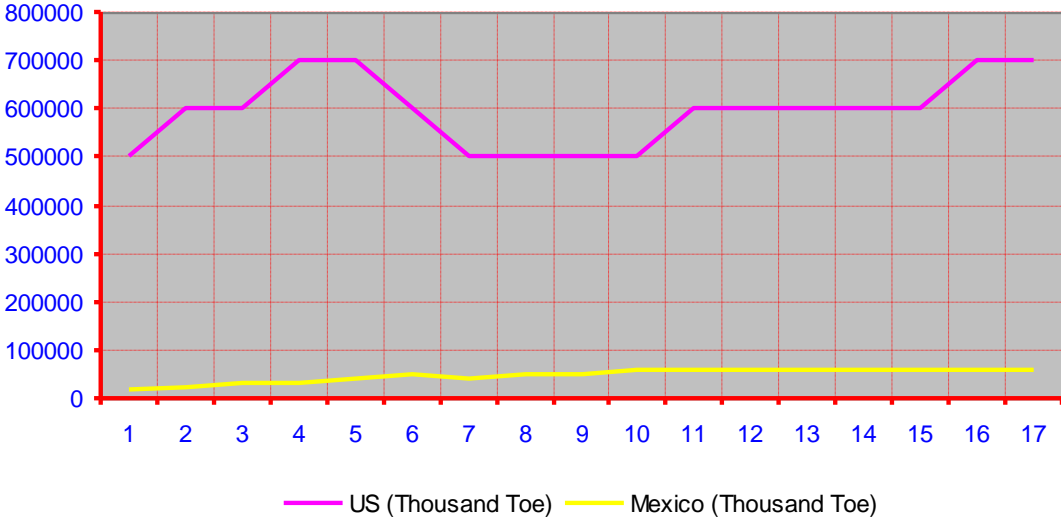


Figure 3. Evolution of gasoline consumption in Mexico and US (1971 to 2003).

Owning a car is a desire for most people who have no car. And, many years ago was difficult to ask those who have never owned a car to continue in that way, because there are a lot of new credits to buy a new car, and there is not any politics to stop this growing. In the United States there is a car per each two inhabitants; in Mexico it is one car per 11 inhabitants. The car population in Mexico has increased dramatically in the last 15 years. It is in the developing countries where not only the people's population is growing the most, but also the car population. Actually, the car population is growing faster than human population (Fig. 4). The prices of new and used cars are also more or less the same in both countries. Besides being a necessity, in both countries a car is a symbol of prestige, of power.

¹ Energy Information Administration (<http://www.eia.doe.gov>), 2006.

New cars sales vs population growth in Mexico

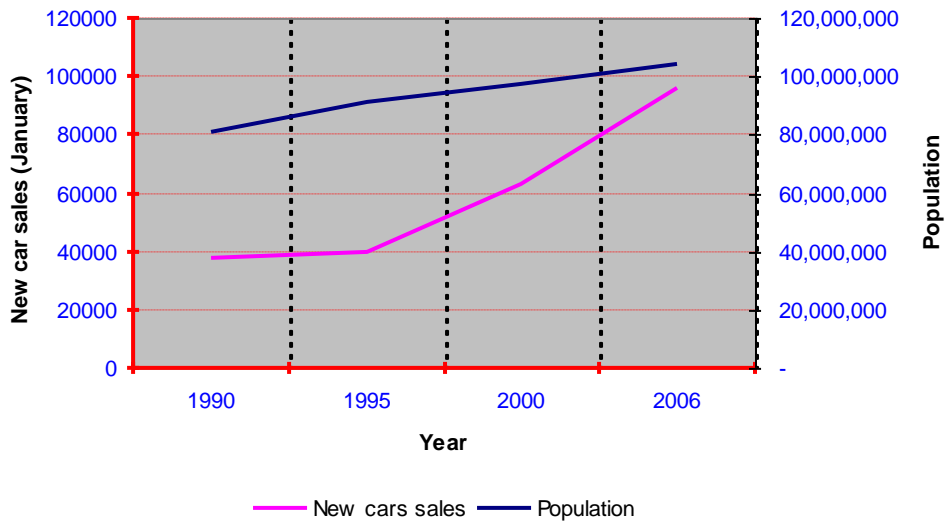


Figure 4. New cars sales² vs. population growth in Mexico³ (2006 information was calculated with a growth rate annual average)

Population vs GDP

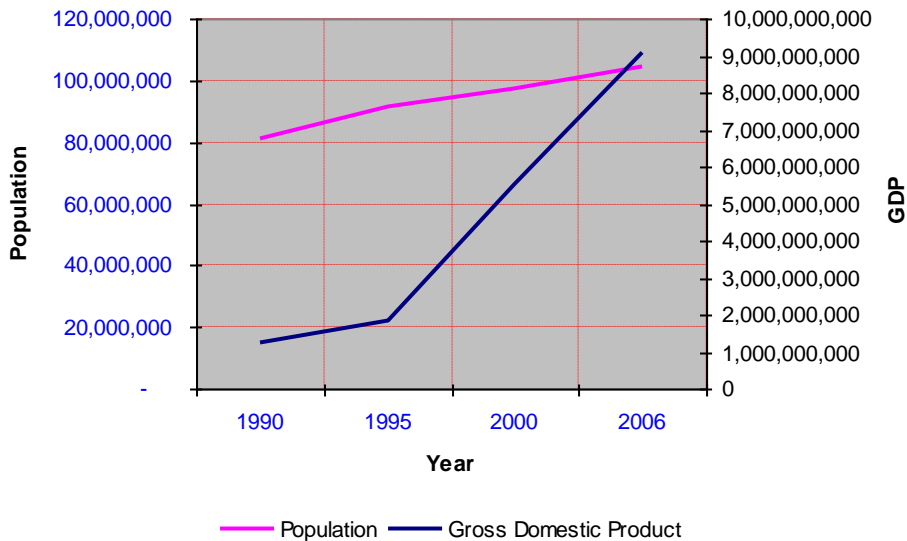


Figure 5. Population vs. Gross Domestic Product³ (2006 information was calculated with a growth rate annual average)

In the United States, robotics technology is a lot more advanced and in use at the gas pump. You can pump gasoline by yourself in the so-called 'self-service' gas

² Mexican Automotive Manufacturers Association, (<http://www.amia.com.mx>).

³ National Institute of Geography, Estadística and Informática (INEGI), 2000 (<http://www.inegi.gob.mx>).

stations, in which basically you do all the work. You just need to go inside of the store to pay for it. Or pay with credit car at the pump. If you want somebody to pump gas for you, it is a lot more expensive.

By contrast, in Mexico there are few self-service stations. Most of them are 'full service', somebody does the work and at the end you give a 'small' tip. Those are full time jobs; also there are people whose jobs are to wash cars, or to clean the windshield of your car on the street while you wait for the green light. In the United States there are not as many people as in Mexico performing these last two activities. It's a matter of lower wages and of Mexico not having an unemployment program.

Driving in both countries is rather comfortable. In the United States most of the highway network was constructed more than 20 years ago. The highways in the US are better than those in Mexico because of security and continued maintenance. In both countries is easy to reach almost any place without paying a toll for driving on the roads from one place to another.

In several US cities, there are special lanes called "high occupancy vehicles (HOV's)". Cars transporting two or more persons are considered high occupancy vehicles. Driving in those special privileged lanes is very convenient. There are stories of people who have used dollies to be able to use such fast lanes. In Mexico there are no such HOV's, but some public transport travel in special lanes in high traffic roads even in opposite direction to the main traffic flow.

People in both countries would like to have the best car according to their economic capability. Obviously, if the cars were more efficient and environmentally friendly, they would buy them, if they could afford them. And there is no apparent reason why people would curb driving. Actually, there is no reason even for the governments of either country to curb driving, unless there is a national emergency.

WALKING

In small towns of Mexico it is easy to see people walking. Most people walk to church, markets, schools, municipal palace, etc. In the United States -even in 'small' towns- the distances from the business centers to the residences can be enormous. They can easily be in the tens of miles. Typical medium and even small cities have of a downtown and residential areas where people live that are far from the downtown area. The supermarkets are somewhere in between. In big cities there are not many people living in the downtown. There is even the concept in the United States of the so called 'inner city', which is by no means the best place in town to live because of more crime in there. The big cities all look alike and they are becoming even more similar in the US as well as in Mexico.

Given that fuel is relatively inexpensive and that the distances in the cities in the US are usually large, it is obvious that walking is not for transportation purposes. It

does not take long to realize that the US cities were not designed primarily for pedestrian traffic. Obviously US people walk, but most rather do it as a form of physical exercise, not to “get somewhere”. There are even motorized devices, which are sold ‘to walk at home’, in which you can walk without moving from the area of your device inside your place. Even, in some supermarkets in the US, walking is also an option. There are small motorized cars you can drive for shopping inside the stores.

PUBLIC TRANSPORTATION

1) Transit Buses

Just by riding a bus in the United States you get the flavor of the economic power of the country, the technology, and the different climates. The buses in the US have both air conditioners and heaters because the climates are extreme in most of the country.

In some US cities, city buses are very punctual, you can set your watch by them. If they are late, it is only for just a few minutes. The public service in the US is superior to the one in Mexico. Actually they cannot be compared. They serve people with different economic resources and needs in different environments. For example, while it is true that in the United States the service is punctual, bus service generally is not provided on weekends, or late into the evenings. Besides that, in many US cities the number of bus routes are restricted.

In Mexico City, the buses have changed a lot as the city has grown. This seems to be part of several planning experiments. For example, there were the classic green buses of the seventies, then the larger so called “dolphins”; later, the minibuses and microbuses, and lately, the regular sized buses seem to be coming back. Minibuses stop at half block have a rude driving style and have contempt for authority. Minibuses in Mexico have discounts for students and some do not charge senior citizens for the ride. In the US there are discounts for senior citizens for a few services, and they may also be discounts for students.

Services to handicapped or physically impaired persons are treated differently in the two countries. There is a law in the United States which states that handicapped persons should not be discriminated against in any way. Therefore, in the US it is easy for a person in a wheel chair to reach practically any important place in most public buildings. In the US there are a lot of cars, mainly vans, which have motors to elevate or lower wheel chairs. Furthermore handicapped people use public transportation.

Public transport fares

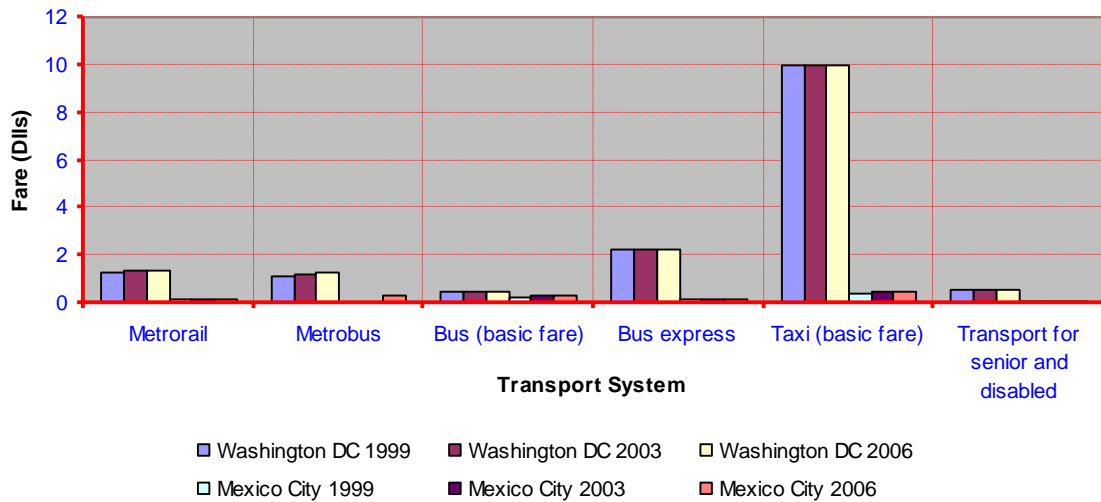


Figure 6. Public transport fares in Mexico City and in Washington D.C. from 1999 to 2006.

In Chattanooga, TN electric buses are manufactured. Actually, there are a handful of electric buses in full operation in that city. These electric buses make trips between a nice old train station (not in use anymore) and the downtown. Those electric buses have one door to the right of the driver for the people to enter. They are beautiful, clean, and quiet. The chassis is very low, so there is only one step a person has to make to enter. Furthermore, the bus drivers can lower the step to street level so that handicapped persons can enter the bus without any problem. In Mexico the design of buses is different because there are too many stoppers (bumpers) on the streets of Mexico City. The electric buses would need two doors because are usually crowded.

There is a laboratory of electric bus at the National Autonomous University of Mexico (UNAM). This laboratory is at the Institute of Engineer. The electric bus already under demonstration is very different from the one in the Chattanooga, the chassis is not low. There was more than one step to enter the bus. It has two doors and the interior of the bus has about 16 seats. And will allow people to ride standing up. It is obvious that it has been manufactured in Mexico. The bus will transport people no taller than 2 meters high, and the chassis is high enough to pass over the bumpers of the streets of Mexico (Fig. 7). Handicapped persons in a wheel chair are not usually transported by any transit bus in Mexico. Thus, there is no need of special equipment in the bus for them to enter or to be transported.



Figure 7. Electric Bus built by UNAM

US buses are very important in US history. In the United States a few decades ago the white people who rode the transit buses sat in the front rows of the buses while black people sat in the back seats. Furthermore, black people entered through the front door to pay for the ride and then they had to go out of the bus and enter through the back door of the bus to get to their seats. That was by law. And if a black person was sitting and there was no seat for a white person, the black person had to stand up and give up his/her seat to the white person. That was the law. The point from analyzing this example is that if public transportation is not affordable, not comfortable or restricted, some people will not use it.

2) Colectivos - Peseros

It is very interesting how Mexico has some unique solutions for some problems. For example, the colectivos. These are vans and small trucks converted into small buses transporting from eight to thirty people and serve only prearranged routes.

The peseros arose from a transportation need that the public government system could not handle. According to a poll made in 1994, 57% of the total travels made in México City were carried out in peseros and taxis. Nowadays, there are almost 25 thousand registered units, and this kind of passenger transportation has the following characteristics: overload in rush hours, bad operating conditions, inadequate management of routes, no fixed stops and traffic congestion in customary stops for passenger load and unload places.

The maintenance in these units is only corrective so there are pollution problems associated to the use of this transport mode, the approximate length covered by colectivos is of 22 thousand kilometers with around 520 routes and almost 6 thousand branches, 60% of which have intersection with a Subway station. The peseros are also called minibuses. In the US, there are limousines providing a similar service but for very special routes (e.g. airports to hotels) and they are not too much cheaper than taxis.

3) Taxis

The US cabs are equipped with high tech. They use radios to communicate their route. This equipment may also help to reduce crime against taxi drivers. In

Washington D.C, you can get printed receipts from the driver with the information of the trip. The fares are higher in rush hours.

In some US cities most crossings you can turn right even if you have a red light in front of you and if there are no cars driving in the lane you want to enter. This saves gas and time. In Mexico, you can do that too.

Taxi rides in Mexico City are very expensive compared to other public transportation, but very cheap compared to those in the US. The fares, are about one third of those in the US. People mainly use taxis in Mexico during pay days, or in short routes. The taxis in Mexico City were mainly volkswagen bugs which highly contaminated the city (Fig. 8). Currently, the government established a program to change the vehicles, improving the air quality (Fig. 9).

This transportation mode operates in two ways. First there are the units that have no fixed itinerary and circulate most part of the day empty generating traffic and pollution problems with a low transport capacity, in 2003 there were 96 645 of this units called "libres". Second, there are the cabs that have a "base" from which they leave when someone phones or boards in this place, there are 9 997 of this units.

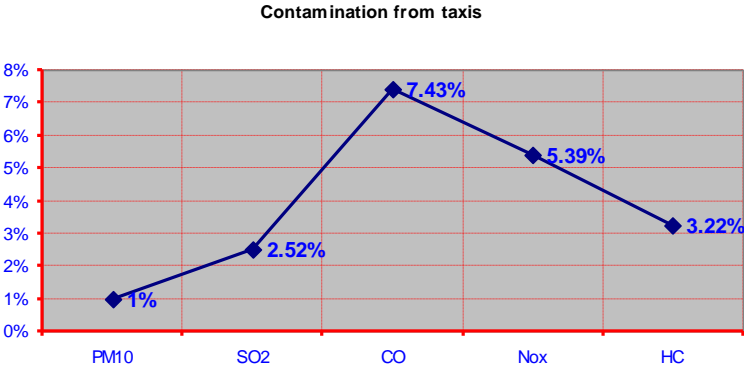


Fig. 8. Contamination from taxis (1998)

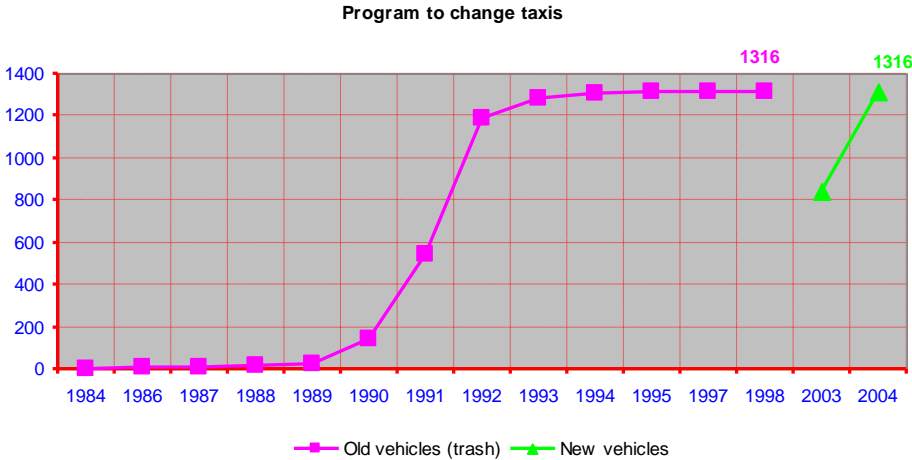


Fig 9. Evolution of program to change taxis (accumulated)

4) Metro (Subway system)

It is obvious that the Metropolitan Subway Service in Mexico is very efficient. It transports about 4.6 million people every day. It is also very cheap: 20 US cents a ride, no rush hour fare, and fare does not depend on the length of the ride. The metro cars are also very clean. This service is so cheap because it is subsidized by the City government at around 400,000 dls/day. The idea that longer trips should pay more is unattainable in Mexico City, because the travelers that make longer trips are the ones with less money. In the US, the subway works very differently. Let us use the example of the metro in Washington D.C. The fares depend on the hour and the length of the ride. Obviously during the rush hours the metro in DC as well as in Mexico are very crowded. The metro service in the US is at least about 20 times more expensive than in Mexico.

The system has 100 routes with a length of 4, 413.3 km.

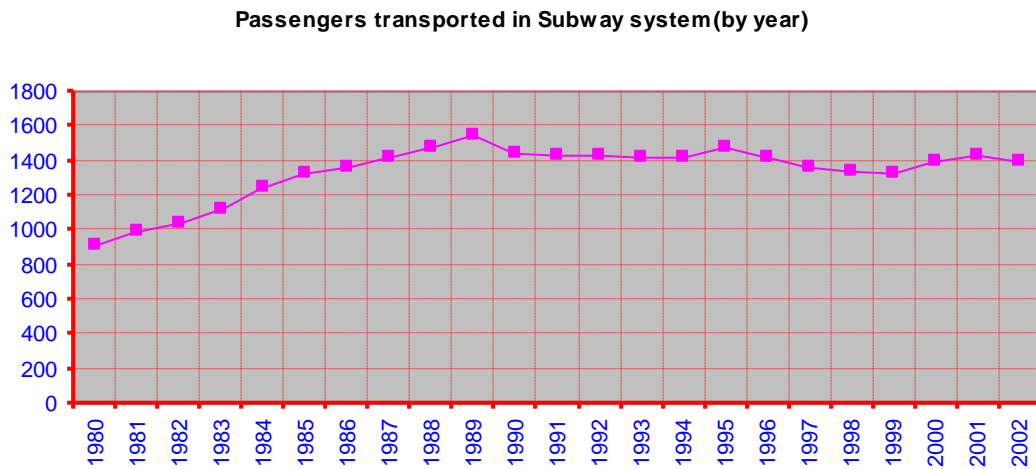


Figure 10. Passengers transported by Metro (Subway)

5) Metrobus

In 2002 the Mexico City's Government got a resources from Global Environmental Fund (GEF) to develop an integral strategy of sustainable transport in some strategic roads runners.

The government began its strategy in Insurgentes Avenue, introducing "the metrobus", this system runs since Indios Verdes to San Angel with modern buses, with right of way and stations of service to give a secure and dependable service.

The project includes to eliminate de traditional public transport service to increase the average velocity.

The buses are articulated units, with a length of 18 meters and 160 passengers of capacity, its average velocity is 20 km/hr. The fuel that utilized the buses to be diesel and the engines will include environmental certification Euro-III. The system to pay for the trip will be with “smart card” (Fig. 11). Figure 12, shows the general process of collection at Metrobus Insurgentes.



Figure 11. Metrobus “smart card”

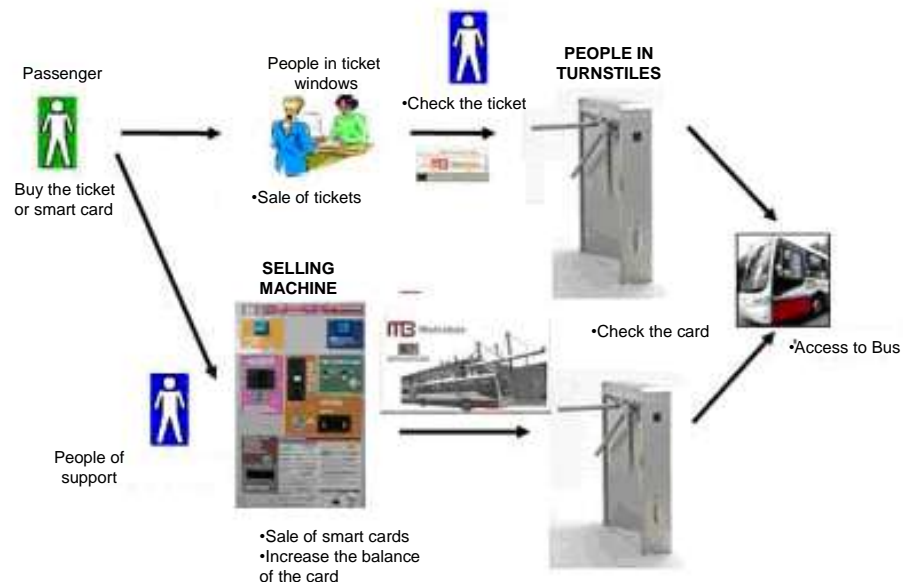


Figure 12. General process of collection at Metrobus Insurgentes

THE ISSUES ARE VERY COMPLEX AND INTERTWINED IN MEXICO CITY

There is no other city like Mexico City. This can be understood by listing some its characteristics:

- * Has automobile congestion equal to that of New York City
- * Has truck traffic equal to a major distribution hub like Chicago
- * Has the petrochemical industry on par with Houston
- * Has the government activity equal to Washington D.C.
- * Has a release of 11,700 tons of pollutants into the air each day

* Has a population of children living on the streets comparable to that of Sao Paulo, Brazil

All this in the most populated city of the world. One-fifth of Mexico's population is located in the city itself. About three-fifths of the nation's automobiles are driven here. And Mexico City uses 150 times the national Mexican average for energy per unit area. All these information has been taken from the report by the Los Alamos-Instituto Mexicano del Petroleo on the Mexico City Air Quality Research Initiative [2]. Obviously, Mexico City offers an excellent test bed for the energy and environmental technologies being developed. The City government is serious about improving the air quality of Mexico City. Mexicans have an integrated plan to improve the air quality of Mexico City [3]. Their budget to implement that plan is around \$12B dls.

The following list represent issues which are also opportunities for the US and Mexico to work together:

*Over 39.9% of all Mexican end-use energy is used by the transportation sector

*Air pollution in Mexico City exceeded health limits 350 out 365 days in 1992

*Mexico City is home to an estimated 20 million people

*3.3 million cars, 106,642 taxis; 3,904 "combis"; 20,855 microbuses; 4,482 transit buses operate daily in Mexico City

*No centralized traffic control exists, only for signal traffic, controlled by computer (approximately 1900 intersections).

*Over 76.7% of Mexico City's air pollution is from the traffic

By looking at the list of issues, it is easy to realize that the issues of energy, environment, and economy are complex and intertwined in Mexico. Where do the environmental issues end? Where do the energy issues begin? Is it possible to achieve sustainable transportation in Mexico City? Everything comes together: energy, environment, economy, and education. Obviously, the health problems created by the pollution originated in the transportation systems are costly. And despite all these problems, the city lives, it does not stop.

REGULATIONS

There is interest to have clean cities in the world, and for governments to have the tools to promote or enforce regulations to manufacture low emission and more efficient cars. Unfortunately, some of the regulations cannot be enforced for several reasons. One of them is that car manufacturers are very powerful. For example in California, the California Air Resources Board (CARB) had a mandate to have 5% zero emission cars ready to be sold by 1998, and 10% by 2003. Unfortunately, the mandate for 1998, will not be enforced. In other US states and other countries regulations like these might be enforced. The US has taken the lead in proposing regulations. Unfortunately, it is the US which has also shown the failure to implement them. For example, CAFE is no longer enforced. Mexico, based on the example of the US, started a CAFE-like PREMCE regulations, with limited success.

A few years ago, Mexico came up with the policy of the “Hoy no Circula”, which means “Banning Driving.” The government came up with a policy in which driving would be banned one day a week for most cars in order to reduce pollution. Depending on the number on the plates, some of the cars would not drive one day a week. Just a few days after the policy of the “Hoy no Circula” was enforced, some Mexicans were buying extra cars, actually old cars, in order to avoid the banning. Because of the policy, the number of cars in the city increased. This is a very good example of how the policies and regulations should not only be technically but also socially, economically, and politically correct.

The private and public transportation problems in Mexico are so unique that if some solutions from other countries are blindly applied, there is no guarantee they will be successful. Mexico has to find its own solutions. Unfortunately, the planning and implementation of the solutions may take time, and the technology has to be demonstrated in the places where it is intended to be used.

TECHNOLOGY

Better technology might alleviate the transportation problems in the US, in Mexico, and -in general- in the world. Technology of course, is only one piece in the puzzle toward solving a complicated problem. US is the world leader in research and technology development (R&D). It spends about 44% of the world spending on R&D. US spends more money in R&D than Germany, Japan, The United Kingdom and France altogether (if defense R&D is included) [4].

Mexico followed with interest the so called US ‘clean car’ initiative. In this initiative the goal was to produce a car which would be three times more efficient than the present ones. This goal requires development and adoption of technology in several fields (e.g., electronics, alternative fuels, sensors, and lightweight high-strength materials). It is obvious that if the goal of the “clean car” has to be reached in about 10-15 years only proven technology will be included. New promising technology can not be developed and tested so quickly as to be considered to be implemented in the ‘clean car’. This initiative is opening possibilities for technologies to be developed or to be available, however, the risky ones, which might be the most promising ones, will not be included. At least not for the prototype of the ‘clean car’. It takes time to develop, demonstrate and commercialize technology.

This presidential initiative is a partnership among the US DOE National Laboratories -whose mission is the development of technology for US economic growth- the US automakers (GM, Ford, Chrysler) and the US government. There are similar initiatives in other countries, and some progress has been made so far. However, to reach the goal in a few years seems to be unrealistic, given the fact that the funding is small (about \$400 million dollars), compared to the funding for R&D for the internal combustion vehicles (several billion dollars). Critics have pointed out that it is possible to have one clean car, but not many. That it is

possible to have one clean car but not a comfortable one, and not a cheap one. At least not in the time frame of the present US presidential initiative.

Mexico is one of the world leaders in the use of electric cars. It has the largest fleet of electric cars (about 3000) in the world for distribution of food products. And it is making plans for replacing more internal combustion cars by electric cars for government use. Mexico with US technology has manufactured electric cars (trucks) for Mexico City. There is a lot of interest by the government of Mexico to develop Mexican technology in this area. The electronics and batteries have to be bought from the US, but the cheap labor in Mexico is a great advantage to reduce the total price of electric buses. The area of electric buses is one in which US/Mexico partnerships can be very productive. Mexico as well as other developing countries could be the leaders in this area in which the most advanced countries have been very conservative so far. In the US, for example, the funding for R&D for the development of electric cars cannot be compared with the funding given to R&D or even for publicity of the internal combustion vehicles [5].

Mexico will be a test bed for electric vehicles, as well as for natural gas fueled vehicles, which are also being considered. Currently Mexico is manufacturing electric cars (trucks) and has plans to export them to other countries. There are a few projects on electric cars in the Mexican plan to improve the air quality of Mexico City and on conversion to natural gas fueled vehicles.

Most of those issues have to be resolved before people will buy electric cars in large numbers. Those issues have not been resolved in the US yet. Obviously, the environmental benefits may make it possible to overlook the price and the other problems.

Another attractive technology in development which can help to save fuel and therefore reduce pollution is the Intelligent Transportation Systems (ITS). However, even in the US the most Intelligent Transportation Systems used nowadays, are the traffic lights, which were patented about 70 years ago, and the car radios. It is still the am/fm radios that are used to get news about traffic accidents and therefore to get recommendations for the best origin-destination paths to take. The most popular radio stations have their own helicopters to update drivers during the rush hours.

This is also true in Mexico, the ITS could be also used to alleviate some of the transportation problems in Mexico City. However, they are under development in the US and in other countries. They still have to be demonstrated. Obviously, Mexico could only buy at this point technology, which has been proven in the US, like centralized traffic signal control.

If Mexico wants to try high tech for its solutions in order to give a quantum leap, it has to buy it. Mexico can not develop technology without using technology base from outside, because the country lacks a strong one of its own. So far, Mexico manufactures cars, but does not develop them and that is the case for the

developing countries. On the contrary, the US is the leader in car technology development.

TRANSPORT and GREENHOUSE GASES

Mexico contributes with about 1% of the greenhouse gases produced in the planet and it is in the ninth place among the main emitters of the compounds which cause the climate change (Wolf Hafele.....). The transportation sector is the principal source of contaminants with 99.5% of the total of CO, 71.3% of NO_x with 54.1% of HC, and then with a smaller contribution of particulate matter and SO_x.

The production and commercial use of energy in Mexico generated in 1993, around 80 millions of tons of carbon. Estimates indicate that if the current rate of consumption of energy continues, the contribution of Mexico to the generation of CO₂ will increase in almost 40% by the year 2000 (Sheimbaum et al. 1996).

Regarding total emissions of CO₂ in Mexico, the transportation sector is the main emitter. Therefore, it is very important to analyze the trends of consumption of energy and greenhouse gases, for the future, in order to be able to define which the policies, regulations and norms must be to reduce the emissions of greenhouse gases from the consumption of energy in this sector.

It is important to point out that the statistics of generation of ozone concluded that it is transportation the main problem (and not LPG leakages). Therefore it is important to curb driving in Mexico City.

SAFETY

It is difficult to compare safety of transportation in both countries, because Mexico does not have as much statistics as in the US. The cars sold in Mexico are the same models sold in the US (see previous section), with some important differences, the main being the time lag between the two countries. However, the Mexican fleet is on average about 10 years old. This could be an indication that maybe driving in Mexico is more dangerous, but there are few statistics to support the statement. There is a noticeable difference in one of the components of the car population. In big cities of Mexico the population of Volkswagen bugs is very large.

The air bags, which are obligatory in the US, are not being enforced in Mexico. Safety belts have been enforced in Mexico only recently.

People in the US cross the streets more in the corners than in Mexico. Crossing in places different from corners is an obvious cause of many accidents.

People of a broad range of ages drive cars. In the United States it is common to see old people driving cars. Younger people drive, too. In the US older people drive safer than youngsters. The statistics are that 5% of the people who drive are teenagers, and 10% of the people who die in crashes are teenagers.

REMARKS

Regarding transportation there are differences between Mexico and the US. Those differences are a result of different cultures, different stages of technology development, different people's economic power, different regulations, etc.

Mexico and the US share 2000 miles of border. One can be pessimistic about the future relations between the two countries. The famous Mexican writer, Carlos Fuentes put their relation in this way: Mexico and the US so far from God and so close to each other [6]. The best way to have better relations is to communicate a lot more between the people of the two countries, and work together. If we try, we may find that we could get along better than expected. Sharing the solutions to the problems affecting the two countries could be a starting point. And later building partnerships to produce goods to be exported to other countries.

The market in Latin America and Asia for energy and environmental technologies is potentially enormous. Therefore Mexico even without NAFTA is important as a business partner. Mexico knows what the country will need in terms of technology, and US has the technology base. Both countries could work together pursuing mutual benefits. The global competition has changed the way business is conducted in the world, and partnerships are necessary in the new arena.

With NAFTA Mexico started giving national treatment to US investors, and intellectual property rights should be fully respected in the future. It is obvious that with the new laws, adoption of technology in Mexico can be implemented. Although of course technology it is only one of the ingredients of any possible solution to alleviate the tremendous transportation problems of the big cities. The issues are challenges, but at the same time are opportunities for partnership.

In transportation there are plenty of solutions which can be tried. Some can involve as little technology as possible. In that case imagination should substitute for the technology.

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