

TAXICAB OPERATIONS DESIGN FOR MEXICO CITY

by

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Licenciado en Ingeniería Mecánica y Eléctrica
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Submitted to the Sloan School of Management
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ABSTRACT

The purpose of this thesis is to come to a better understanding of the taxi service as a mean of transportation in order to apply their unique operation characteristics for the design of a taxicab service suitable for Mexico City.

Mexico City's taxicabs are seen as a complement to public transportation and a mean for replacing private transportation.

From the point of view of the social interest of Mexico City, the abuse on private transportation and the dangerous levels of pollution achieved in winter months call for the adoption of a series of policy measures to upgrade urban public transportation in which taxicabs are the efficient way to offer high quality radial, interconnecting services to complement public transportation and therefore induce the public to stop using private vehicles in the city.

In order to upgrade taxicab services in terms of the social interest of the public, it is necessary to make them a more effective mode of transportation.

There are many practical ways to improve taxi cab service. The improved taxi operation could be achieved not so much with the introduction of more licensed units, but rather through the more efficient use of existing taxicabs and the improvement of their service quality.

Given the opportunities for technical improvements, the taxicab industry can be subject to a phase of modernization. Despite certain financing constraints that are clearly to be expected, this transformation would enable taxicabs to intensify their use and make a significant contribution in urban transportation.

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Chapter 1

Introduction

Taxicabs are playing an increasingly important role in public transportation and each day they become more important for the development of effective urban transportation.

The purpose of this thesis is to come to a better understanding of the taxi service as a mean of transportation in order to apply their unique operation characteristics for the design of a taxicab service strategically suitable for Mexico City.

The material in this thesis is structured in such a way that it does the following:

- A) Gives a general background of taxicab services and gives some facts of the situation of Mexico and Mexico City's business environment;
- B) Looks at the operating environment of taxicabs;
- C) Examine the organizational implications related to taxicab operations;
- D) Analyses the industry and settles its strong and weak points;
- E) Proposes a taxicab concept for Mexico City and presents its marketing strategy;
- F) Summarizes the findings of the thesis and gives a number of recommendations.

1.1 Background of Taxicab Services

Mexico City's taxicabs are seen as a complement to public transportation and a mean for replacing private transport.

Taxicabs operate under a not fixed route and therefore are able to respond to the need for personal transportation on demand.

The essential characteristics of taxicab service are:

- The provision of a vehicle which is offered to the customer at given places or request, and;
- The option to chose destination by the customer.

In other words is availability and flexibility that makes taxi service different to all other scheduled public transportation services.

The organization of public transportation in fixed routes is a decisive factor that places taxicabs in a position to offer services between the city's main traffic routes, particularly during the peak periods.

This situation is partly explained by the extension and geographic distribution of the city; the concentration of economic and social activities in downtown and other specific areas in the south and the west of the city; and the concentration of industrial activity in the north of the city.

This situation accounts for the heavy passenger traffic within the surrounding suburbs as well as downtown. Therefore, giving a particularly active role for taxicabs, not only as occasional mode of transportation but also as a replacement for public transportation services in some instances (were infrastructure is non sufficient).

It is known that urban public transportation essentially has the function of:

- Providing transportation to people that does not have private vehicles;
- Supplying alternative services when planning requirements or infrastructure puts constrains in the use of private transportation;
- Convincing the population to give up private transportation either by offering high quality fast, comfortable, or low price public transportation.

Taxicabs are well suited to fulfill some of these functions, as well as to fulfill the lack of infrastructure and investment in public transportation.

From the point of view of the social interest of Mexico City, the abuse on private transportation and the dangerous levels of pollution achieved in winter months call for the adoption of a series of policy measures to upgrade urban public transportation in which taxicabs are the efficient way to offer high quality radial, interconnecting services to complement public transportation and therefore induce the public to stop using private vehicles in the city.

In order to upgrade taxicab services in terms of the social interest of the public, it is necessary to make them a more effective mode of transportation.

There are many practical ways to improve taxi cab service. The improved taxi operation could be achieved not so much with the introduction of more licensed units, but rather through the more efficient use of existing taxicabs and the improvement of their service quality.

Taxicab services must be changed from a technical standpoint taking into account profitability levels while taking appropriate steps to reduce spare capacity and increase the number of taxis in productive use (hire status), during day and nighttime.

Given the opportunities for technical improvements, the taxicab industry can be subject to a phase of modernization. Despite certain financing constraints that are clearly to be expected, this transformation would enable taxicabs to intensify their use and make a significant contribution in urban transportation.

1.2 Market Characteristics

Mexico City is the fourth largest city in the world in terms of population (after Tokyo, Sao Paulo and New York), with 15 million people (1990)¹. In the year 2000 it is estimated that Mexico City will be the biggest city in the world with a population of 24.4 millions. This implies that the city's demand for services and transportation will increasingly demand more resources as well as more efficient systems.

The taxicab industry in Mexico City is as big and concentrated as the city itself. The city has shown a continuous increase in taxicabs. It is estimated that 110,000 units are licensed, and the latest official numbers (1989)

¹Mexico Social 1990-1991, Banamex

indicate there were 105,000 licensed units in 1989 (compared with 170,000 units operating in 1991 in the United States (Gilbert 1991)).

Mexico City's population is expected to keep growing and the need for more efficient transportation systems is there. Nevertheless the higher the economic growth, the better the services that citizens will be able to afford and the higher the possibility for further innovation in the taxicab industry.

In order to have a clear picture of the external environment affecting the development, and understand the dynamics and potential of the taxicab industry in Mexico City, we need to understand what is the situation of Mexico as a country, which have been the latest changes and where is it going in terms of the economic situation of the country, labor force, employment, and wages and prices.

1.2.1 The Mexican Economy

For last years, Mexico has been under big reforms, and the Government is opening the country to democracy as well as to trade and competition.

Mexico is pursuing an economic strategy to achieve sustainable growth, but this is not new, the government has tried to achieve this goal along the years, having mixed results.

To understand the struggle for development it is useful to go back and see how did the Mexican economy changed up to date.

Between 1958 and 1970 Mexico enjoyed real economic growth averaging about 6.8% a year and inflation of 2.9 % a year. In no year of this period did the current account deficit of the balance of payments exceed 3% of GNP. However, the fruits of economic growth were unevenly distributed.

From 1970 to 1982, as de government pursue economic growth through higher public expenditure, protecting the peso and causing a massive capital flight. From 1983 to 1988 the economy collapsed and suffered the oil crisis and the effects of a huge external debt; in this period the economy grew by an annual average of no more than 0.1 percent experiencing high inflation rates.

Since 1973, Mexico suffered effects of high double and triple digit inflation (reaching 159% in 1987), and a continued devaluation of its currency.

From 1980 to 1981 the economy grew 17.8% while average annual inflation is 19%. The public deficit deteriorated, and increased from 7.5% of GNP in 1980 to 14.1% in 1981.

From 1982 to 1988, the public debt accounted in average for 12.6% of GNP while the external debt payments represented 5.6% of GNP. This resources transfer caused a slow down in the economy, which only grew 0.4% with an 88% inflation.

Since 1985, the government starts restructuring the economy, accelerating reforms (mostly after 1987), with an economic stabilization plan.

From 1989 to 1990, the first outcomes of the economic stabilization plan are seen in changes in the economic trend of the country. The economy grows (5.7%) and inflation falls (to an annual average of 25%), while there is a significant improvement in its financial performance (the public debt is reduced), and substantial rise in output and employment savings.

Overall, the program of structural reform initiated in the mid-1980s and intensified since 1989 has set the way for a more efficient and dynamic economy based on market signals while opening it up to international capital and competition, creating the conditions for sustainable economic growth.

The observed success of Mexico in the last years has to be attributed to the efforts of the Mexican Government and the support of the Mexican people. The authorities have been successful in supporting prudent financial policies, negotiating general agreements on prices and wages among the public sector, labor unions, and the private sector, providing this way an anti-inflationary anchor. In order to achieve sustainable economic growth, in the last years the government has done some structural reforms, including the tax system, the divestiture of public sector enterprises (more than 1,000 government owned companies have been privatized), and additionally, took measurements to liberalize its external trade and investment system, to enter into free trade arrangements, to liberalize and privatize its financial system, and to deregulate specific economic activities.

Mexico's situation has been showing impressive changes toward a more stable growth but it is still to prove that stability can be maintained and improvements in quality of life achieved.

The following table presents the main economic indicator for 1987-91 as well as the summary of 1992- 1993 forecast:²

	1987	1988	1989	1990
GDP (US\$)	139.91	171.27	204.59	241.34
GDP per Capita (US \$)	1,812	2,173	2,541	2,976
Real GDP Growth %	1.7	1.3	3.3	4.4
Consumer Price Inflation (end year, %)	131.8	114.2	20	26.7
Exchange Rate	1,378	2,273	2,462	2,813
Population (millions)	77.2	78.8	80.5	81.1

	1991	1992	1993
GDP (US\$)	282.57	280.01	288.18
GDP per Capita (US \$)	3,421		
Real GDP Growth %	3.6	3	4
Consumer Price Inflation (end year, %)	22.7	12	10
Exchange Rate	3,018	3,137	3
Population (millions)	82.6		

Note: In January 1993, three zeros were taken off the peso:dollar rate.

1.2.2 Wages and Prices

The taxicab industry is a labor intensive industry, making it very sensible to labor wages in terms of supply (drivers). For the good fortune of the industry, wages in Mexico are low and there are no problems of labor supply.

Wages have as reference the minimum wage, which is established by a National Minimum Wage Commission. Around 75% of all households earn less than three times the minimum wage.

² Mexico's 1992 Country Report

The following table presents Mexico City's annual remuneration levels for 1990³ (1990 equivalent thousand US. Dollars per year):

<u>Position</u>	<u>Minimum</u>	<u>Maximum</u>
General Director	105	194
Functional Directors	34	94
Middle Management	20	58
Tech & Supervisors	6.9	13.2
Skilled Labor	5.5	10.9
Non Skilled Labor	3	4.2

Includes Benefits:

25% of salaries for executive levels

65% of salaries for workers

1.2.3 Labor Force and Employment

One of Mexico's biggest problems is to find gainful employment for its rapid increasing population. Government officials have estimated that over 800,000 new jobs should be provided each year.

The work force (estimated in 1990 to number some 28 million workers), represent only about half of those who actually enter the formal labor market. In 1989, unemployment and underemployment are estimated (by a 1990 official study into poverty) , at 10.2% and 40%.

In the Next ten years 12 million workers are due to enter the job market. The occupation structure of all the population in 1989⁴ indicates that 20% of the population is less than 12 years old.

³ Promociones Industriales Banamex, March 1990

⁴ Mexico, A new world for Business, Banamex June 1990

Chapter 2

Taxicab Operating Characteristics

Now that we have a general picture of the situation in Mexico and we have a sense of the macro environment in which a taxicab must operate, we can go further and analyze the characteristics of taxicab operations to understand its operation environment in a micro level.

We understand as taxicab operations the activity realized by taxicabs to move passengers from one point to another.

In its original sense a taxicab activity implies a vehicle with driver being placed at someone's disposal. The passenger is the one who decides where he wants to go and then the price is established according to the length of the journey, the time it will take to finish the service, or the value of the service for the passenger or a combination of these variables.

2.1 Taxicab Industry Structure

In most countries, taxi services have played an essential role in the transport system. In this context, such factors as the degree of national development, density of private cars and population, efficiency of public transport, residential pattern between others, are of great importance.

As it could be expected, in a society with a low GNP, few private cars (relatively), and insufficient public transportation service, taxicab services play a somewhat different role than would be the case in a country with high GNP, efficient and sufficient public transportation and a high density of private cars.

Our purpose is to focus on the operations of taxicab services for Mexico City, where the role of taxicab services can be described as a mixture of the two categories indicated before.

2.1.1 Demand Factors

Mexico City is the capital of a country with 81 million people (1990), of which 15 million lived in the Mexico city area.

According to 1989 official numbers, around 20 million trips per day were made in the city.

This distribution is product of a recent change, in 1988, with the introduction of the obligatory “one day without car” program in Mexico City and the adoption of an urgent bus replacement program to control pollution .

This measurement made private cars reduce their participation in terms of total trips- passenger per day by half compared to 1987 (from almost 30% to 20%), while buses reduced their participation by 1/3 in terms of total passenger-trip per day (from 35% to 25%).

In this regard it is worth to mention that according to 1989 numbers, there was one taxi per each 143 persons and that there were 9 persons per private car.

2.1.2 Supply Factors

The geographical characteristics determine the very specific conditions governing the development of the transport supply.

Mexico City is situated in the center of the valley of Mexico and has suburban areas all around. The city is crossed by two main avenues that cut the city in four and run from east to west and north to south) and meet in the center of the city.

The center of the city is formed by the old city and older suburbs and it is connected by a road network that runs al the way to the west, north and south of the city in what are called “ejes viales” (build in the 70s). Downtown (the old colonial city) is always very congested and presents one of the most crowded commercial districts.

The western and south suburbs are connected by a well developed public transportation network as well as good roads and fast way lanes. The northern suburbs are part of what is called “Ciudad Satelite” and is located 25 kilometers away from downtown, it lacks from sufficient public transportation and does not have enough fast way roads, which explains why it suffers the biggest traffic jams in the city. The eastern suburbs of the city are in what used to be the Texcoco Lake (it was dried in the 50’s), and is where most of the low income population lives and has been target

of big public transportation investments which have been insufficient to match demand.

Within Mexico City there is an urban bus and trolley service that consist of 6,184 and 812 units respectively, carrying both 5.4 million passenger-trip per day. And there is also a Subway that has grown continuously and had 141 kilometers and 2,404 cars in 1989 and accounted for 4.2 million passenger-trip per day.

Mexico City's taxicab Industry information on size and trends is limited, and shows some deficiencies in consistency, but the information available is enough to give us an idea of which is the trend of the industry.

For many years now, the total volume of personal transportation in Mexico City has been growing rapidly but more in terms of the increase of population than in the increase of individual travel requirements .

It is not known the importance of this industry in terms of sales but it seems that sales are in the range of 1.5 billion dollars per year, moving 45% of the total number of passengers-trip per year in the city (approx. 7.5 million), or in other words, 45% of the transported passenger multiplied by the number trips done in one year.

2.1.3 Distribution

In terms of taxi industry size distribution, small operators dominate the industry. It seems that there are not many operators with more than five cars, but this information can not be confirmed.

2.1.4 Services Provided and Users

There are at present no precise statistics concerning the passengers of taxicab services in Mexico or Mexico City, but it seems to be true that the use of taxicabs depends on the availability of private cars and other kind of transportation as seen in figure 1.

Daily Ridership Transportation Mode

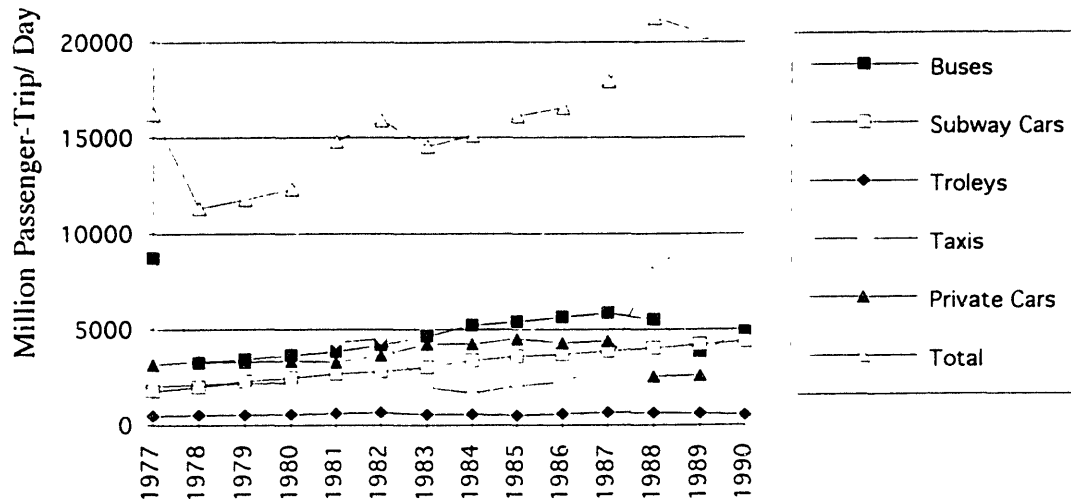


Figure 1.

Taxicab's users are varied; both high income and low income individuals (captive ridership), and they range from businessmen, tourists and the elderly and disabled.

Nevertheless, no matters who uses the service there are some factors that determine the use pattern of taxicabs, some of the most important are:

- Frequency of use of the service: It seems that there is a small base of regular customers, but most of the taxicab users require the service from time to time.
- Purpose of the trip: It is clear that taxicabs play a secondary roll in trips to work or school, but in the case of shopping and entertainment it is quite relevant.
- Sex: while taxi users undoubtedly belong to very varied groups with significantly different needs, the fact remains that women seem to use taxicabs slightly more than men⁵. In terms of service perception it is interesting that men are more concerned about quality in terms of technical factors (speed and safety), while most of the women are more concerned about the way the driver receives them and the cleanness of the vehicle.
- Age: most of the users are over 16 or 17 years; young people use more

⁵ECMT Round Table 54, Organization of taxi services in towns, 1981

taxicab services during weekend nights In terms of frequency of use, taxicab service is more important for old people, including retired people (specially if they have some kind of physical handicap). This fact must be considered when setting fares, because older people are more sensitive to price changes due to the modest incomes.

- Physical disability: this is one of the groups that present more frequent use of taxicabs, because of the convenience of door to door transportation.

There are other three main factors on the technical side that determine the quality of taxi services and the determinants of user choice, these are : availability, waiting time, speed and safety.;

But these three factors are short in giving a valid assessment of taxicab service quality, because it is necessary to take into account the sociological factors.

Among the sociological factor we have for example, how sensitive the users are to the drivers' attitude; or how much does not knowing in advance exactly how much will have to pay for a trip affects the price sensitivity of customers.

2..1.5 Traffic Structure

During the day-time, a surplus capacity is available whereas during the night hours the capacity is not always equal to the demand. In the afternoon rush hour a bigger percentage of taxis is available than in the morning rush hour, but at the early morning (4 AM to 6 AM) is when less taxis are available.

It could be true that the daytime demand per taxicab is proportional to the night time demand but during the day, the average vehicle speed is considerably less than at night. Thus, in order to achieve a parallel mileage, considerably more vehicles will need to be made available during the day than at night.

The number of taxicabs with passengers sharing the unit is also dependent of the time of the day. During the late evening and at night, the amount of taxi-sharing by passengers is greater than during the rest of the day.

2.1.6 Substitutes

The scope for competition between taxis and conventional modes of public transportation (particularly buses), is quite narrow, because taking a bus is impractical for many of the taxicab users and thus these customers are not potential users of buses. It is also true that some proportion of the taxicab customers consist of users that are unfamiliar with existing regular public transportation services and therefore would find difficult to use other means of transportation (private car owners, foreigners, etc.)

The economic factors characteristics of taxicab transportation limit the competitiveness of taxicab services in terms of fares because they offer high prices over very short distances (high flag-fall charges); and compared to other transport modes they offer prohibitive costs for the users over long distances.

At this time, the substitutes available are: private cars, buses, minibuses (“peseras”), subway and trolleys.

All these transportation modes are self explanatory, but minibuses (‘peseras’). Minibuses give a kind of shared-taxis services. This kind of service is more important in Mexico than in the developed countries, because it offers transportation levels that cover the gap between the service level of buses and those of private cars (which poor people can not afford) .

The following figures (2 and 3) show the number of units in existence up to 1989 in Mexico City.

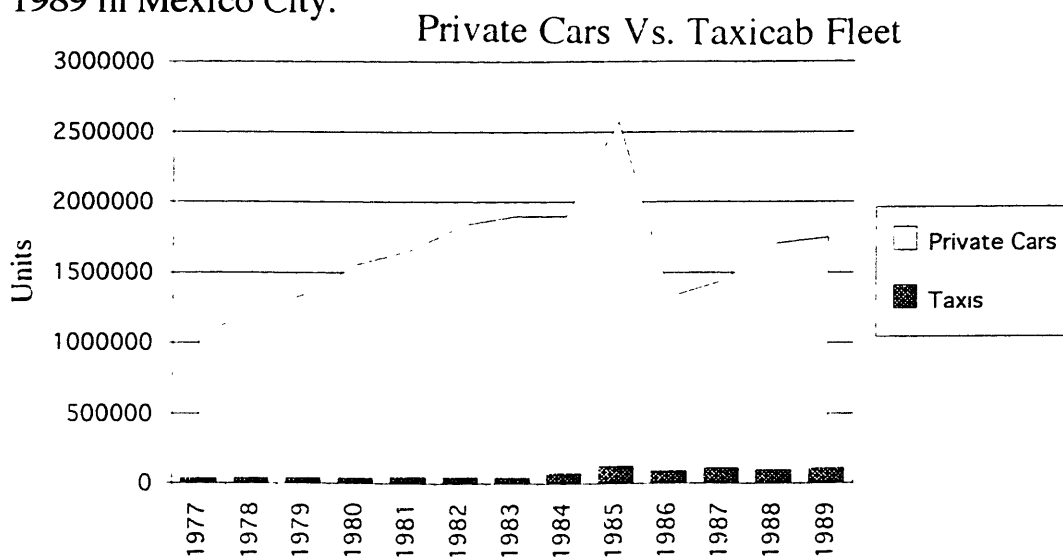


Figure 2.

Number of Units per Transportation Mode

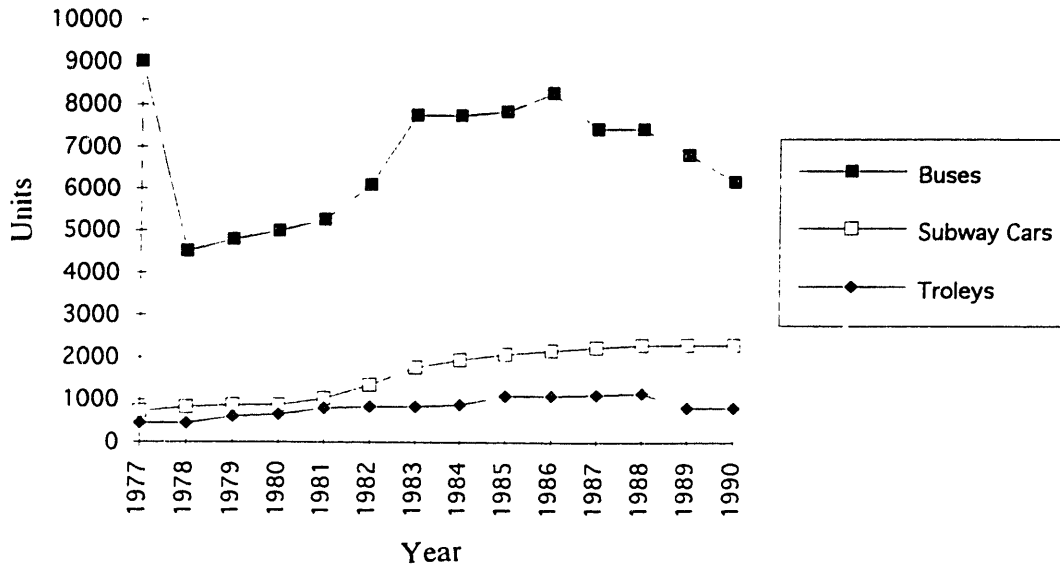


Figure 3.

While figures 4 and 5 show the daily ridership (or passengers * Trip / Day) for the same modes of transportation.

Ridership per Day Per Transportation Mode Unit

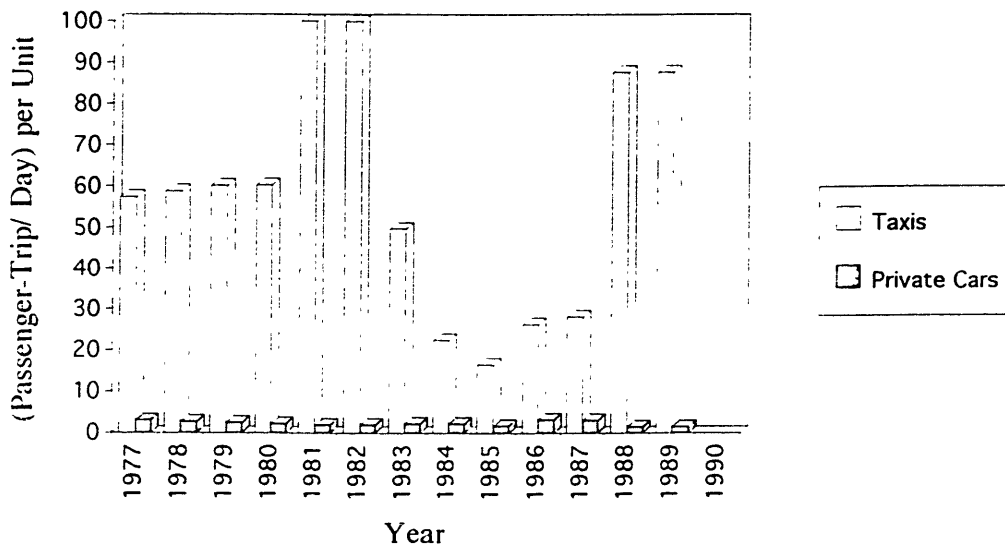


Figure 4.

Transportation Mode Daily Ridership Per Unit

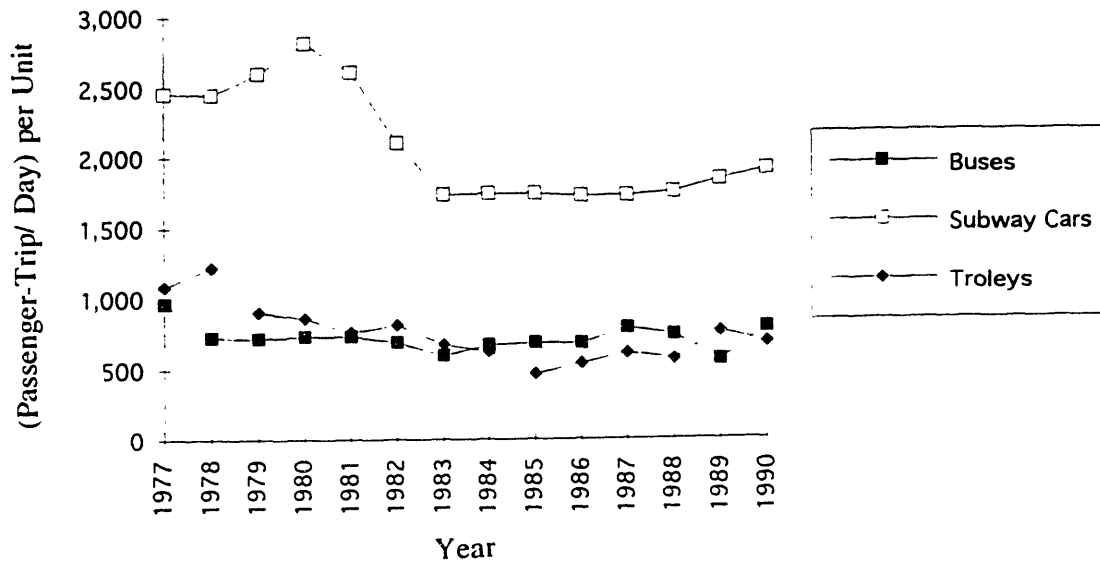


Figure 5.

Comparing the taxicab service features with bus and private cars it is interesting to see that :

- In terms of walking distance, taxicabs are:
 - Easier to reach than buses.
 - As easy to reach as private cars, and in cases with parking restrictions, even better than cars.
- In terms of Availability (24 hours), taxicabs are:
 - Better than buses.
 - Almost the same as cars.
- In terms of waiting time, taxicabs are generally short, but dependent of demand, and therefore are:
 - Worse than cars.
 - Better or equal to buses.
- In terms of Travel time, taxicabs are:
 - Same as car.
 - Better than buses.

- In terms of comfort, taxicabs are:
 - Variable in comparison with cars (depending on the unit), but always offer the convenience of having a driver.
- : - Better than buses

- In terms of price per trip, taxicabs are:
 - More expensive than car.
 - Much more expensive than bus.

After this comparison it is easy to see that taxicabs have a rather high standard of service; and the same results would be drawn if a comparison between taxicabs and the subway and minibuses' service is done (because their characteristics are very close to those of buses).

In Mexico City minibuses ("peseras") operation characteristics are similar of that of buses, but minibuses have no stop restrictions as buses have, and run shorter fixed routes than buses (their function is to feed the other public transportation means).

Apart from the transportation modes just seen, Mexico City has two other transportation services that target directly niche segments of customers also targeted by taxicabs, they are called "Servicio Guia de Turismo" (tourist guide service), and "Servicio a Puertos y Aeropuertos" (ports and airports service).

"Servicio Guia de Turismo" is a service offered regularly by cars with a capacity of 5 persons. This service is licensed by the tourism bureau and are restricted to the owner-driver of the unit. These vehicles are not subject to timetables or fixed routes.

"Servicio a Puertos y Aeropuertos" is a service offered in Federal Ports and Airports and is dedicated to the transportation of people and luggage to cities and hotels. The vehicles that give this service have an average capacity of 7 persons.

There is no information available for Mexico City of how many units of these services are operating and how many passengers are currently transported, but in 1988 in all the country, "Servicio Guia de Turismo" operated 2,727 units, moving 5 million passengers that year; and "Servicio a Puertos y Aeropuertos" operated 2,266 units and moving 5 million passengers.

Even though, these two services show potential for improvements, for the purpose of these theses they will not be considered and will be left for a future analysis, concentrating our focus only in regular taxicab services.

2.1.7 Regulation

The operation of taxis in Mexico City is strictly controlled. The provision of taxi services requires a license from the city's transportation authority. So far, licenses have been granted mainly to physical persons and only in very special cases can be provided to companies (Mexico City's Airport). This has led to a structure in which most of the licenses are held by people with only one license and one vehicle; and most of the services are given by the license and vehicle owner.

2.1.8 Tariffs

Tariffs are fixed by the authorities and are made up of various elements, the basic rate, the mileage charge, standing charges together with some other special rates.

By means of mileage charge, the actual distance covered by the taxi is taken into account. This charge may be dependent upon the time of the day or the day of the week.

The standing charges come into operation if a journey is interrupted. Originally, it was intended to apply when the driver was obligated to wait before or between the service, but now it also applies when the speed drops below certain levels to account the time lost in traffic jams and traffic lights.

Tariffs for other services independent of the service offered are necessary to cover expenses arising out of the installation and maintenance of extra equipment, like radios, telephones or computer terminals.

Special rates should be charged for additional passengers as well as for the carriage of luggage or pets but is too complicated to understand and calculate for the public and thus is better to have a single tariff than a complex one.

2.2 Taxicab Fleet and Equipment Characteristics

The characteristics of the units of a fleet must be chosen according to the quality of the service and the target market intended to attract.

Nevertheless most of the units in operation in Mexico City have been selected having in mind the operator and not the user.

The general features of a regular taxicab in Mexico City are:

- Small capacity units (2-5 passenger capacity), most of them are Volkswagen Beetles (model 1987-1993).
- Very intensive use.
- Higher speeds than other public transportation because of size, fewer stops, and hard driving habits of operators.
- Units are often owned by the operator or one of his relatives and vehicle maintenance is usually handed on a somewhat “handyman” basis by the operator himself or in small local workshops.

Choosing the Right Kind of Unit is very important, because it is easy to see in the streets units which are not suited to give the desired service or that may give the service but with a considerable reduction of its operating life. The problem is that in Mexico most of the time , the selection of units’ kind is made by intuition or experience.

In order to choose the right unit, we need to make a detail study of which are the characteristics of operation and service required and then asses the option that fits best our needs.

The individual components of a certain car model (engine, suspension, etc.), can have good quality, but once assembled may not be the most feasible for operation.

Operational cost, as well as quality of service can be affected by some factors related to vehicle’s characteristics.

One of these characteristics is having a homogeneous fleet, (same kind of unit). Having a homogeneous fleet gives more facility for maintenance control and planning. If owning the maintenance facilities is considered, having an homogeneous fleet helps to reduce auto-parts and special hardware inventories and promotes the specialization of mechanics which is translated in costs savings.

There are no studies on what is the impact of standardized versus non standardized taxicab fleets, but there is one for buses⁶ that may show some similarity with taxicab fleets. According to this study, the bigger the variety of kind of units the higher operation and capital costs.

In average, there is a 3% increase in operation cost per each different kind of unit included in the fleet. The initial training cost for the introduction of a unit of a different kind is twice than when a unit of the same kind of the fleet, and so does the spare parts' inventory.

Regarding capital cost, they increase when a non standardized unit is introduced in the fleet, because it requires some specially designed tools for its maintenance.

Even though, it is important to notice that in companies that usually operate a non standardized fleets, the impact of introducing a different kind of unit has a lower impact on cost than in standardized fleet companies that do the same.

Another factor affecting operational costs and quality of service are the driving habits of drivers. The way in which the units are driven, is critical because this affects directly the operating cost, mainly in fuel, maintenance and parts.

The better the control measurements over drivers' operation of the units, the lower the possibility of accidents and the lower fuel and maintenance costs. Therefore it could be useful to use an evaluation system for drivers based on results and may be worth to analyze the possibility to use mechanical or electronic devices to track how the units are driven (speed, revolutions, number of stops, etc.).

2.2.1 Unit Reposition

The reposition and renovation policy depends on the strategy of the company as well as the trend in reposition of competitors.

The average age of the fleet must be given by the returns of each unit, and this can only be calculated per with operation costs per unit Vs depreciation.

⁶Trans.. Research Board, Report 17, Impacts of Standardized vs. Non Standardized bus fleets, June 1990.

2.2.2 Maintenance

Maintenance can be separated in four different types of operations: Service station maintenance; preventive maintenance; corrective maintenance; and reconstruction maintenance.

- **Service Station Maintenance:** This maintenance should be done each 3,000 to 3,500 kilometers and includes oil change, fluids and tires checkout, tun-up and other minor repairs.

- **Preventive Maintenance:** This maintenance consists in the adjustment or parts change done before a mechanical failure occurs. The frequency of this service should be based on two criteria:

- **Systematic Criteria:** consists of a preset frequency for adjustments and parts change (like the one established in the owners manual of cars).

- **Conditional Criteria:** consists of a scheduled frequency for adjustment and parts change based on own fleet and individual car statistics of failure.

Conditional criteria are not commonly used because they imply an individual maintenance control for each unit and require more skilled and knowledgeable mechanics which can be translated in higher introduction costs for maintenance.

- **Corrective Maintenance:** This maintenance is always the product of failure that restrict the operation of a vehicle, and most of the time and with mechanical repairs.

It is common to think that it is better to keep maintenance until there is a failure (corrective maintenance), but this kind of maintenance means a longer reparation time were the vehicle can not operate (immobilization cost), and also most of the time corrective maintenance requires more complex repairs which affect directly the quality of operation of the unit (the better the mechanic, the better the quality and therefore the better the operational outcome), and thus the profitability of the vehicle.

Another issue to consider about using corrective versus preventive maintenance comes about depending on the kind of taxicab service offered.

If a traditional taxicab service is offered the implication of having a unit out of operation is only the cost of immobility, but if the service offered

includes radio-taxis or more complex dispatching systems, there is an additional cost for the non performance of the service which affects the customer perception of the service (for instance if the car does not arrive or arrives late, the customer may never call again).

Preventive maintenance requires a high frequency of stops and therefore can be only afforded when there are many units in operations and then there is some flexibility for keeping some units in the repair shop without disturbing the company's or owners' monthly cash flow.

When there are few units in operation the immobility cost due to preventive maintenance may be higher than the immobility cost of corrective maintenance.

This explains why it is common to see in the taxicab industry a clear interaction between service demand and maintenance/repair opportunities, that is because whenever the taxicabs are used more, repair and maintenance is postponed and carried out during months with lower demand levels.

- **Reconstruction Maintenance:** this kind of maintenance is a common practice that consists in rebuilding or changing a big % of the car parts. This kind of maintenance is done to units in a very bad shape due to accident or extreme use and is justified by its low cost compared with the investment to buy a new unit.

2.2.3 Repair shops and Maintenance Equipment

In the long term there are three different categories of repair shops that can be used for maintenance of taxicabs: independent repair shops, concession repair shops or own repair shops.

Having your own repair shop requires a bigger investment, but it has the advantage of having control over repairs and parts costs, as well as timing and quality of the repair. All these factors affect directly the quality, reliability and service image of the company and can be used to differentiate the services offered.

It is important to clarify, that no matter what kind of repair shop is used, it is important to use one which has the minimum amount of equipment to assure that the diagnosis and the repairs can be done as fast and well as possible.

Having or not the required equipment and facilities for diagnosis and repair can be a big difference in terms of immobility cost and reduction of not needed repairs.

Chapter 3

Taxicab Organizational Characteristics

The internal organization of taxi services is an essential factor governing their function as a transportation mode.

In Mexico City there are a variety of ways in which taxi operations can be organized. These are: Individual proprietorship/partnership; family corporation; association or cooperative.

The characteristics of each form of organization are important not because their structure, but because of the services provided and the relationship between ownership and Operation.

3.1 Vehicle Ownership and Operation

The industry operates most of the units in a driver-owned and driven manner, driver-owned and leased manner and individual-owned and leased manner.

This last manner is becoming more popular, because since three years ago the government has been increasing restriction on age of units and pollution emission levels, requiring that all taxicabs must be at most 5 years old. As most owner of the units were taxi drivers, they did not had the capital for the reposition of their units. Private investors are buying all the licenses of those who can not afford the new units and are leasing new taxicabs to the old driver-owners.

3.2 Industry Relationships

Studying traditional taxicab organizations is not the purpose of these thesis, but understanding the kinds of relationships present in this service help to define many of the fundamental industry relationships, that exist as well in non traditional taxicab organizations.

The most important relationship in a taxicab organization it that between the employees and the owner or management. By employees we understand, all the drivers, mechanics, managers, dispatchers (if used), etc.

Among the employee, drivers are the single most important employee, because they are the only means of production and the only one strictly necessary to offer the service. Drivers offer their services to cab operators (persons or organizations) which own the means of production.

The taxicab organization type is defined by how taxicab drivers relate to taxicab operators, and how operators are organized internally and externally.

Drivers perform nearly all the functions necessary to produce the transportation service: they select and serve passengers, determine the most suitable route to their destination, operate and maintain the equipment, receive payment for services rendered and maintain necessary records.

The relationship between driver and operator is determined by how the driver receives compensation for his work. Four general categories of compensation can exist: hourly wage rate, commissions (or meter percentages), gross fares less lease cost, and gross fares less cab ownership costs.

Hourly wage rates and commission drivers are paid employees of a taxicab operator. Hourly-rate drivers receive a fixed wage plus fringe benefits regardless of the volume of business they do. Commission drivers usually receive a percentage of their cab receipts plus fringe benefits, so that their direct income depends on the volume of business they produce. Lease-drivers are not legally considered as employees of an operator, but are classified as independent contractors. Drivers lease a taxicab on a shift basis (daily, weekly, or monthly) from the cab operator who owns the vehicle. They receive as income all fare receipts after paying normal operating and ownership expenses.

These driver-operator relationships imply different levels and combinations of industry services offered to drivers.

The industry services are constituted by all those services which help contribute to the production of the transportation service by the driver and its unit. Among the industry services we have: dispatching (stands, radio or computer based), vehicle maintenance, insurance, marketing, financial support, etc.

Operators who hire by hourly rate and commissions are more likely to offer a complete range of industry services to their units, while operators

with lease-drivers may or may not provide a full range of industry services to its drivers.

Independent-owner-operators, which are owner-drivers, must obtain also the industry services, but if they can not internalize their services within their own operations, there are incentives to affiliate or coordinate with other people who offer the services they need.

3.3 Dispatch Function

The dispatch function acts as an interface between the demand for taxi services and its supply. The dispatching function can be provided by different dispatch systems.

3.3.1 Taxi Dispatching Systems

There are three different stages of development in terms of taxi-dispatching systems, and these are:

- First Generation: taxi-stands with telephones for direct client orders;
- Second Generation: central to taxi voice radio dispatching; and
- Third Generation: computer dispatch communication.

3.3.2 Taxicab Stands

Taxicab stands provide a stop-over point where taxis can park and thereby avoid the accumulation of unpaid mileage.

Taxicabs should be generally located near activity centers in order to maximize exposure of available taxis to people who would use a cab if an empty one were to appear at just the right time (impulse buying).

There are two kinds of cab stands, those which can be used by any licensed taxi on a first come, first served basis (bus stations, hotels, etc.); or those which are private stands.

Private stands can be organized formally with licenses of the authorities and therefore legal recognition (“sitios”), or can be organized informally, just parking in a certain place. Both kinds of stands charge a right to use or

stand fee (fixed or variable) to all the taxicabs who use it.

Formally organized stands always have telephone service to assign fares to their taxicabs and all their services are demanded by phone or at the stand and are not allowed to pick people out in the streets. In exchange they are able to charge higher rates than regular taxis (“libres”).

Informally organized stands are always close to an activity center, they do not have phone service, and are used by regular taxis “libres”, which are only required to come back to the stand a certain number of times per day without any other restriction. This kind of stands are convenient for taxi drivers because they are located in places that offer a continuous flow of passengers (like hospitals, shopping centers, etc.), and they also offer a place where drivers can relax in a friendly environment.

3.3.3 Radio Taxis

The two way radio gives the opportunity of flexible communication which is superior than the stand phone system, because taxicabs are no longer completely bound to their stands for orders. Calls can be answered by the closest available cab thereby providing the public with a faster-reacting system.

The problem with radio-taxis compared with taxis stands is that even though it offers greater potential for centralized control, the driver is the one in control, and some drivers may even just turn off their radio. Driver compliance in the proper use of the radio is not so much a problem for small fleets where the dispatcher keeps track of the locations of all cabs, whether they are doing street work or taking phone orders.

Studies of radio taxis made by the European Conference of Ministers of Transport⁷ show that radio-taxis have a real advantage over regular taxicabs. Radio-taxis in a certain location obtained around 20% more number of hiring per hour than regular taxis and their journey length per hiring was in average 29% longer, which translate in higher income.

Once the proportion of radio-taxis is between 35 to 40% of the fleet, a very high percentage of users get into the habit of calling the radio control center rather than a taxicab stand, because the service is much more reliable and offers the possibility to book in advance.

⁷ ECMT round table 54, Organization of Taxi Services in Towns, Paris 1981

According to certain calculations⁸, a radio taxi can often earn as much in seven hours as a regular taxicab in ten hours, because they reduce wasted time and also because their journeys are longer in average than those in taxicabs without radios.

Radio-taxis have a greater potential for services which originate in the suburbs or in the city limits; and they offer advantages in night operation and Sundays, when it is harder to pick people in the streets.

3.3.4 Computer Dispatching

This system offers an attractive, feasible transportation alternative⁹ if properly planned and implemented. It is important to be careful in assessing the benefits of computer dispatching for any particular area, computer dispatch systems are not inexpensive.

Effective computer dispatch systems use three different kind of programs : one for evaluation and statistical analysis of the operations of the fleet; the other for communications between the control center and the vehicles; and the last one for optimizing the task of assigning or distributing the incoming demand calls in order to reduce time of pickup and at the same time give a fare distribution between the fleet.

The advantage of using computer dispatching versus radio dispatching are to increase:

- Revenues and profits:
 - Positioning better the fleet according to the demand and thus reducing unproductive operations and their costs (fuel, maintenance, etc.).
- Customer Satisfaction:
 - Offering extended service in places where other transportation modes are not available;
 - Offering an option to have a last resort transportation if needed in a specific time.
- Dispatcher productivity:
 - Permitting major expansions in productivity without increasing labor cost at the dispatching center.
 - Giving the ability to schedule dispatchers/operators to deal with daily

⁸ Laneyrie, P: "Le taxi dans la ville"

⁹ Urban Mass Transportation Administration, Taxi-Based Paratransit Technology, D.C. May 1985.

- or hourly variations in demand.
- **Speed of handling incoming calls:**
 - Reducing the busy signals.
 - Reducing the order taking time.
- **Fairness and the speed of selection of vehicles:**
 - Identifying the most appropriate vehicle.
 - Eliminating unfair assignments of orders to drivers and bribing of dispatchers.
 - Eliminating scooping of orders by drivers.
 - Reducing dispatching errors (orders are verified and transmitted in writing).
- **Response time customers:**
 - Reducing response time for service availability and time of pickup.
 - Increasing the accuracy of arrival times forecast.
- **Quality and speed of communication with drivers:**
 - Improving number of vehicles per radio channel.
 - Increasing transmission speed and accuracy.
 - Reducing mistakes in communication and transmission time.
 - Eliminating noise in units and control center (better work conditions).
- **Safety:**
 - Reducing noise distractions for drivers.
 - Reducing working hours
 - Giving the possibility to place an emergency button to activate a monitoring device in emergencies.
- **Market share:**
 - Increasing demand in the medium and long run because of the better quality of the service.

The introduction of computerized dispatching can also give the option to:

- Provide better information on traffic to the general public via telephone or news stations;
- Handle request-steered traffic for the city authorities;
- Make efficient long-term plans
- Design efficient travel routes;
- Introduce simpler invoicing procedures for taxicab's credit customers;

From the drivers perspective, the use of computer dispatch systems alters not only the working environment but also the routine in which the driver operates over the working day. This implies that the driver requires a certain willingness to change their habits and this is not always easy to do, specially for taxicab drivers who have highly independent personalities.

The driver has to agree to let the control center know where he is all the times, permitting a much closer check on his revenues. This mean that the change to computer dispatching can not occur without resistance. The good thing is that benefits from this system outweighs substantially the costs and other eventual disadvantages.

From the car owner point of view it requires an extra investment of a couple of thousand dollars in equipment so unless financing terms are well established, their resistance to a computer dispatch system is likely to be enormous, even if they understand the advantages of the system.

3.3.5 Implications of Investing in Dispatching Technology

For starters, price differences among the varying technologies should not be compared directly, as each system differs in what it is attempting to provide in terms of service. the actual cost incurred by any given project is in many ways unique, and hence difficult to use for direct comparison.

If the change in technology is merely enhancing its traditional dispatching system rather than starting from scratch, there will be some doubts about some start up cost, especially if there are already some computers in place, or dispatching facilities, radios and taximeters already in operation. What is sure is that larger systems can benefit from economies of scale and it is important to have this in mind.

3.4 Labor

Drivers have different motivations to be in the taxicab industry. In these sense we can differentiate drivers by the following categories:

- Drivers pushed by the circumstances, finding the taxicab industry as a source of short term or occasional employment, in this situation we can say that the taxi industry operates as a kind of employment insurance.

The problem with this kind of drivers is that any attempt to organize operations is futile, but in the other hand it keeps organized labor away.

- Drivers who have held jobs in different industries and enter into the industry to break the monotony or stress of their former job and work as drivers until they return to pursue their career interest.

- Drivers who enter the industry as a long term career. They are the kind of people that like to escape from the constraints imposed by large scale office or factory occupations. They are also the type that likes and believe in self management and are likely to seek for better career opportunities within the industry.

3.4.1 Leasing

Leasing offers four distinct advantages to taxicab operators:

- Operators are able to avoid legal responsibilities of employees by considering drivers as independent contractors rather than employees. The contractor relationship enables operators to keep a large pool of full and partial time drivers avoiding the administrative cost of carrying them as employees.
- Operators are guaranteed a fixed return on every leased shift, since the risk of generating revenues (exceed lease rates) is transferred directly to drivers.
- Operators are freed from all direct costs related to benefits (social security, housing, pensions, etc.).
- Operators have less risk of having an organized labor force, since the lease-contractor relationship puts drivers as independent entrepreneurs who individually bear market risks and therefore look for their individual interest and not that of the collective.

From the point of view of drivers, leasing offers:

- Freedom of choice to apply their unique insights or view of the industry which derives into greater personal satisfaction.
- Potential for tax minimization via unreported income, reducing the risk of their lease or in other words, increasing their average take home pay.
- Maximum control of operations because of the contractor status, which means minimum interference from third parties. which drivers seem to like.

3.4.2 Training

Training is important for efficiency in operations and the standardization of the quality of service delivered.

Training can be used to improve the sociological factors that determine part of the customers perceptions about the quality of service. For instance it can be used to help drivers increase their performance by: knowing better their service area characteristics, identifying local traffic patterns, understanding the importance of passenger relations and their benefits, learning emergency maintenance, and avoiding alcohol abuse, among others.

Training programs can also be designed to improve driver safety, by teaching drivers technical driving witch enhance operation efficiency (torque, horse power use, gear control, pedal use, etc..), as well as the control of the unit in emergency situations.

3.5 *Productivity and Economics*

3.5.1 Economies of Scale

The impact of the size of the taxi service providers and its effects in the cost and quality of service is important to determine fleet characteristics and the coverage that maximizes profits.

Scale is important in at least three ways:

- Greater scale may permit an organization to offer more diverse industry services;
- Greater scale means greater market share which may provide the operator more stability in volume of business; and
- Greater scale permits lower unit cost of operation

Operational scale can be divided in two subcategories with different features: scale efficiency and scale optimality¹⁰

¹⁰ Urban Mass transit Administration, Cooperative Forms of Organization in the taxicab industry, June 1993.

Scale optimality implies that organizations attempt to maximize organizational income by reducing the unit costs of operations through scale efficiencies.

Scale efficiency may not fully use all the potential for scale optimality, but it implies that organizations try to maximize up to a scale found optimal for its members where not only operational scale is involved, but where other where organization dynamics are involved (manageable size of the organization, labor availability, etc.).

Speaking about scale efficiency in the taxicab industry needs to be referred to ridership (trips) which in other words is the service produced, and coverage. So the question is how much should the ridership levels be and what coverage should it have to maximize profits.

In this sense, it has been found¹¹ that for the taxicab industry the optimum size depends only in ridership, and that the taxicab industry (in the US) shows economies and diseconomies of scale depending on the cause of increase in ridership. If ridership is increased by increasing service area while rider density is maintained constant, a U-Shaped cost curve results. However, average costs are lower for operators with high rider densities.

3.5.2 Efficiency

Two important economic measures of fleet performance are the percent paid kilometers and the revenue per kilometer. Its reasonable to think that vehicle productivity (passenger-trip/day), could also be a good measure of performance but most operators think it is not relevant .

Even though, the most important measure of taxicabs efficiency is the percent of paid kilometers. Given the fact that most of the taxis operate different lengths of time per year, the variation of the annual trips per taxi is large, but in average around 40% of the kilometers run are paid kilometers.

Paid kilometers is related to many factors, some of which involve demand density and distribution. driving performance and, if existing, dispatching performance. This factors have an uneven importance in terms of contribution to efficiency and therefore need to be explained in more detail:

¹¹ Economies of scale in paratransit, US Department of transportation, may, 1981.

- Demand Factors:

- Demand Density: As demand density increases, dead mileage decreases and therefore paid miles increase.
- Demand Pattern: A high proportion of trips from activity center to activity center or from one same place to another (business to business) tends to increase paid miles.
- Characteristics of Service Area: High activity zones give more potential trip generation (trip generation density), the closer the units stay to an activity area the greater the trip generation potential.
- Substitutes Available:

- Supply Factors:

- Units Operating Overall: The lower the number of persons per taxicab, the lower the potential trip generation.
- Exposure to Potential Customers: the higher the coverage or exposure to potential customers (own units available), the higher percentage of impulsive buyer attracted (customers that use a taxicab because it is available).
- Location of Garage: The more centric the garage to the operation, the lower dead mileage at the beginning and end of the shift.
- Location of Suppliers: The more centric gas stations, washing and maintenance facilities, the lower dead mileage.

- Cab Stands:

- Location of Cab Stands: The better exposed to potential customers, the lower dead mileage. The closer located to business activities, the better.
- Fleet Size: the larger the fleet, the better the coverage of the area, the faster telephone orders can be served.

- Dispatching Systems:

- Type of Dispatching System: The better the dispatching capacity the better the pick up time, the accuracy of the estimated pickup time , and the ordering service speed, and therefore the higher the customer loyalty and the potential trip density.

- Drivers:

- Drivers Motivation: The more aggressively the driver seeks street fares, the higher the number of fares per hour.
- Drivers Theft :The more the drivers do not report trips, the lower the apparent productivity of the unit.

3.5.3 Costs and Revenues

Given the level of wages in Mexico, actual operation of a taxicab is fairly inexpensive. Calculations indicate that of the taxicab costs, 50% represent drivers wages, minor maintenance and fuel and about 7% for insurance charges.

Comparing costs and revenues is important, since the profitability of the industry is essential to its survival. Taxi operators normally keep careful records of their costs. Revenue data, however, is not collected for the vehicles that are leased. This is because it is impossible to know exactly which are the wages of most vehicles that are leased.

Profitability in the taxi industry is dependent upon the local tariffs in operation as well as the volume of passenger traffic of each individual taxi

The average shift of a taxi driver is about 10 hours. If we were to consider only the time worked productively (hire periods) we would arrive to a figure of four hours, whereas the remainder of the shift would be made up of approximately three hours for the lost mileage and a further three hours approximately spent simply in waiting.

Profitability also varies according to the economy (Figure 6.). It is high when wage cost and prices do not increase rapidly, because otherwise an increase in these two variables have lead to certain resistance of the general public to use taxicabs.

Nevertheless, the increase in traffic jams, insufficient public transportation, higher new car prices, higher car taxes and the introduction of the “hoy no circula” program has lead to an increase in demand even though buying power has decreased.

Transportation GNP Vs. Taxi Units

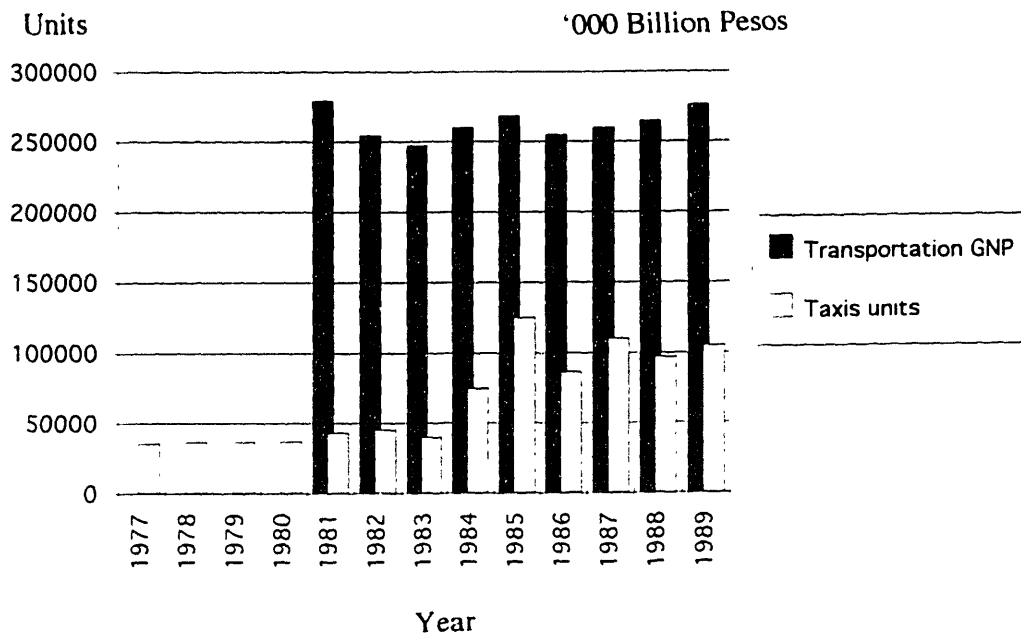


Figure 6.

Figure 7. shows the impact of the introduction of the “hoy no circular” program and the bus renovation program since 1988 in terms of daily ridership in the taxicab industry.

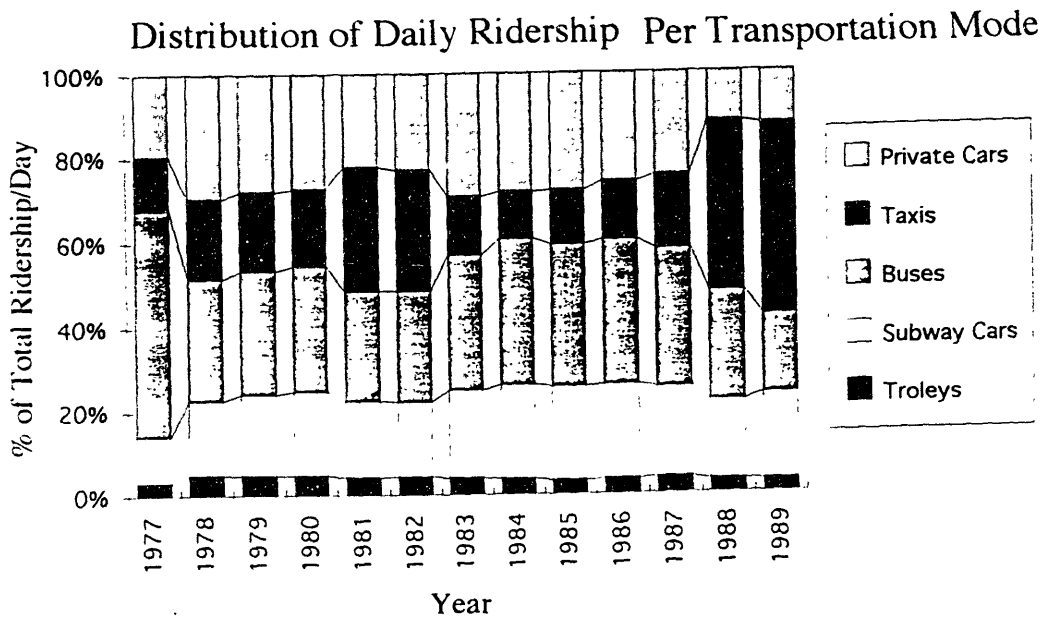


Figure 7.

Chapter 4

Taxicab Industry Strategic Analysis

Once understood the basics of the operation of the industry its time to go through Mexico City's industry analysis. For this purpose it is useful to apply Porters framework for analysis because even when the external factors affecting the industry could be analyzed individually, Porter's model is easier to follow and read and gives chance for more profound analysis.

4.1 Porters Model Analysis

In order to facilitate the analysis process the following analysis is complemented graphically with charts from EDS Strategic Planner software¹² (Prof. Hax).

4.1.1 Barriers to Entry

Barriers to entry are high because of the limited number of taxicab licenses granted. The main factors affecting barriers to entry are the following:

- Economies of Scale: Economies of scale are important in the transportation sector for three reasons:

- First, because having a certain number of units, justifies to have maintenance in house (repair shops, renovation shops, washing, and also internal distribution of parts, fuel, oil, etc.).

The bigger the fleet the complex and efficient these facilities can be (between others we could have for instance automated washing, expensive diagnosis and repair equipment, computerized inventories and satellite unit supervision).

- Second, because the bigger the fleet, the more stable the cash flows and therefore the lower the risk of non performing loan payments, so the easier the access to capital.

- Third, because economies of scale benefits depend not only on the number of units, but also on the ridership of the service offered and the

geographical coverage and customers concentration, so there is no ideal number of units to reduce costs.

- **Product Differentiation:** This point has not been very important, because the taxicabs operate with a limited number of licenses, and this were increased at authorities discretion. Taxicabs operate in a regional oligopolic basis, where competition has been restricted by number of licenses and price control.

In 1988 new taxi characteristics restrictions were issued (only five year old units could operate), and also pollution control was enforced (strict emission exams).

At the same time, authorities started a permanent traffic restriction program (“hoy no circula”) to reduce car pollution, restricting the use of cars for all users one day per week (and in winter even two days); and restricting taxicabs and minibuses operations once each 15 days.

These traffic restrictions decreased the amount of taxicabs available in the streets (many owners could not afford to buy new units) and at the same time increased the demand for public transportation, increasing taxi ridership and therefore revenues and profits.

Nevertheless, even when the “hoy no circula” program is still in place, taxicab availability has increased, as more units are now operating because financing has been available for taxicab owners who did not afford to buy new units before (1988-1992).

This meant a change in ridership, pushing revenues and profits downwards but still at very high return rates. If these trend continues there will be more potential for competition in quality of the service offered in order to maintain profit margins.

- **Brand Identification:** As the industry operates in an oligopoly and fleet companies do not exist at all, taxicab brands do not exist. If quality of service becomes more important, brands could be expected to have more impact.

- **Switching Cost:** Switching cost from one taxicab to another was not a big issue, because supply was restricted in terms of number of taxicabs and other form of public transportation supply and therefore the availability for consumers, but as more taxicabs operate and, public transportation is increased options are becoming available causing a reduction in the

switching cost for consumers.

It is important to see that switching cost depend highly on the segment of users we refer to, because only car owners and users who are not used to public transportation have high switching costs.

Here we have to note, that as the economic situation of the country has been improving in the last years, more people has been buying cars, increasing switching costs slightly (still most of the population can not afford a car, but may be they will in the future).

- **Access to Distribution Channels:** Distribution channels are represented by taxicab units.

New operators access to the market is restricted by the physical number of licenses. If a new entrant wants to operate it needs to buy licenses in the secondary market which has licenses available at market prices.

The initial cost involved in starting a taxi firm is very low (aproximately \$12,000). All that is needed is the vehicle, and its equipment (taximeter, painting, etc.) and the license to operate.

Once operating in the industry, we would like to push authorities to require to have a membership of a dispatch center to make more difficult the access to distribution channels.

- **Capital Requirements:** Capital requirements are relatively low to maintain and renovate a taxicab (around \$12,000 per unit).

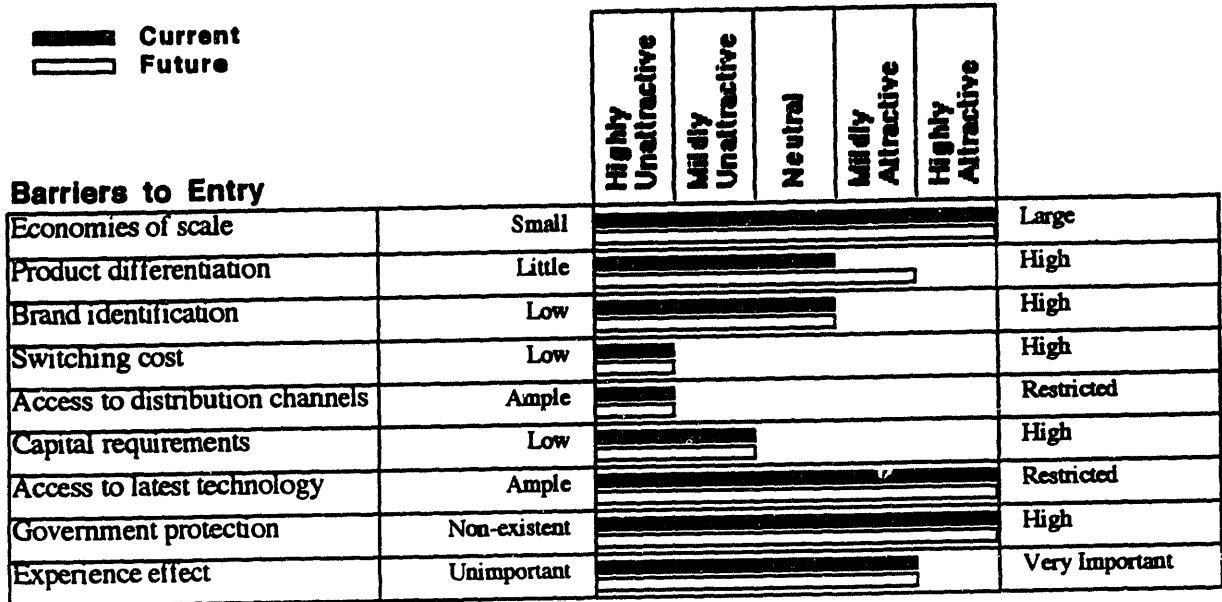
- **Access to latest Technology:** Taxicab technology is related to operation and management tasks. The equipment used for this task may be computers, dispatching systems, radios, and maintenance equipment.

For the moment the current operators can not afford to make big capital investments until new entrants come into the industry.

- **Government Protection:** As said before, government regulates the industry and protects its members.

- **Experience Effect:** The taxicab industry operates in a very informal way, where drivers realize most of the work task. Therefore some experience as driver, or extensive contact with them is needed to learn the characteristics of the environment and how to handle authority's requirements (there is a

kind of Mafia in the system, with many bureaucratic procedures).



4.1.2 Barriers to Exit

Barrier to exit are low since a small investment is required and in order to get out of the industry it is easy to sell the units in the secondary (used cars market), and to sell the taxicab licenses.

- **Asset Specialization:** Most of the assets of taxicabs operators consists of cars, maintenance equipment, auto parts inventories and in some cases, small properties. All of these could be relatively easy to sale, but it depends a lot on the particular physical characteristics.
- **One -Time cost of exit:** Taxicabs have value because of the value of its assets and the value of its cash flow generation capacity.

In general equipment is sold as such, and the value of cash flow generation capacity is included in the price of the license.

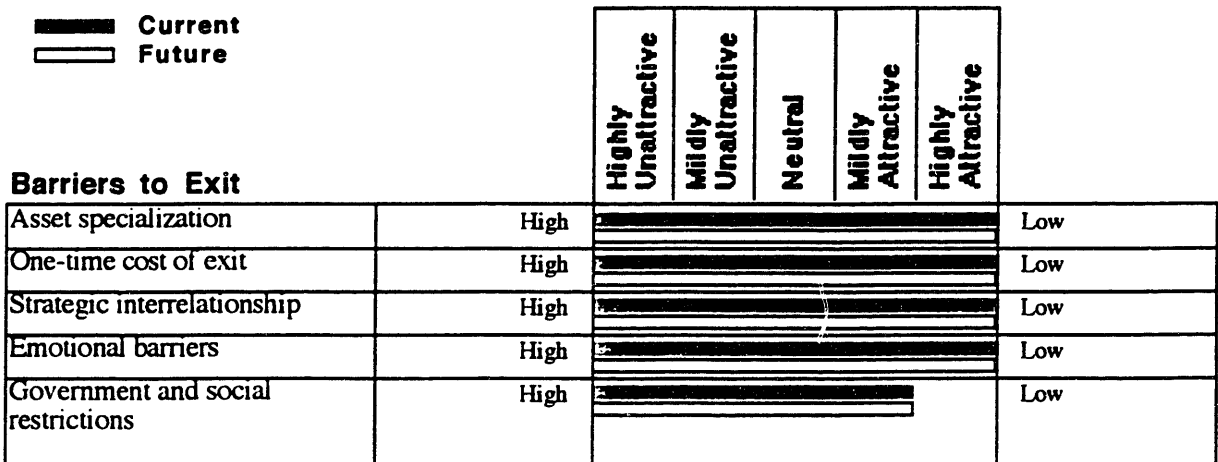
Licenses have a big market value and show an upward trend, so one time cost of exits are low. It is relatively easy to go out of the industry.

- **Strategic Interrelationship:** In general, all taxi operators are not vertically or horizontally integrated, so there is not any strong strategic interrelationship.

- **Emotional Barriers:** Emotional Barriers are low because even when some experience is valuable, most of the operators are drivers and in many cases the are in the industry just in the short term while they find better job opportunities (not all).

In other cases, even when there are some emotional barriers, financial difficulties push operators to sell their units.

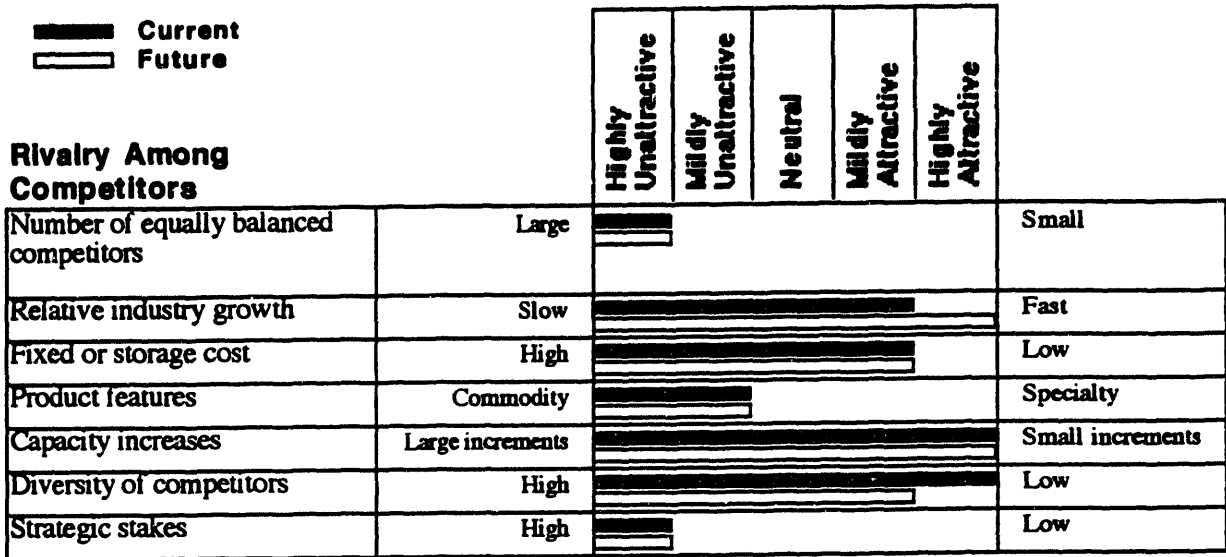
- **Government and Social Restrictions:** They are low and consist of taxes and owner transference fees.



4.1.3 Intensity of Rivalry and Competition

This is neutral

- **Number of Equally Balanced Competitors:** Most of the cars are operated on an owner-driver base, and in practice, individuals are not allowed to have more than five units.
- **Relative Industry Growth:** In the last ten years the industry has doubled in terms of units, and is expected to continue to grow as demand increases 2% per year due to demand increase (close to population growth).
- **Fixed or Storage Cost:** As in Airlines and Bus lines, taxicab operators have a high fixed cost given by the units, spare parts and maintenance equipment.
- **Product Features:** As well as in Airlines and Bus lines, taxicab operators can not store their product because it is a service, and this is the biggest problem they have to face. In order to keep profitability they need to keep occupation.
- **Capacity Increases:** Capacity increases are done by unit (taxicab), but the number of authorized new licenses depend highly on the policy of city authorities. the present administration trends to keep a relatively stable number of licenses but it is impossible to predict what will happen in 1994, when the new administration takes office.
- **Diversity of Competitors:** Almost all of the competitors work in the same environment with the same operation systems, but recently some few operators have shown interest in more institutional structures and modern managerial structures.
- **Strategic Stakes:** All the operators have all their resources in the same industry and most of the time is their only income source. Only recently, people not related to the industry have started to buy some units as marginal investments.



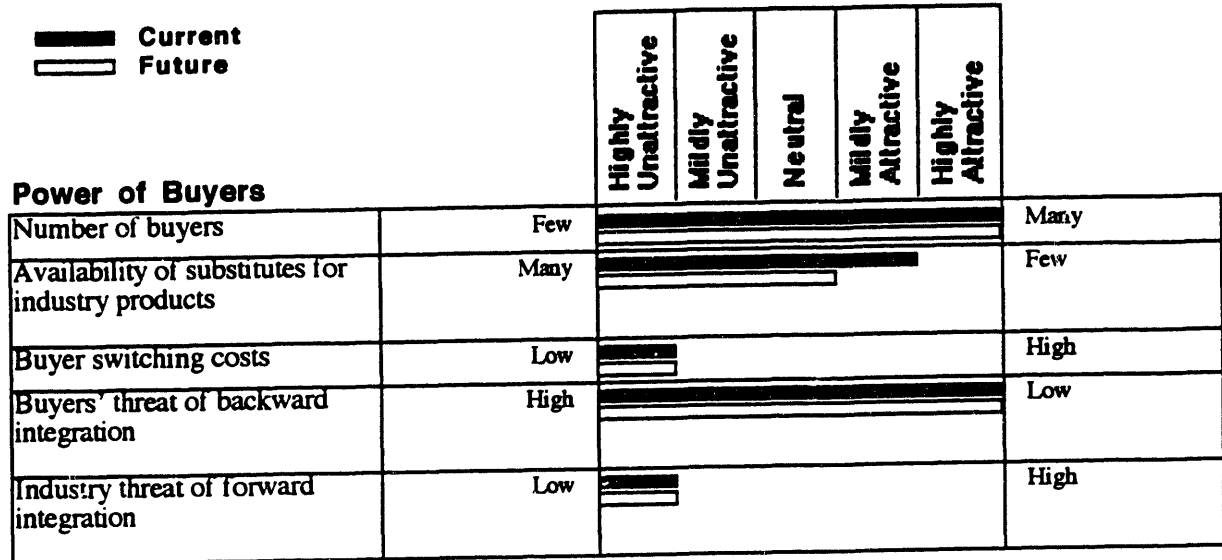
4.1.4 Power of Buyers

Power of buyers is relatively low, as we will see in the following points:

- **Number of Buyers:** There are approximately 9 million passengers-trip per day.
- **Availability of Substitutes for Industry Products:** There are only two substitutes for the taxicab service. Private cars, which are much more expensive; and public transportation which is not as available and flexible as taxicab services.
- **Buyers Switching Costs :** The buyer has some options, but: the city does not have enough public transportation infrastructure, and the country has a very low income and most of the people can not afford to have a car.

The only inconvenient of taxicabs, is that their services are much more expensive than all other means of transportation which makes switching cost an important factor, and more when many of taxicab customers are somehow, price sensitive.

- **Buyers Threat of Backward Integration:** There is not a big possibility because most taxicab customers have relatively low incomes for the investment.
- **Industry Threat of Forward Integration:** Economies of scale and captive markets make feasible forward integration, but it requires bigger capital, which most of them do not have.



4.1.5 Power of Suppliers

Power of suppliers is neutral, as seen in the following points:

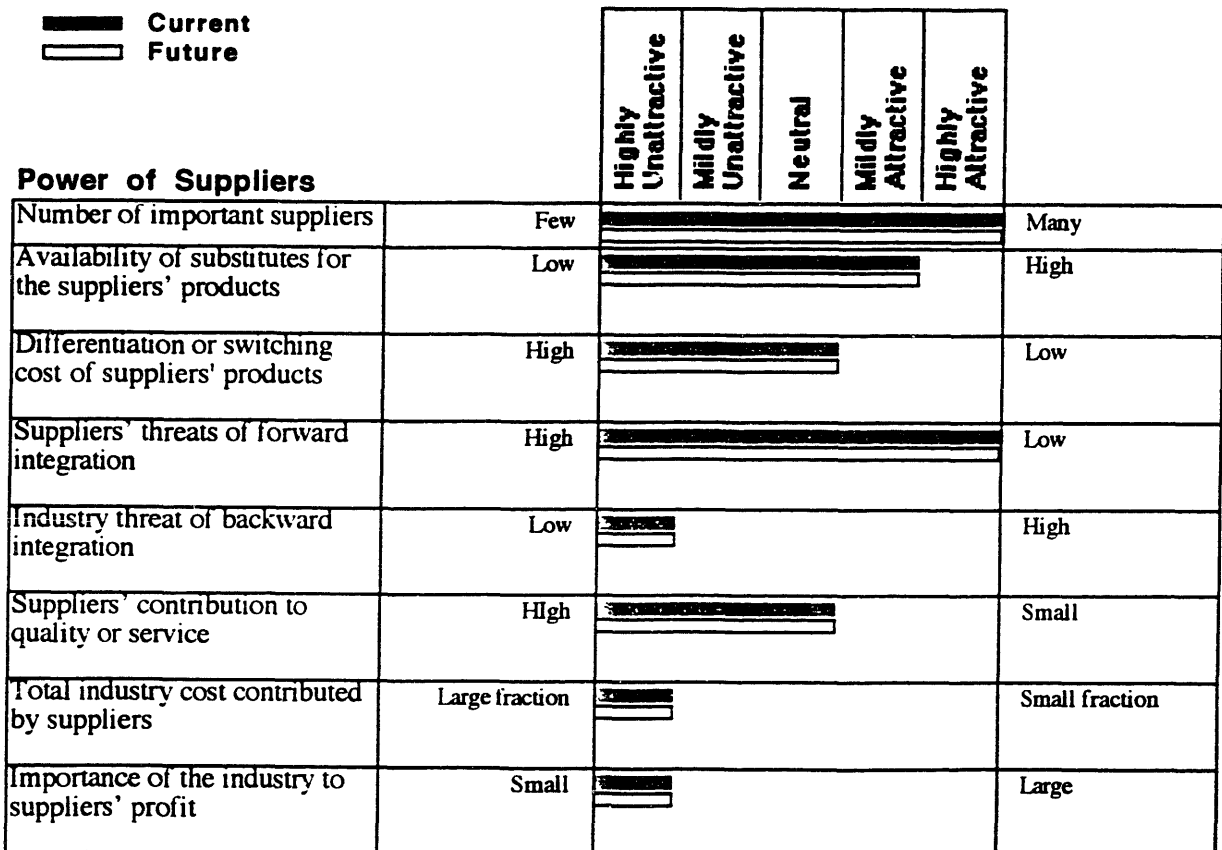
- **Number of Important Suppliers:** There are many. The cars used as taxicabs can be of any brand. Currently most of them are Volkswagen Beetle, because is the cheapest and easiest to maintain car, but is highly available (used and new). Volkswagen even sells the car almost ready to operate as a taxicab (color, interiors, etc.).
- **Availability of Substitutes for the Suppliers' Products:** Not all the operators can afford to buy other car brands or bigger models. Many of the operators depend on the availability of used cars.
- **Differentiation or Switching Cost of Suppliers' Products:** It is more efficient to have a homogeneous fleet (same brand) to reduce costs of maintenance, maintenance training and inventory and this makes taxicab operators more willing to depend of one brand. But there are always many

suppliers (repair shops, autoparts, etc.) too chose from.

- **Suppliers Threats of Forward Integration:** Taxicab industry is too small for car manufacturers for forward integration. The business of producers is manufacturing and not services.

The only suppliers that may be interested in entering the industry are repair shop owners.

- **Industry Threat of Backward Integration:** This is only possible in the case of maintenance facilities, but as said before, requires capital.
- **Suppliers' Contribution to Quality of Service:** It is important for new units because the quality of the service depends on the quality and reliability of the units among other things. But in the case of older units it depends more in the maintenance program.
- **Total Industry Costs Contributed by Suppliers:** As said before, taxicab operators have relative high fixed costs and the most important of them is the investment in cars.
- **Importance of the Industry to Suppliers' Profit:** It varies, but in all cases taxicab represent a small number of new units sold per year.



4.1.6 Availability of Substitutes

Substitutes are not a big threat, but are present, and this is reflected in the following points:

- **Availability of Close Substitutes:** As said before, there are not many alternative transportation means as flexible as taxicab service. Substitutes are represented by private cars and public transportation, but it is hard to keep transportation infrastructure growth at the same level than population in a city as big as Mexico City.

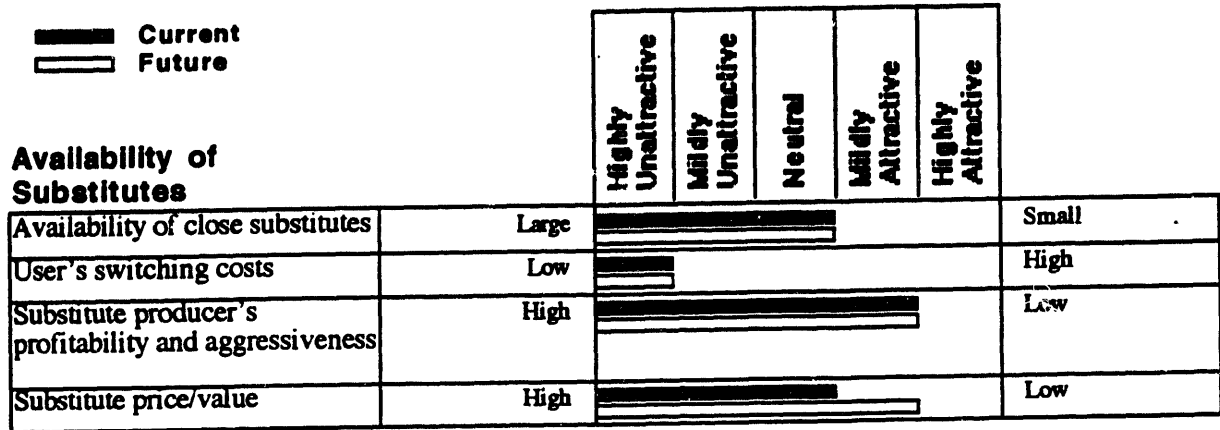
Public transportation compete with taxicab services not only because of the quality of the service but because of the price.

- **User's Switching Costs:** For urban transportation the difference of price ranges between taxicabs and other public transportation modes are appealing for only those who are not price sensitive (small percentage of population).

- **Substitute Producer's Profitability and Aggressiveness:** in the one hand, all substitutes operated by the government do not offer any profitability aggressiveness, because these services are subsidized. in the other hand, minibuses (and also some buses), are being operated by private investors and even when they are profitable and show some aggressiveness, their fares are regulated as well as taxicabs' so there is not much room for competition.

- **Substitute Price/Value:** For the moment real income is low and therefore the option of cars as substitutes are far from being affordable for most of the population. Only in the long run, if real disposable income increases, car transportation could take a significant share of the market business, but any how there is not much space for cars in the city.

In terms of Public transportation, Price/Value is relevant and one of the causes for the substitution of taxicab services by users. We might think that for most of the population of Mexico City, transportation is a commodity where price is always more important than product features in most of the cases. But as explained before, the characteristics of taxicab service is unique (flexibility and availability) and therefore, because of the lack of enough public transportation the impact of substitutes' price/value is lower.



4.1.7 Government Action

Government action has been regulating taxicab operations and has a strong presence.

- **Industry Protection:** No foreigners are allowed to enter the market and only those individuals who get licenses are approved by the government can give taxicab services.
- **Industry Regulation:** Tariffs are set by the government, as well as age and some environmental characteristics of the units.

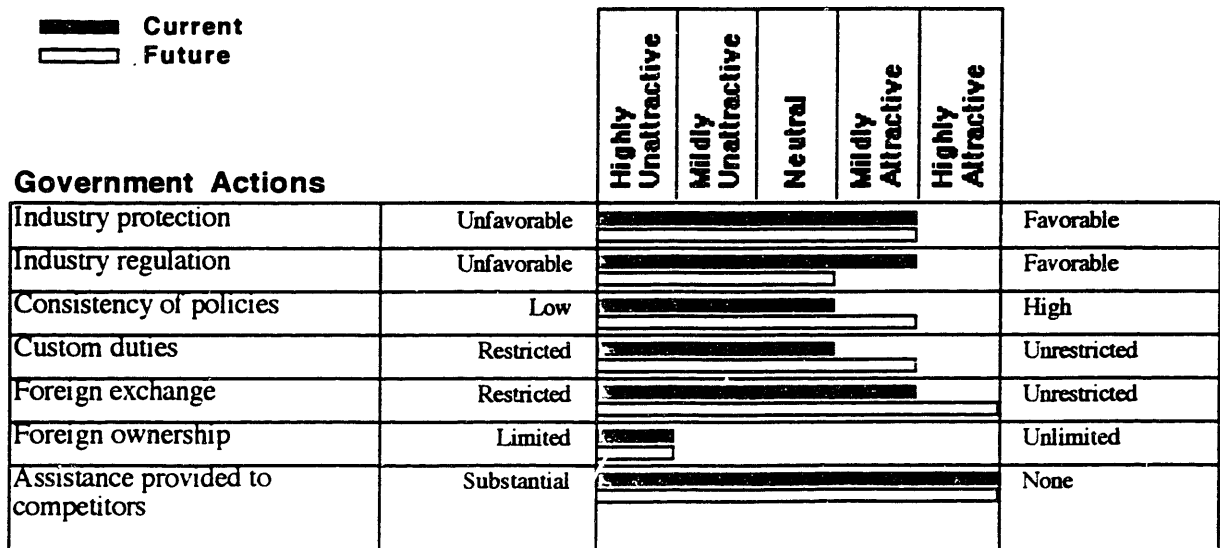
In the last few years the government has increased their emphasis in pollution control and has push legislation to reduce the average age of the taxicabs to a maximum of five years imposing also a more strict verification of emission control..

The government has change the fiscal treatment of operators cutting the previous special treatment of taxicabs, this is pushing the sector to a more efficient capital use and cost allocation.

- **Consistency of Policies:** The number of licenses has been consistent in this administration and it seem that it will continue that way.
- **Custom Duties:** Taxes and tariffs have been lowered for some expensive car imports but they still do not affect the industry. But in ten years, if the North America Free Trade Agreement is signed we can expect to see all kind of cars in the Mexican Market.
- **Foreign Exchange:** Foreign Exchange is relevant for those imported units or equipment, and for their spare parts as well as imported components for Mexican produced cars.

Foreign Exchange plays an important role if investing if we consider investing in dispatching technology.

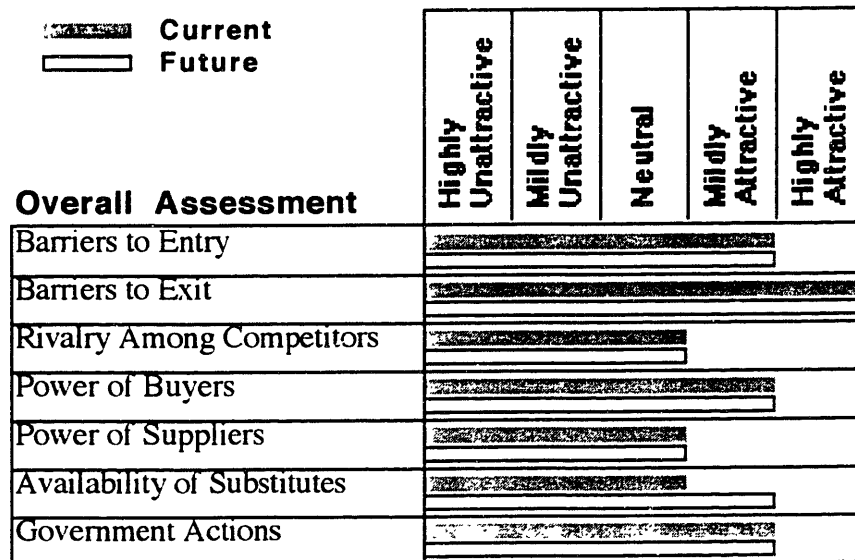
- **Foreign Ownership:** There is non. An almost sure it will not be.
- **Assistance Provided to Competitors:** The government is trying to change all minibuses fleet (capacity of 22 passengers), to buses (40 passengers capacity), but is not offering any subsidies or special incentives at the moment.



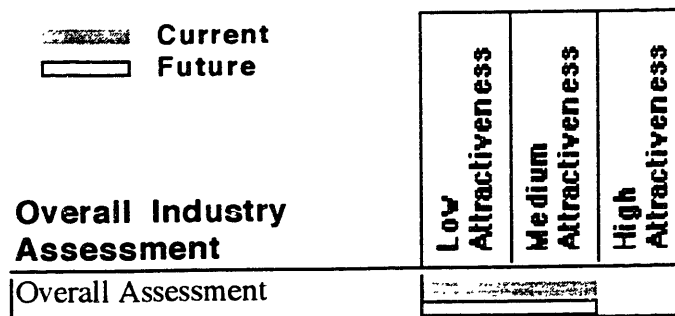
4.2 Overall Industry Assessment

Summarizing my analysis, we have the following results:

- Barriers to Entry: mild attractive in the present and in the future.
- Barriers to Exit: Low.
- Rivalry Among Competitors: Neutral .
- Power of Buyers: Neutral.
- Power of Suppliers: Neutral.
- Availability of Substitutes: Neutral.
- Government Actions: Present.



So these leads us to say that overall the industry shows a medium attractiveness both now, and in the future.



The Industry presents the following Key Opportunities:

- A highly profitable growing market
- Unattended niche markets, where services could be offered.
- Potential for Professional Management Advantage
- Captive markets where other product could be offered.
- Potential to make joint ventures with Repair shops and dealers.
- Potential to develop Information System Technology and Dispatching services and sell services to small operators.

But also presents the following Threats:

- Potential capacity saturation.
- Possibility for consolidation process with mergers and acquisitions
- Uncertain exchange rate for imports
- Long Term Uncertainty of Demand (depending of economic development).
- Appearance of competitors in some other transportation mode.

4.3 Conclusion

Overall it seems that the taxicab industry could be very profitable business for small and big investors who have the resources to invest in technology and have the organization to control costs and quality. It seem that the ones who are best in this two last factors will get the most in the long run and will still be profitable even under tight market competition.

The changes in this industry will not happen very fast but in the mid term we will see the results of further economic development and the opening of car imports.

There is room for foreigners for the supply of equipment, parts, capital and technology, but is hard to visualize a foreign competitor giving transportation services if it is not allied with a Mexican partner, even in the long run.

Future investments and regulation changes in public transportation and private car use will give the picture of what is going to be the taxicab industry in the long run.

Chapter 5

Marketing Analysis

5.1 Customer Analysis

As service becomes more important in terms of consumer's satisfaction assurance, there is a strong need to understand what kind of approach is more effective to reduce the gap between product features and customer's satisfaction.

In order to do that we need to know which are the elements needed to satisfy customers expectations.

As seen in point 2.1.4 taxicab users are varied, and have different characteristics.

From the point of view of the customer, the frequency of taxicab usage depends on:

- **Demographics:** age, income, sex, physical disability and location (where they live and where they go), and purpose of the trip.

Among these the most important factors are income and purpose (destination) of the trip.

By purpose, taxicabs are used to go to: Home, Work, Shopping, School, Social-Recreational, Personal Business, Eating, Medical and Dentist, Civic and religious, and as interface for other transportation means.

By Income, taxicabs are used more by low and mid income persons than high income persons.

Low income persons then use taxis to go to: shopping, doctor, personal business, or when other public transportation modes are not available. Showing an increased usage on weekends and on the first and the second week of the month when they get their paychecks and do more shopping.

This segment is more price sensitive, and includes many persons with pensions, that may have physical movement restrictions and for which taxicabs are their only transportation mean.

High income persons use taxis more sporadically, and they use them more to go to work, airports, shopping, eating or in cases where they do not have a private car available for transportation or where they need to go to a place where parking space is limited.

- Psychographics; which consists of:

- motives: availability, waiting time, speed and safety, which can be translated to: arriving when planned, no transfer calling and no delay, less walking distance, direct route and safety.

- needs: substitution of public or private car transportation, which can be translated to the following situations: regular mode of transportation non available, carrying packages, difficult to walk to bus stop, frequency of buses available, and trip duration.

- interests: work, school, entertainment, medical, shopping and eating.

In general what customer expects in a taxicab service is: immediate delivery, personal attention and respect, accurate cost estimates, convenient hours, good price/value, and service guarantee.

What customers do not expect or like is to bargain price, to wait, and to deal with bad attitude drivers.

5.2 Concept Design

The long term success in this industry is given by managing financial resources adequately, reducing costs, and keeping or improving the quality and delivery of their service.

This is easier to achieve when the organization keeps its focus on the scope of services it gives to satisfy the market segments it chooses to work with. So the target of the concept design is exactly to identify the target market and design a differentiated service suitable for it.

Not all the markets behave equally, so it is important to identify the target market that will enable the organization to operate successfully in the medium and long term.

In order to identify the segment to work in, we need to distinguish the

service used by segments.

The first step is to identify if users require a relationship approach (support service), or require a transactional approach (just as a commodity, standard market products). In this sense, taxicab customers are more in the transactional part (commodity), because switching cost are low, there is no customer loyalty and the service implies a very low risk.

Nevertheless, there are some particular taxicab services that show a more relationship approach. These are the services to places where customer appreciates to have a more on time delivery, like airports or important appointments.

This two kind of services represent potential niche markets where customers are less price sensitive, and where new services could be introduced (express taxis to the airport, and executive taxis).

For the moment we do not want to speak about new services. We rather concentrate our focus in core of Mexico City's taxicab service: "the regular service", which still shows big growth potential (2% per year = population growth).

We have to focus on competencies and growth in the segments of the market where we can have an advantage in the long term, and be cautious to measure the long run risk/benefits of entering new segments.

Expansion to other services is only viable if there are the systems to support the infrastructure of the organization as well as there is the government authorities' approval.

The idea is to design an improved and more predictable "regular service", that differentiates itself from other regular services with hard to copy characteristics.

The guidelines for designing this improved service are to keep standards simple, look for a broad appeal, improve the quality of the service and keep happy servers.

In order to do so, we propose to introduce a more industrialized taxicab service, where efficiency, technology and volume can be transformed to a more reliable, rapid and low unit-cost service.

This means that we want an operator with efficient management planning and control systems that assures easy access to a more responsive, convenient, reliable and personalized service, with more coverage and, at the same time, less operation costs.

This service can be improved continuously, as the processes, the technology and the people of the organization improve. The idea is to start from the basics and build an organization with a culture toward improvement and innovation.

The idea is to focus on continuous change or improvement in services and also in innovation. This concept is shown in figure 8.

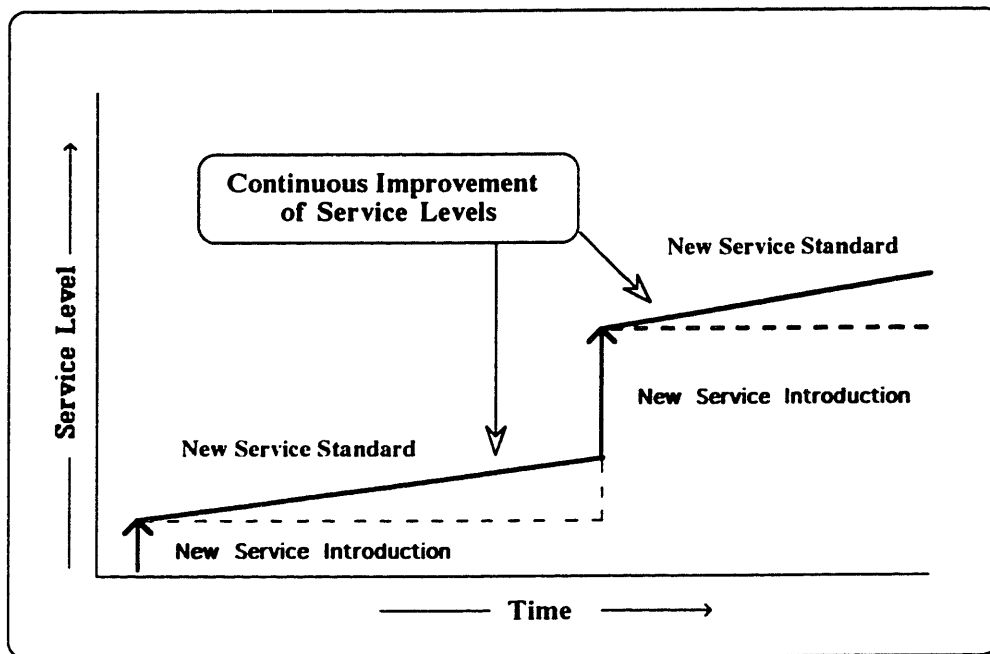


Figure 8.

In a first phase, in order to take advantage of Mexico City's current situation, we have to improve the way systems work to reduce costs and then promote and institutionalize a culture environment toward change.

In a second phase we can think to enhance existing services, that could include:

- **Contracts with private companies, private individuals, hospitals, schools, Social Service Agencies, Transportation Authorities, and Government and other Agencies.**

The users of Contract services are: company employees, school children, hospital patients, government employees, blood and hospital supplies, senior citizens, public aid recipients and handicapped.

Another form of contract could include package services a mixed passenger and package service in order to use excess passenger space. This space may be leased to companies like DHL or big firms that require to send packages from point to point on a regular basis.

- **Airport Service: if a franchise could be granted by the airport authorities. (airport authorities have a monopoly in airport transportation).**
- **Tourist taxicabs: an agreement could be signed with hotels and taxicabs could be provided by appointment or directly with drivers with some English language knowledge.**

To offer better services in the two first phases, when the level of technology is low, the process of continuous improvement will focus on people, because people can only produce better quality products when they have better skills (quality as professionals).

In a third phase we could introduce dispatching technology in order to increase efficiency and availability of the service. Technology is important to assure the product's quality , low costs and delivery .

In these third stage, the focus on continuous improvement is on the technology. Usually a company needs to go from a process of continuous improvement on people (to make them more productive), to a process on continuous improvement in technology, assuming that the level of knowledge of people depends on the product requirements to satisfy customers' needs.

In order to get into this third stage, the organization's managerial procedures and systems, the labor force and the level of knowledge (technology) must be enough developed. In this sense we have to consider that labor motivation for change is not the same as for technology.

Labor motivation for change depends on their expectations, and these expectations depend on the cultural background, knowledge and life style

of each individual. Generally we can see that people expectations in a company are not homogeneous but if seen carefully most of the times people of same hierarchical level tend to have similar expectations (for instance secretaries, workers, management , etc.).

People's expectations change in time and these changes require new skills that can only be achieved by learning through experience or training, so people's expectations have to be changed before implementing any training because otherwise learning will be forced and training will not be as effective.

5.3 Marketing Strategy

Now is time to present a marketing strategy that fits the needs of the taxicab organization in the environment we have analyzed along the previous chapters.

The marketing strategy has to be based on the service intended to offer (regular taxicab service), and the customer needs and expectations.

The purpose of this market strategy should therefore be to fully meet the needs of the customers without sacrificing quality of service and reliability, in order to create a reliable image of the taxicab organization.

5.3.1 Pricing

Pricing is regulated by the authorities, and therefore can not be increased. However, in order to compete with other taxicab service providers, the organization may offer volume discounts to regular clients or large accounts (if contracting is used). Another possibility is to make discounts to customers depending in their monthly ridership.

The taxicab organization must also put attention to price sensitive customers and try to offer small discounts (old and handicap people).

In order to match supply with demand it is important to consider fluctuations in demand and offer more discount when ridership is lower.

5.3.2 Product

Customer needs can be divided in two categories, the main service that is the adequate transportation; and the facilitating services that are the details (uniforms, friendliness and environment) .

Customers look for both but are more interested in the transportation service convenience which is their main objective is transportation, the facilitating services are not as important, but help to differentiate the company's services and make customers perceive a higher value return.

Both, main service and facilitating service constitute the packaging of the product, which gives the whole transportation experience (other features that can be considered to be offered are credit to customers, and cellular phone service.).

The strategy is to differentiate its service by quality translated in special attention to customers. The company would follow the strategies of good maintenance, new equipment, well selected personnel and extensive training to assure quality standards and reliability.

Technology plays an important role. In one hand we have car technology that makes them more efficient and reliable in speed, and safety; and in the other hand we have information technology that gives the opportunity to produce faster and more complex control and planing systems.

Another tool that must be used to improve level standards of delivery and reliability is quality control.

Quality control should not be done by measuring the ratio of passengers to complaints or compliments because customers who write them could some times be biased and have a misleading perception of what the service standard is designed to be.

A more accurate source for quality control measurement is the data gathered by feed back from driver reports, evaluations and statistical operating data; but a more extensive quality program has to be used in which competitors` performance, customers` expectations and other market factors have to be considered.

Government statistics can be used to compare the industry trend, but to be more realistic, the operator has to reduce the three year gap in the publication of official results by complementing the data with internal

research.

The company has also to deal with the problem in quality, caused by excessive charges and drivers` attitude, because these areas are critical to differentiate and to stay competitive. To solve this problem, we would recommend to use team units to improve quality. Teams can be made by drivers and can be used to introduce group evaluation and push drivers to supervise other team members for their benefit.

5.3.3 Distribution

Drivers are the interface between the company`s service and the client, and are the only distribution channels.

The company should focus on customer expectations on its distribution of services. For that the company should consider that:

- Training should focus in the communication, problem solving skills and customer psychology needed to achieve the company`s strategic goals. Growth has to be planed considering training limitations.
- Performance measure must be more objective and must focus on qualitative and quantitative criteria related directly to the drivers` tasks, and must not be subject to the personal relationship between evaluator and evaluated. Client evaluation during transportation could help to improve feedback. There must be also an evaluation on the interest of the employees careers within the company.
- Productivity and performance can be measured by the change in the ratios of passengers/car, revenue/passengers, passengers/staff size and average ridership between others.

In order to keep a stable flow of taxicab services, the company needs to take into account that the company growth is constrained by the ability to hire and train skilled personnel (distribution -drivers-).

In this respect capacity of labor, capital and equipment has to be determined on demand forecast basis and has to consider the time gap on training people, developing systems and acquire new equipment.

Manpower Planing is very difficult in a very labor intensive industry like the taxicab industry, so they need to take care of getting people with the

adequate skills and also to develop training, motivational incentives and reward systems to keep their staff. These systems have to be consistent with the company's strategy and also have to consider the external environment constraints.

Drivers should be rewarded in terms of ridership, mechanical condition of their units and repair record. Drivers with high and stable ridership may receive additional bonus for their performance.

A thing to have in mind is that low labor cost may be something that could disappear in time so there is a need to start adapting the strategy of the company to stay competitive and differentiate the services to stay profitable in the long run.

5.3.4 Promotion

To promote the company's commitment to quality, it is possible to start advertising campaigns in a small scale to educate customers about the service, and a brand name can be established.

The company should also establish incentive programs for drivers that encourage the formation of a customer base (regular clients), and encourage their communication with them.

The company can also offer credits to drivers when a certain level of regular customer base is achieved.

5.4 Impact of Implementing the marketing Strategy

The implementation of this strategy will enable the company to promote a high-quality and reliability image among all its customer, setting some brand recognition.

This marketing strategy should also effectively deal with the possibility of an increase in number of taxicab licenses in the future. Moreover, it will allow a significant industrialization of the service.

Introducing service contracts to companies for the transportation of passenger and packages; and increasing the regular customer base and offering discounts and promotion will allow the company to increase ridership which may be translated to higher profits.

Chapter 6

Insights

The overall strategy for a taxicab company in Mexico City is focusing on growth of market share in Mexico City's taxicab market.

To increase market share the critical issues that one have to consider to be successful in this Industry are:

- **Quality:** depends much on human resources. You can't give quality if people don't have it. To promote quality there is a need to promote training and understand the learning curve effect in the organizational culture as well as the impact of hiring policies, compensation, and most important, the quality of the management team, because management policies are responsible for a big percentage of the results and failures, because it provides the tool needed to reach desired goals.

Cost structure : costs are critical to compete in order to keep the company profitable even with small operation margins. Costs depend on fuel efficiency of equipment (depends most of all on age of equipment), wages, fixed assets, maintenance, capitalization and finance conditions .

Delivery: depends on the identification, target and satisfaction of the desired segments where the taxicabs operate (leisure, business, other). For an adequate delivery we need a good market research to identify potential customers where we can have a domain advantage, then we need the fleet, routes, and human resources as well as the systems to operate it (dispatching function).

Financial Structure: In the one hand, liquidity is essential to keep operations, it indicates how well the operation is doing. In this kind of industry, accounts payable (repairs, fuel, etc.) are always there, but accounts receivable vary depending on the ridership behavior and market situation which fluctuates easily and can't have control of.

The strategy to increase market share can be implemented by working on five basic objectives:

Client Base Expansion: In order to growth, diversify to different consumer segments and establish a plan for geographic expansion

Quality Assurance: Promote a company's culture by training.

Cost Cutting: Reduce cost by industrializing the service and the use of technology and scale.

Distribution of Products: Improve driver- owner relationship and offer customer oriented training to drivers.

Technology: use benchmarking and be a follower in technology.

In terms of the investment required for operations and its value, we have to decide if an investment opportunity will add value to the firm's operation, but the hard part comes in establishing which criteria, given the amount of data available, is the best to measure adequately the impact of a project in a company's operation.

First we have to define what makes a project valuable for the company, is it just the cash flow, or is it the permanence of the business? The problem is that is hard to measure the value of anything in a dynamic business environment where all the variables are changing in time, but we can get a good idea of what's going on if we identify the critical issues.

To identify the critical issues we can divide the analysis in two different, but equally important measuring criteria, the first one oriented toward results (here we include money), and the second one oriented toward the process and the long term strategy of the company.

Is hard to tell which point is more important, because if there is much emphasis in the result criteria we lose the long term perspective, and if there is too much attention in the process and the long term strategy of the company we may underestimate the value of doing the investment.

In terms of the structure of the taxicab organization, the idea is to create an organization that will undertake the following main functions:

- Provide administrative services for taxi-owners;
- Reach agreements with the suppliers of vehicles, fuel. etc.;
- Market taxi services;
- Train and recruit drivers;
- Adapt the number of vehicles in traffic to the demand;
- Operate services with its own vehicles;
- Sign contracts with major customers.
- Create new services.

And in order to make the creation of this organization easier there are three recommendations to consider:

Keep Things as Simple as Possible.

There is a need for a clean organization structure in order to ensure the proper communication at all levels, not just from the top to the bottom but from the bottom to the top. This way the strategies and policies can be transmitted as well as the problems that arise from its implementation.

Use all the systems and tools that will help to simplify the operation of the company, because it is the only way to reduce cost and make the company flexible to respond faster to any needed change.

Improve Continuously Core Competencies.

In order to create the opportunities for improvement, identify and recognize problems and mistakes and be open for new ideas. Establish a way to measure the development of the company's strategies and policies to check results and stimulate learning.

Manage through leadership .

Driving the company through values is more effective than through control systems. For the long run success of the company there is a need to manage through leadership, experience and personal convictions and not only through authority.

To change people expectations, we have to think in money compensation and recognition compensation achieved by giving more responsibility and decision making power as well as rewards for intellectual work to people. It is hard to establish an optimal mixture of compensation to achieve a desired change in expectations, and that is why companies are always changing their compensation and incentives` system.

Compensation changes do not always bring the expected benefits (mostly in the labor force), but that is because most of the time companies lack understanding on which are their employees expectations and do not design a compensation system according to their expectations,

Then to implement a successful change there is a need to reduce the gap between labor expectations and what a company makes them perceive. To do so, there has to be an alliance between the management and the labor force to work together in a kind of partnership where the most important issue is to understand what is what other part needs to win in order to be motivated and make the alliance work for the benefit of everybody.

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