

**ÉTUDES ET
RECHERCHES
EN TRANSPORTS**

SUPPLY AND DEMAND IN THE QUÉBEC TAXI INDUSTRY

SUPPLY AND DEMAND CHARACTERISTICS

MICHEL TRUDEL

**SYSTÈMES
DE TRANSPORT**

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ABSTRACT

The ministère des Transports du Québec has conducted a study on the characteristics of supply and demand for taxi services in Québec's 53 urban areas. The methodology used for the study consisted in systematically recording calls received by service associations and in conducting two surveys of the activities of 1 000 taxi drivers selected at random.

The first survey was conducted in November 1984 on 500 taxi drivers in Montréal-Centre, which issues 52% of Québec's taxi permits. The second survey, carried out in November 1985, was also directed at the activities of 500 taxi drivers working in one of the 14 participating urban areas.

The methodology employed allowed researchers to obtain a body of data on the number of calls recorded for the month of November by day, hour, urban area stratum, driver, vehicle, customer and trip. These data were used to determine the various productivity and profitability indicators by stratum and observation period.

In November 1985, 1 184 000 calls were recorded for taxi service associations outside Montréal-Centre; the November 1984 figure was 866 000. The proportion of trips made following calls decreased indirectly with the size of the area, with 94% in small and medium-sized areas, 72% in the very large urban areas and 32% in Montréal. Therefore, the number of trips actually made by taxis is much greater than these 2 million calls recorded over the month. According to our compilations, the number of trips totalled 20 million in 1985 for all urban areas excluding Montréal, and 31 million in 1984 for Montréal. This represents a total of 50 million trips, for 70 million passengers transported and an overall sales figure of more than \$220 million.

1. OBJECTIVES AND METHODOLOGY

1.1 Context and objectives

The taxi industry data bank project was begun in 1984, on the eve of the implementation of the plan to buy back taxi permits in the Montréal Urban Community. First, statistical surveys were conducted to gather data on the supply and demand for taxi services in Québec's various urban areas. Then, these data were combined with socioeconomic and geographic variables. These statistical surveys were conducted using a methodology developed by the Bureau de la statistique du Québec at the request of the ministère des Transports du Québec. This methodology was adapted to the specific features of the Montréal Urban Community by the Service de la statistique in keeping with the Department's objectives.

The objectives of this project were:

- (1) to estimate the supply and demand for taxi transportation services in Québec's urban areas;
- (2) to measure the impact of new markets on taxi service supply and demand;
- (3) to evaluate the minimum demand for public passenger transportation given that taxis are prime passenger carriers in several urban areas; and,
- (4) with the help of indicators, to determine taxi service quality and availability and the industry's productivity and the profitability in order to establish the optimum number of taxi

permits for each urban area.

The first survey was conducted in the Montréal Urban Community in fall 1984. Its results were transmitted by the Minister of Transport to the industry's principal representatives in October 1985 (Appendix I). A second survey was conducted in fall 1985 in 14 urban areas of assorted sizes. The present document gives the results, which are presented by groups of urban area strata depending on their size and the observation period (Appendix II). The results obtained in Montréal in 1984 are also given in certain tables for comparison.

The success of this study was made possible through the full cooperation of various parties within the taxi industry: drivers, directors of various taxi leagues, and taxi service association coordinators. This unflagging cooperation continues since some 65% of service associations continue to record their daily calls.

All parties that provided confidential data have been assured that sources would not be divulged. The results for each individual association are also available to authorized individuals upon request.

1.2 Sampling and data sources

Data on taxi service supply and demand were obtained in two ways: by systematically recording the calls received by taxi service associations, whose role is to dispatch customer calls to the drivers; and by conducting two surveys of taxi drivers, one in

November 1984 and one in November 1985. Since the methodology used for the Montréal-Centre survey has already been described (Appendix I), we will describe only the methodology used for the survey of the other urban areas.

1.2.1 Call recording

At the request of the ministère des Transports du Québec, taxi service associations have been recording the number of calls they receive daily since April 1985. Hence, these data were available for every day of November 1985. Moreover, the service associations that participated in the special November 1985 survey (some 25 associations of varying sizes) recorded this information in great detail, hour by hour, for each day of the month. The results of this tally are given in sections 2 and 3 of Appendix II.

1.2.2 Driver survey

In November 1985, once again, we interviewed about 500 taxi drivers chosen at random. The only criteria were that they belong to a taxi service association and that we be able to contact them by telephone. Drivers were surveyed in 14 taxi areas, also selected at random. Québec's urban areas, excluding Montréal-Centre, were divided into four strata based on five criteria (population, number of permits, population density, surface area, and presence or lack of a public transit system).

Fourteen (14) urban areas were selected at random from among these groups. Then, almost all of the service associations for these urban areas were contacted regardless of their size. Cooperation was, once again, exceptional and some 25 associations participated in the survey and the hourly call recording process. Overall, these associations represent close to 40% of the permits issued outside Montréal-Centre. Table 1.1 shows the relative size of the various strata and their rate of participation in call recording and in the survey. Appendix IV gives a detailed presentation of the urban areas belonging to each stratum and those that participated in the survey.

The following method was used to interview drivers. A Department observer called a service association to obtain a taxi, introduced himself to the driver, asked the driver whether he would participate in the interview and, if the driver agreed, asked to be driven to the service association office. During the ride, the observer completed a questionnaire on the driver's status in the firm, his age, experience, work habits and vehicle (Questionnaire A: Appendix V). Once he had arrived at the service association office, he paid for the trip and asked the driver to fill out a survey form during the next two hours of his usual work day (Questionnaire B: Appendix V). This questionnaire contains data on the trips made during this two-hour period

(duration, trip distance and cost, method of obtaining the customer, etc.). The observer also gave the driver a questionnaire for subsequent two-hour period.

Then, the observer gave the driver several copies of a third questionnaire that customers would be asked to complete and return to the driver. This questionnaire touched on the main features of trips (reasons, origin, destination) and customer characteristics (how often they used taxis, their age, sex, occupation and place of residence) (Questionnaire C: Appendix V).

During this time, the observer inventoried the calls received by the service association and was able to record the trips accepted by his driver. At the end of these two hours, the driver returned the completed questionnaires B and C and the observer paid for this last trip.

About 500 drivers, 91% of those selected at random, agreed to participate in the survey by completing the questionnaire on their activities over a period of 2 consecutive hours and distributing the third set of questionnaires to their customers. Overall, we had data on 1 862 trips and information from 1 111 customers who completed Questionnaire C. The results of these questionnaires are given in sections 4, 5, 6 and 7 of Appendix II.

Questionnaires were distributed over a 4-week period beginning Sunday, November 3, 1985, November being generally considered an average month for transportation demand. Interviews were distributed over the 84 2-hour periods in a week. To allow a more accurate comparison of data gathered at various times of the week, the week was divided into four relatively uniform observation periods. Table 1.2 details how these observation periods were defined.

TABLE 1.1
URBAN AREA PARTICIPATION
IN THE SURVEY AND CALL RECORDING

Urban area strata ¹	No. of urban areas ¹	No. of permits	PARTICIPATION IN		No. of urban areas surveyed
			call recording (Nov. 85) (in % of no. of permits)	survey	
Small	17	299	56	28	3
Medium	25	960	63	25	6
Large	5	418	78	39	2
Very large	5	1 603	94	50	3
TOTAL	52	3 208	79	39	14
Montréal-Centre	1	5 222 (2)			1

- 1 The list of all Québec urban areas and their division by size into strata is given in Appendix IV.
- 2 The number of valid permits in June 1985 before the enforcement of the taxi permit buy-back plan.

TABLE 1.2
OBSERVATION PERIODS

2-HOUR PERIODS	DAYS OF THE WEEK						
	MON	TUES	WED	THURS	FRI	SAT	SUN
00:00 to 02:00	A	A	A	A	A	A	A
02:00 to 04:00	A	A	A	A	A	A	A
04:00 to 06:00	A	A	A	A	A	A	A
06:00 to 08:00	D	D	D	D	D	B	B
08:00 to 10:00	D	D	D	D	D	C	B
10:00 to 12:00	D	D	D	D	D	C	B
12:00 to 14:00	D	D	D	D	D	C	B
14:00 to 16:00	D	D	D	D	D	C	B
16:00 to 18:00	D	D	D	D	D	C	B
18:00 to 20:00	C	C	C	C	C	B	B
20:00 to 22:00	C	C	C	C	C	B	B
22:00 to 24:00	C	C	C	C	C	B	B

Observation periods :

- A: night (every day)
- B: Saturday evening, Sunday and Sunday evening
- C: weekday evenings and Saturday
- D: weekdays

1.3 Data validity and interpretation

The survey and call recording process resulted in a considerable body of data which the ministère des Transports du Québec wishes to make accessible to the parties involved. We invite these groups to indicate which analyses they would like done using these data. Thus far, some preliminary results are available.

This study represents a summary of the preliminary results and also an introduction to the detailed results available for consultation in a 7-volume report described in Appendix II. Results from the call recording are shown without any indication of the margin of error, which is difficult to estimate since data are the result of an incomplete record. Margins of error are probably very small. Results from the survey are shown with the margins of error calculated. Variations in these margins are normal. Where the margin of error is less than 15%, results are considered very good. In the 20-25% range, results are considered unreliable; we have shown them for information purposes only.

The following caveats apply to the summary of the data and the entire statistical report:

- A- The Montréal-Centre area is excluded from the 1985 survey. Data obtained from the Montréal-Centre urban area in 1984 are shown in this document for comparison only.
- B- Calculations are based on all vehicles (or permits) operating in one of the 132 taxi

service associations. For this purpose, we considered that a vehicle operated in an association if the driver could be reached by telephone, whether he was alone or with others. All other permit holders were considered to be independent operators working directly on the streets. Such operators were excluded for practical reasons; they number about 50.

C- The number of permits per service association is variable. Our calculations for November were based on information obtained for this period from associations or league directors.

D- Given the survey method employed, we used certain special definitions to establish the number of vehicles on duty, and we are aware of their limits. The number was determined based on the number of vehicles that had accepted calls. For example, if the number of vehicles is 1 278 for Monday morning from 7:00 to 8:00, this means that 1 278 vehicles accepted at least one call during this time. This figure represents a minimum estimate of the number of vehicles on duty since it does not reflect those taxis which do not receive calls because they are making a long trip, cruising, under contract or waiting at a taxi stand. The proportion of taxis cruising or waiting is much higher in large or very large urban areas than in small or medium-sized communities. Similarly, neither the call recording nor the survey includes those taxis working at Montréal airports, namely: 136 taxis for Montréal-Centre, 44 for Montréal West

and 15 for east-end Montréal.

- E- Data from the driver-completed survey describe taxi service supply on a two-hour basis, in accordance with the method used for the survey. Results presented in volumes 4, 5, 6 and 7 regarding the number of trips and distances covered are broken down into two-hour periods.
- F- Results shown are averages. They do not reflect each driver's actual work, but rather the work done by a relatively large group of taxi drivers. Each driver can, however, see whether his work is in line with the average.
- G- The only data presented by urban area are those from the driver-completed survey. These data describe the work of these drivers, on an average. They do not characterize any agency, association or league. Data on calls from associations are grouped together for much larger regions than the urban areas.
- H- In our opinion, the data presented reflect the taxi industry quite accurately, at least in its main features. The survey team, which was also responsible for compiling results, is open to any comments which may help in interpreting these data, as they feel they cannot do so properly without the assistance of those working in this sector.

2. NUMBER OF CALLS AND VEHICLES ON DUTY

2.1 Number of calls daily in November 1985

In November 1985, 1 184 000 calls were recorded by service associations in urban areas, excluding the Montréal Urban Community. A total of 865 814 calls was recorded for November 1984 in Montréal.

Thursdays and Fridays are the days with the heaviest volume of calls in all urban area strata, regardless of size (Table 2.1). These are the only days when the average daily number of calls (39 464) is exceeded, by 35% on Fridays and 17% on Thursdays. Tuesday and Wednesday represent average days, whereas Sunday accounts for only 60% of the daily average. Depending on the weekday, these deviations from the average are greater in small and medium-sized urban areas. This observation is also confirmed by comparing the results obtained in 1985 with those for the Montréal Urban Community. For all urban area strata, the heaviest day in the month was Friday, November 29, and the second heaviest day, Friday, November 1. In Montréal, the heaviest day in November 1984 was Friday, November 2. These dates clearly correspond to end-of-month deadlines, obligations and payments.

TABLE 2.1

RELATIVE IMPORTANCE OF DAYS OF THE WEEK
IN % OF AVERAGE DAILY NUMBER OF CALLS
BY URBAN AREA STRATUM

DAYS OF THE WEEK	URBAN AREA STRATA					
	Small	Medium	Large	Very Large	Reported average (1985)	Montréal (1984)
SUNDAY	58%	55%	70%	65%	62%	76%
MONDAY	85%	88%	86%	90%	88%	93%
TUESDAY	91%	93%	98%	98%	98%	92%
WEDNESDAY	99%	99%	98%	99%	99%	94%
THURSDAY	119%	120%	114%	115%	117%	111%
FRIDAY	141%	142%	132%	131%	135%	123%
SATURDAY	95%	88%	95%	95%	93%	98%
Average number of calls per day	3 880	11 571	6 762	17 251	39 464	28 860

2.2 Supply/demand balance

Fluctuations in the number of calls recorded and the number of vehicles in operation depending on the period of observation (Table 2.2) show that, despite considerable variation in the absolute figures, the balance between supply and demand remains relatively stable.

The number of calls recorded per hour during the night represents on average a third of the calls received during weekday hours. Compared with weekday hours, Sunday and Saturday evening account for 45% of calls, and weekday evenings and Saturday, 70%. Since the number of vehicles on duty fluctuates in the same proportions, the number of calls received per hour per taxi remains quite constant throughout observation periods and urban area strata. The variance in calls per vehicle on duty is 2.2 for a large urban area during one hour on a weekday, compared to 1.7 calls per hour during the same period for a taxi working in a very large urban area.

We can therefore conclude that, despite very wide variations in demand, taxi drivers are able to adjust the supply accordingly.

TABLE 2.2

SUPPLY/DEMAND* CHARACTERISTICS
BY OBSERVATION PERIOD AND
URBAN AREA STRATUM

OBSERVATION PERIOD	URBAN AREA STRATA			
	Small	Medium	Large	Very large
"A": night	145/67 = 2.16*	342/180 = 1.90	166/93 = 1.78	319/157 = 2.03
"B": Sunday and Saturday evening	159/87 = 1.82	489/245 = 1.99	281/129 = 2.17	557/275 = 2.02
"C": Weekday evenings and Saturday	265/126 = 2.1	806/381 = 2.11	363/166 = 2.18	779/397 = 1.96
"D": Weekdays	383/175 = 2.18	1154/528 = 2.18	529/240 = 2.20	1165/679 = 1.71
AVERAGE	261/123 = 2.12	765/362 = 2.11	360/168 = 2.14	767/419 = 1.83

*

Number of calls per hour	Number of vehicles on duty	=	Average number of calls per hour per vehicle on duty
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2.3 Number of vehicles on duty

Survey and call recording data are used to estimate the total number of vehicles on duty for each hour for each observation week and urban area stratum (Table 2.3). This gives a total of 180 102 vehicles/hour of operation per week. Supply is naturally highest on Thursdays and Fridays.

Note also that the number of vehicles on duty is estimated using the record of calls supplied by service associations. A taxi is considered to be on duty only if it has accepted at least one call during a given hour. Since the proportion of trips made following calls is less in very large urban areas (72%) compared to other areas (93%, 95% and 75%) (Table 5.1) and since, in the very large urban areas surveyed, many taxis work in airports and hence are excluded from the survey, the estimated number of vehicles on duty must be considered a minimum.

In the Montréal Urban Community, trips made following calls are very few (32%), and consequently observations on the street and at taxi stands were used to estimate the number of hours of operation per day, although airport services were not considered.

Table 2.4 also shows that the lowest proportion of radio-equipped vehicles on duty is found in the very large urban areas. This holds true for all observation periods.

TABLE 2.3

NUMBER OF VEHICLE-HOURS OF OPERATION PER
DAY OF THE WEEK AND URBAN AREA STRATUM

DAYS OF THE WEEK	URBAN AREA STRATA					
	Small	Medium	Large	Very Large	TOTAL (1985)	Montréal (1984)
Sunday	1 903	5 251	2 875	6 066	16 095	29 286
Monday	2 890	3 507	3 728	10 070	25 195	40 632
Tuesday	3 094	8 686	4 027	10 368	26 175	43 222
Wednesday	3 156	9 055	4 188	10 744	27 143	42 716
Thursday	3 391	10 301	4 556	12 012	30 260	56 884
Friday	3 365	11 475	5 053	12 524	32 417	58 082
Saturday	2 802	7 578	3 863	8 574	22 817	46 178
Total per week	20 601	60 853	28 290	70 358	180 102	317 000

Note : These data are considered a minimum estimate of the number of vehicle-hours of operation, especially in large and very large size urban areas; see point D in section 1.3.

TABLE 2.4

AVERAGE PROPORTION OF RADIO-EQUIPPED VEHICLES ON DUTY
BY OBSERVATION PERIOD AND URBAN STRATUM

OBSERVATION PERIOD	URBAN AREA STRATA					
	Small	Medium	Large	Very Large	Reported average (fall 85)	Montréal (fall 84)
"A": Night	0.23	0.19	0.22	0.10	0.16	0.07
"B": Sunday and Saturday evening	0.30	0.26	0.31	0.18	0.23	0.14
"C": Weekday evenings and Saturday	0.43	0.40	0.40	0.26	0.33	0.18
"D": Weekday	0.60	0.56	0.58	0.44	0.51	0.24

3. MAIN CHARACTERISTICS OF DRIVERS AND VEHICLES

3.1 Drivers

On the average, taxi drivers are 43 years old, with 11 years' experience in this line of work (Table 3.1). They work an average of 11 hours a day and more than 80% work full-time. Of the drivers interviewed, 56% owned their vehicle.

These data did not vary significantly by urban area stratum and are comparable to results obtained in the survey of the Montréal Urban Community. Note that drivers in larger urban areas are younger and have less experience and that far fewer of them own their vehicle (15% vs. 56%). The unique situation in the taxi industry of Hull, one of the two large urban areas surveyed, may explain this difference: In Hull, a small number of companies own most of the taxis. The percentage of full-time drivers increases with the size of urban area strata.

Analysis of driver characteristics according to observation period (Table 3.2) shows that those who work weekdays are older and more experienced, on the average, than those who work nights or evenings. More daytime drivers work full-time and own their vehicle than those who work nights and evenings. Daytime drivers also work the longest hours (11.7 hours daily).

TABLE 3.1

TAXI DRIVER CHARACTERISTICS BY
URBAN AREA STRATUM

AVERAGE CHARACTERISTICS	URBAN AREA STRATA					
	Small	Medium	Large	Very Large	Reported average (1985)	Montréal (1984)
Driver age (years)	42.9	43.0	40.9	44.1	43.1	44.0
Experience (years)	11.4	11.4	9.5	12.5	11.4	11.0
Full-time work (%)	59.0	74.0	83.0	94.0	81.0	81.0
Total hours work/day (hours)	11.8	10.9	10.9	11.3	11.2	11.4
Vehicle owner (%)	49.0	62.0	15.0	69.0	56.0	50.1

TABLE 3.2
TAXI DRIVER CHARACTERISTICS BY
OBSERVATION PERIOD

AVERAGE CHARACTERISTICS	OBSERVATION PERIODS				
	A Night	B Sunday and Saturday evening	C Weekday evenings	D Weekdays	Reported average (1985)
Driver age (years)	40.5	39.7	39.6	45.8	43.1
Experience (years)	8.5	9.9	9.0	13.3	11.4
Full-time work (%)	70	79	78	86	81
Total hours work/day (hours)	10.6	10.2	10.7	11.7	11.2
Vehicle owner (%)	46	44	50	63	56

3.2 Vehicles

The average age of taxi vehicles is just under four years. Vehicles are older in small and medium-sized urban areas and much newer in large ones (Table 3.3).

Besides the driver's seat, there are four other seats in 46% of vehicles, only three others in 14% of vehicles, and more than four others in 39%. The average is 4.2 passenger seats.

There is a correlation between vehicle age, number of cylinders and number of seats. Where vehicles are older (small and medium-sized urban areas), there are more vehicles with 8-cylinder motors and more than four passenger seats.

The fuel used in 85% of vehicles is gasoline, with diesel used in 12%.

Eighty-four percent (84%) of taximeters are electronic.

TABLE 3.3

VEHICLE CHARACTERISTICS
BY URBAN AREA STRATUM

CHARACTERISTICS		URBAN AREA STRATA					
		Small	Medium	Large	Very Large	Reported average (1985)	Montréal (1984)
Vehicles two years old or less (%)		32.0	39.0	51.0	42.0	41.0	18.3
Vehicles six years old or more (%)		36.0	45.0	7.0	31.0	33.0	40.1
Average age of vehicles (years)		4.3	4.4	2.8	3.9	3.9	4.8
Number of cylinders (%)	4 cylinders	25.0	16.0	29.0	44.0	30.0	21.0
	6 cylinders	21.0	25.0	38.0	18.0	24.0	26.0
	8 cylinders	54.0	58.0	33.0	39.0	46.0	53.0
Number of seats in addition to driver's	3 seats (%)	0	19.0	29.0	9.0	14.0	3.3
	4 seats (%)	31.0	24.0	42.0	72.0	46.0	75.0
	more than 4 seats (%)	69.0	57.0	29.0	20.0	39.0	22.0
	average (no.)	4.7	4.4	4.0	4.1	4.2	4.2
Type of fuel (%)	Gasoline	84.0	91.0	90.0	77.0	85.0	95.0
	Diesel	15.0	6.0	7.0	19.0	12.0	4.0
	Other	2.0	2.0	3.0	4.0	3.0	1.0
Electronic taximeter (%)		66.0	95.0	83.0	81.0	84.0	65.0

4. CHARACTERISTICS OF CUSTOMERS AND TRIPS

The survey conducted in the fall of 1985 in various urban areas was the first to provide detailed data on customers and reasons for travel by taxi in Québec. The sample included 1 111 customers who agreed to complete the customer questionnaire. An opinion poll regarding the taxi industry in the Montréal Urban Community was conducted in the fall of 1984 among the general public, the business sector and tourists. Since the methodology used in the customer survey differed from that used in the general public survey, comparisons are not valid and are not shown in the tables. The reader may consult this study¹.

4.1 Customers

One of the salient features of customer socioeconomic characteristics is the large percentage of women using taxi services, that is, 59% of all customers. This percentage ranges from 52% to 65% depending on the size of urban area strata (Table 4).

The main age group using taxi services is 18 to 39 years, regardless of urban area stratum. This age group, which accounts for 35% of the population, represents 70% of all taxi customers. The 18 to 64 age group (the active population) represents roughly 90% of the demand for taxi services. Those aged 65 and over use this mode of transportation very little;

¹ Survey conducted by the firm Multi Réso Inc., at the request of the Montréal Urban Community and financed by the Ministère des Transports du Québec (Corneille, Simon, Étude sur l'industrie du taxi, Analysis reports I to IV, Montréal, January-February 1985).

their rate of use (6% of all customers) is lower than their relative numbers in society (9% of the population).

Between 47% and 62% of clients, depending on urban area strata, are executives, professionals, office personnel and service employees. Day labourers and manual workers represent only 6% of customers in large urban areas compared to 19% in very large areas and 13% to 15% in small and medium-sized areas respectively. On the average, day labourers and manual workers make up 14% of customers. This percentage increases to 38% at night, versus 9% during the day (Table 4.3). Executives and professionals, who represent a total of 27% of customers, represent only 9% of customers at night, versus 31% during the day.

Homemakers represent a considerable number of the customers in small urban areas -- 17% compared to other strata. The percentage of students is also higher in small and medium-sized strata than in large and very large areas. This may be explained by the greater reliance on taxis by customers in smaller areas, probably due to the lack of public transit service and fewer customers from outside the urban area.

4.2 Trips

Table 4.2 "Frequency and Reasons for Taxi Use by Customers" shows that the most regular taxi customers are those in small strata. The proportion of individuals using taxis five times a week or more is

46%, compared to approximately 34% everywhere else. In small areas, the proportion of customers from outside the area is also the lowest -- 12% compared to an average of 20%.

In all strata, depending on the observation period (Table 4.3), work-related travel is consistently the main reason (34%) for travel by taxi. Travel for recreational purposes is the second leading reason. This type of use is greatest at night and on weekends, representing only 10% during the day. The second leading reason for travel during the day is shopping (19%). The proportion of non-local residents is 23% on weekdays and drops to 14% on weekday evenings.

Comparison of customer occupation and reason for travel by taxi shows the relative percentage of each category of trip for the urban areas surveyed (Table 4.4). The highest concentration is in the category of travel to and from work by office personnel and service employees (15% of all trips recorded) or by executives and professionals (10%). Together with manual workers and day labourers, this accounts for nearly one third of all trips by taxi to and from work. This is also the main reason for travel by taxi for each of these customer groups.

Travel by taxi in the course of the customer's work accounted for 9% of all trips and most often involves executives and professionals (6.5%), followed by office personnel and service employees (2%). Recreation-related travel is the second leading reason for all travel by taxi among the various

customer categories. Taking a taxi to go shopping most often involves homemakers and accounts for nearly 5% of all travel by taxi, followed by pensioners at 2.4%.

Study-related travel represents only 3% of all trips by taxi, while 19% are taken for reasons other than those listed. A subsequent survey should detail other reasons for travel, in particular, travel to receive medical attention or for other personal reasons.

TABLE 4.1

CUSTOMERS' SOCIOECONOMIC CHARACTERISTICS
BY URBAN AREA STRATUM

CUSTOMER CHARACTERISTICS		URBAN AREA STRATA					
		Small	Medium	Large	Very Large	Reported average (1985)	Québec 1981*
Sex	Female	58.0	65.0	52.0	58.0	59.0	
Age Groups (%)	Under 18	8.0	6.0	2.0	5.0	5.0	31.0
	18 to 39	71.0	74.0	70.0	65.0	70.0	35.0
	40 to 64	16.0	15.0	22.0	23.0	19.0	25.0
	65 or over	5.0	4.0	6.0	7.0	6.0	9.0
Customer Occupation (%)	Excutive or professional	25.0	23.0	34.0	27.0	27.0	
	Office or service employee	22.0	30.0	28.0	27.0	27.0	
	Day labourer or manual worker	13.0	15.0	6.0	19.0	24.0	
	Homemaker	17.0	7.0	9.0	8.0	9.0	
	Student	13.0	12.0	8.0	7.0	10.0	
	Pensioner	4.0	6.0	7.0	8.0	6.0	
	Other	6.0	7.0	6.0	4.0	6.0	

* Distribution by age group, 1981 Canada Census.

TABLE 4.2

FREQUENCY AND REASON FOR TAXI USE BY CUSTOMERS
BY URBAN AREA STRATUM

USE		URBAN AREA STRATA				
		Small	Medium	Large	Very Large (1985)	Reported average
Frequency of Use (%)	5 times/week or less	11.0	12.0	9.0	16.0	13.0
	10 times/year	8.0	13.0	11.0	14.0	12.0
	25 times/year	13.0	19.0	23.0	13.0	17.0
	1 time/week	22.0	20.0	25.0	23.0	22.0
	5 times/week or more	46.0	35.0	33.0	34.0	36.0
Reason for Use (%)	To or from work	31.0	39.0	25.0	33.0	34.0
	In the course of work	4.0	5.0	20.0	9.0	9.0
	Shopping	20.0	14.0	13.0	16.0	15.0
	Recreation	26.0	22.0	15.0	19.0	20.0
	Study	2.0	2.0	3.0	3.0	3.0
	Other	16.0	17.0	23.0	19.0	19.0
Residence	Outside urban area	12.0	18.0	33.0	19.0	20.0

TABLE 4.3

CUSTOMER CHARACTERISTICS AND REASONS FOR TRAVEL
BY OBSERVATION PERIOD

CUSTOMER CHARACTERISTICS (%)	OBSERVATION PERIODS				
	A Night	B Sunday and Saturday evening	C Weekday evenings	D Weekdays	Reported average (1985)
Women customers	40	58	59	63	59
18-39 year age group	79	74	76	65	70
Executives or professionals	9	27	24	31	27
Day labourers or manual workers	38	15	14	9	14
Residence outside urban area	16	22	14	23	20
REASON FOR TRAVEL (%)					
To or from work	30	28	30	37	34
In the course of work	1	5	7	13	9
Shopping	1	4	20	19	15
Recreation	45	41	23	10	20

TABLE 4.4

RELATIVE IMPORTANCE OF TRIPS BY CUSTOMER
OCCUPATION AND REASON FOR TRAVEL

CUSTOMER OCCUPATION	REASON FOR TRAVEL						
	To or from work	In the course of work	Shopping	Recreation	Study	Other	Total
Executive or professional	10.6%	6.5%	1.7%	3.2%	--	5.1%	27.0%
Office or service employee	15.1%	2.0%	2.2%	3.7%	0.1%	4.2%	27.0%
Day labourer/ manual worker	5.4%	0.3%	1.5%	4.4%	0.8%	1.6%	14.0%
Homemaker	--	--	4.9%	2.1%	--	2.2%	9.0%
Student	1.1%	0.4%	1.6%	3.8%	1.8%	1.3%	10.0%
Pensioner	0.3%	--	2.4%	1.3%	--	2.2%	6.0%
Other	1.3%	--	0.8%	2.2%	--	1.7%	6.0%
TOTAL	34.0%	9.0%	15.0%	20.0%	3.0%	19.0%	100%

5. TRIP CHARACTERISTICS

The great majority of trips by taxi are made once the customer has called a taxi service association. However, a sharp decline in this figure may be observed as the size of the urban area strata grows (Table 5.1). The proportion of trips made following calls is more than 90% in small or medium-sized strata, over 70% in large ones and only 32% in Montréal.

Trips are nearly exclusively made for passenger transport, with package delivery by taxi representing only a small fraction. The number of trips per hour of work is about 2, ranging from 1.6 to 2.6 depending on the urban area. Evenings and weekends are the most productive periods with 2.2 trips per hour (Table 5.2).

The length of the average trip in small and medium-sized urban areas is less than that in large and very large areas. On the average, trips made at night are longer than those at other periods. This variation in the distance covered per trip depending on the stratum and the observation period also applies to the average cost of a trip.

In terms of the quality of service as measured by customer waiting time, the A-11 urban area offers the best service, with an average waiting time of 3.5 minutes. The poorest service is found in large urban areas where the customer's average waiting time is close to 10 minutes, followed by the very large areas with average waiting time of 6.7 minutes. Average waiting time was observed to be shortest at night. This is also the time when taxis in operation are most available since they make only 1.3 trips per

hour. Waiting time is the time between the moment at which the driver receives the call and the moment he picks up the customer. This variable does not include the time between the moment at which the service association receives the call and the moment it is transmitted to the driver.

TABLE 5.1

TRIP CHARACTEREISTICS
BY URBAN AREA STRATUM

TRIP CHARACTERISTICS	URBAN AREA STRATA					
	Small	Medium	Large	Very Large	Reported average (1985)	Montréal (1984)
Trips following call (%)	93.0	95.0	75.0	72.0	85.0	32.0
Trips obtained by cruising (%)	6.0	2.0	4.0	6.0	4.0	48.0
Trips obtained by waiting at a stand (%)	1.0	3.0	22.0	22.0	11.0	20.0
Passenger trips (%)	100.0	97.0	100.0	99.0	98.0	99.7
Number of persons per trip	1.6	1.3	1.3	1.4	1.4	---
Number of trips/hour of operation	1.85	2.6	1.88	1.66	2.03	1.9
Average distance of a trip (km/trip)	2.7	2.0	3.8	4.5	3.1	3.5
Average cost of a trip (\$/trip) ¹	3.23	3.05	5.03	5.41	3.97	4.25
Customer's average waiting time (minutes)	4.7	3.7	9.9	6.7	5.6	3.5
Average time for a trip (minutes/trip)	5.4	5.4	7.8	8.5	6.7	8.7

¹ The average cost to the customer according to the meter reading, not including tips.

TABLE 5.2

TRIP CHARACTERISTICS BY
OBSERVATION PERIOD

TRIP CHARACTERISTICS	OBSERVATION PERIODS				
	A Night	B Sunday and Saturday evening	C Weekday evenings	D Weekdays	Reported average (1985)
Trips following calls (%)	83	90	75	88	85
Number of trips/ hour of operation	1.3	2.22	2.27	2.05	2.03
Average cost of a trip (\$)	4.68	3.68	3.91	3.95	3.97
Average distance (km)	3.9	3.0	3.1	3.0	3.1
Average waiting time (minutes)	4.4	5.5	7.8	4.8	5.6

6. ECONOMIC INDICATORS

6.1 Caveat

Thus far we have presented the data obtained from the survey and call recording. The objective in this section will be to combine data and relate them to other socioeconomic variables in order to determine different ratios and economic indicators.

Some of the data obtained and processed in this manner resulted from extrapolation and, as such, are presented in a separate section from the direct results of the surveys and call recording. These economic indicators can be used to characterize supply, demand, productivity and profitability of the taxi industry in the various urban area strata.

The number of hours of taxi service in a given period is a more significant indicator or measure of the supply/demand balance than any other criterion, including the number of valid taxi permits according to the population served. To obtain this variable, we extrapolated the average number of cars on duty per hour following calls in each stratum with the goal of establishing indicators on an annual basis.

As shown in Table 2.3, the number of taxis on duty is the number of vehicles which have accepted at least one call within a one-hour period. This variable does not include the number of taxis cruising or under contract, serving customers directly at taxi stands and airports, or making long trips. To

correct this bias, which affects data most in large and very large urban areas, we have adjusted the average number of taxis on duty as a result of calls per hour according to the percentage of trips made as a result of calls, and the number of vehicles that do not belong to service associations or are assigned to airports.

Our hypothesis was that the number of car/hours of operation as a result of calls includes some hours spent cruising for customers or waiting at a stand, and that the number underestimates part of this time. The underestimation is a function of the percentage of trips made as a result of calls, the number of vehicles without a radio and those operating out of the airport. In the case of very large urban areas, it may be claimed that taxis who have accepted at least one call per hour (419) also obtain a proportionate number of customers by cruising or waiting at a stand (72% through calls and 28% through other means). Under these conditions, the number of taxis who have accepted one call per hour represents 92.16% of all radio-equipped vehicles on duty, excluding airport taxi services ($72\% + (28\% \times 72\%)$). The underestimation in this case is therefore 7.84%. The process we used as well as our results are shown in Table 6.1.

TABLE 6.1
EVALUATION OF THE ANNUAL NUMBER OF
VEHICLE-HOURS OF OPERATION

	URBAN AREA STRATA				
	Small	Medium	Large	Very Large	Reported average (1985)
Number of vehicles that have accepted at least one call per hour	123	362	168	419	1 072
% of trips made following calls	93%	95%	75%	72%	85%
Underestimation of number of vehicles on duty other than on call ¹	0.49%	0.25%	6.25%	7.84%	2.25%
Vehicles without a radio as a % of total (number)	0.0%	0.0%	0.96% (4)	2.99% (48)	1.59% (52)
Vehicles in airport use as a % of total (number)	0.0%	0.0%	0.0%	3.68% (59)	1.80% (59)
Total number of vehicles on duty per hour ²	123.6	362.9	180.1	479.8	1 146.4
Annual number of vehicle/hours of operation (x 8760 hours)	082 736	3 179 004	1 577 676	4 203 048	10 042 464

- 1 - (% of trips made following calls + (% of trips made following calls x % of trips obtained through other means))
2. Average number observed per hour x (1 + % of underestimation, + % of vehicles without a radio + % of vehicles in airport use)

6.2 Observations

6.2.1 Demand

The first observation which should be noted is that although the number of residents per permit in Montréal is four times lower than that in other urban areas in Québec (244 residents per permit versus 945), the number of trips by taxi made per resident is four times greater (24.6 versus 6.5).

These figures are obviously due to the higher proportion of tourists and business people in Montréal than elsewhere, in addition to a centralized cultural and restaurant sector which attracts suburbanites. Montrealers also seem to use taxis more than other city dwellers in the province for demographic and economic reasons and for ease of transportation. Montréal has more elderly residents and small, low-income households, a fact which directly influences the rate of vehicle ownership and use per family. In addition, public transit facilities combined with constraints on traffic circulation encourage Montrealers to use taxis.

There is little difference in the number of trips per permit per year in the Montréal Urban Community and the average for other urban areas, despite doubling in very large areas over medium areas.

TABLE 6.2
ECONOMIC INDICATORS
REGARDING THE DEMAND FOR TAXI TRANSPORTATION

INDICATORS	URBAN AREA STRATA					
	Small	Medium	Large	Very Large	Total or average (1985)	Montréal (1984) ¹
Population served	285 300	1 134 900	435 600	1 245 500	3 101 300	1 274 000
Population/permit	954	1 182	1 042	777	945	244
Number of trips/year	2 003 061	8 265 410	2 966 030	6 977 060	20 386 202	31 319 600
Number of trips/permit/year	6 699	8 609	7 095	4 353	6 215	5 998
Number of trips/resident	7.02	7.28	6.81	5.60	6.57	24.58
Number of passengers carried	3 204 897	10 422 682	3 855 839	9 670 205	17 969 869	43 710 940
Number of trips/("déplacements")/résident	11.23	9.18	8.85	7.76	9.02	34.31

1. Montréal data, in particular, ratios, are based on the number of valid permits in April 1985, before implementation of the buy-bac plan.

6.2.2 Supply

Although the number of permits in Montréal is proportionally four times higher than in other urban areas in Québec, the number of hours of operation for each taxi is nearly identical: 3 157 hours of operation per permit in Montréal versus 3 062 hours in other urban areas. Large urban areas lead with 3 774 hours of operation per permit per year, closely followed by small urban areas with 3 621 hours per permit. Taxi permits in very large urban areas appear to be the least used, with only 2 622 hours per permit per year.

Per resident, the number of hours of operation is much more uniform throughout the various urban area strata (from 2.8 to 3.8 hours per resident per year), except in Montréal which peaks at nearly 13 hours of operation per resident.

The total annual number of kilometers travelled varies from 40 000 to 57 000 kilometres with an average of 51 000 in Montréal and 44 000 in other urban areas.

TABLE 6.3
ECONOMIC INDICATORS
REGARDING THE SUPPLY OF TAXI TRANSPORTATION

INDICATORS	URBAN AREA STRATA					
	Small	Medium	Large	Very Large	Total and average (1985)	Montréal (1984) ¹
Number of permits	299	960	418	1 603	3 280	5 222
Permits/1 000 residents	1.05	0.84	0.96	1.29	1.06	4.09
Hours of operation/year ²	1 082 736	3 179 004	1 577 676	4 203 048	10 042 464	16 484 000
Hours of operation/permit/year	3 621	3 311	3 774	2 622	3 062	3 157
Hours of operation/resident/year	3.79	2.80	3.62	3.37	3.24	12.94
Hours of work/driver/day ³	11.8	10.9	10.9	11.3	11.2	11.4
Hours of operation/permit/week ⁴	69.63	63.67	72.58	50.42	58.88	60.70
Total km/year (000)	12 018	35 954	23 965	74 724	143 519	267 041
Km/taxi/year	40 195	37 452	57 333	46 615	43 755	51 138

1. Before implementation of buy-back plan in June 1985.

2. See Caveat, section 6.1.

3. Results of driver-completed survey.

4. Estimate from call recording and vehicles in use.

6.2.3 The industry's productivity

Taxis that serve large urban areas are busiest, with 55% of their hours of operation devoted to picking up and driving customers. The average for other taxis in Québec is about 40% with a minimum of 31% for small urban areas. This taxi occupancy rate, while favorable for operators, also increases customer waiting time which peaks at 10 minutes in large urban areas and falls to only 3.5 minutes for Montréal customers.

Taxis serving large urban areas are also more productive in terms of paid mileage, which is 47% versus only 41% in Montréal. The fact that nearly 50% of customers in Montréal are picked up through cruising explains this large amount of unproductive mileage for Montréal taxis.

TABLE 6.4
ECONOMIC INDICATORS
REGARDING THE TAXI INDUSTRY'S PRODUCTIVITY

INDICATORS	URBAN AREA STRATA					
	Small	Medium	Large	Very Large	Total (1985)	Montréal (1984) ¹
Trips/hour/taxi	1.85	2.6	1.88	1.66	2.03	1.9
Time/trip (min.)	5.4	5.4	7.8	8.5	6.7	8.7
Waiting time	4.7	3.7	9.9	6.7	5.6	3.5
% time occupied/ (hour) ¹	31%	39%	55%	42%	42%	39%
Paid mileage/trip (km)	2.7	2.0	3.8	4.5	3.1	3.5
% of paid mileage	45%	46%	47%	42%	44%	41%
Total km/trip	6.00	4.35	8.08	10.71	7.04	8.54
Passengers trans- ported/year	3 204 897	10 422 682	3 855 839	9 670 205	27 969 869	43 170 940
Passengers/ vehicle/km	0.266	0.299	0.161	0.129	0.195	0.164

1. Waiting time and time/trip x No. of trips per hour - 60 minutes.

6.2.4 The industry's profitability

The driver-completed survey was used to establish the average cost of a taxi trip. The average cost is the amount shown on the meter and does not include the tip. These data are valid for fall 1985; two rate increases have since been awarded, one in January 1986 and another in February 1987, bringing the rate from \$1.20 to \$1.50 and finally to \$2.00. These data on the industry's profitability constitute average gross revenue, excluding tips, valid for 1985 and are provided for information purposes so that comparative ratios can be established.

The revenue per kilometre related to a trip (productive and unproductive mileage) runs from \$0.50 in Montréal and very large urban areas to \$0.70 in medium-sized urban areas. Gross wages per hour are about \$8 in Montréal, as is the case for all urban areas. However, considerable differences exist between small urban areas where the hourly wage is \$6 and large urban areas where it is \$9.50. Most of these differences can be explained by the percentage of occupied time which falls at either extreme for these areas.

Total gross revenue generated by the industry in 1985 is estimated at a minimum of \$220 M for all Québec urban areas, including 150 on the Island of Montréal (urban areas of Montréal-Centre, East and West). If we assume that the 1 460 regional category permits perform on the same

economic basis as permits in small urban areas, we obtain a figure of \$220 M for the entire province.

Annual gross revenue per permit is estimated at \$25 000 with a low of \$21 600 in small urban areas and a high of \$35 000 in large urban areas². This variance is due partly to the industry's high productivity and the good economic situation for taxis in the two areas surveyed for this size urban area. Random sampling resulted in the selection of the Hull and Sherbrooke urban areas as representative of the large-sized urban areas in the survey. A number of factors combine to create the favorable situation for the taxi industry in these areas: In Hull, a small number of companies own the majority of taxis, and 40% of customers are from outside the Hull area. In Sherbrooke, the ratio of residents to permits is 1 236:1. The prosperous situation for taxis in these areas goes along with the quality of service as expressed in waiting time.

We would, however, stress that these data are presented to provide an overview of the taxi industry in Québec and not as a detailed analysis of the profitability of taxi operations in each urban area. We have certainly not attempted to estimate operators' incomes, which fluctuate widely depending on each driver's

² A study by the Bureau de la statistique du Québec in 1979 estimated the average annual income per taxi in 1979 at \$20 600.

method of operation and at what rate he operates his vehicle. Due to the margin of error, this estimate should be considered to be for information purposes only.

We, therefore, conclude that no significant difference existed between the level of profitability of taxis operated in Montréal in 1984 and those operated in the rest of the province in 1985.

TABLE 6.5

ECONOMIC INDICATORS
REGARDING THE PROFITABILITY OF OPERATIONS

INDICATORS	URBAN AREA STRATA					
	Small	Medium	Large	Very Large	Total and average (1985)	Montréal (1984) ¹
Cost per trip (\$)	3.23	3.05	5.03	5.41	3.97	4.25
Volume of business/ year (\$)	6 463 934	25 209 501	14 919 131	37 745 894	84 338 461	133 103 300
Volume of business/ permit (\$)	21 618	26 260	35 690	23 553	25 713	25 490
Revenue/hour of operation	5.97	7.93	9.45	8.98	8.06	8.07
Revenue total km (\$)	0.538	0.701	0.622	0.505	0.564	0.498
Revenue/passenger	2.02	2.35	3.87	3.86	2.84	3.03

7. CONCLUSION

In planning its study on the supply and demand for taxi service, the ministère des Transports set a number of objectives. We will now discuss whether they have been met.

The first objective was to assess the supply and demand for taxi transportation in Québec urban areas. Through the use of very precise data on the changing levels in calls by hour and by day, the number of vehicles on duty and the number of hours of operation, this first objective was attained.

The second objective was to measure the impact of new markets on supply and demand. In this regard, results are mixed. No impact could be measured. However, in many areas, taxis have been offering their services under contract for the transportation of the handicapped. Although minimal, this impact should have been evaluated. Methodology should be reviewed to measure this element's impact.

The third objective, evaluating the minimum demand for public passenger transportation, was achieved through the assessment of the demand for taxi transportation. In some urban areas, taxis are the only form of public transportation available. In these cases, the demand for taxi transportation would be equal to the minimum demand for public transportation.

With data on the number of trips per hour, the duration of a trip, the number of productive kilometres, customer waiting time, revenue per trip, etc., we have sufficient

information at our disposal to determine the quality of service, availability, and the taxi industry's productivity and profitability. More detailed knowledge about user characteristics will allow better assessment of user needs and allow companies and operators to target their services and marketing strategy more closely.

In general, the study of the supply and demand for taxi service in Québec achieved the objectives set initially. These promising results could not have been obtained without the invaluable cooperation of those working in the industry, drivers, service associations and taxi leagues.

APPENDICES

APPENDIX I

STUDY OF THE SUPPLY AND DEMAND FOR TAXI SERVICES IN QUÉBEC AND CREATION OF A TAXI INDUSTRY DATA BANK

Documents on Methodology

DAVID, Jean, Paul BERGERON, Michel TRUDEL and Claude RODRIGUE, Objectifs et grandes étapes de réalisation d'une banque de données sur le taxi, Service de la statistique, Direction de la recherche, ministère des Transports, Québec, April 1985.

DAVID, Jean and Paul BERGERON, Définition des paramètres du sondage, Service de la statistique, Direction de la recherche, ministère des Transports, Québec, January 1985, 23 pages and appendices.

DAVID, Jean, Développement d'un système d'information pour l'industrie taxi, Annual AQTR Convention, Québec, March 1986.

DAVID, Jean, Development of an information system for the taxi industry, Direction de la recherche, ministère des Transports, Québec, March 1986.

Documents on the Survey in the Montréal Urban Community

DAVID, Jean and Paul BERGERON, Déroulement du sondage, Service de la statistique, Direction de la recherche, ministère des Transports, Québec, February 1985, 19 pages.

DAVID, Jean, Paul BERGERON, and Louise GUIMONT, Résultats du recensement des appels et des voitures en opération accompagnés des résultats d'un sondage auprès d'environ 350 chauffeurs de taxi, Service de la statistique, Direction de la recherche, ministère des Transports, Québec, September 1985, 107 pages.

DAVID, Jean, Michel TRUDEL and Jacques VUILLE, Analyse sommaire du recensement des appels et du sondage auprès des chauffeurs de taxi dans l'agglomération de Montréal, Service de la planification et du développement des réseaux, ministère des Transports, Québec, Montréal, October 1985, 10 pages. (Recherches-Transport newsletter 31).

APPENDIX II

STUDY OF THE SUPPLY AND DEMAND FOR TAXI SERVICES IN QUÉBEC AND CREATION OF A TAXI INDUSTRY DATA BANK

Surveys and Call Recording in Québec's Urban Areas, Excluding Montréal

BERGERON, P., J. DAVID and L. GUIMONT, Sondage dans différentes agglomérations, Service de la statistique, Direction de la recherche, ministère des Transports, Québec, September 1986.

NB These survey documents are available in French only.

- VOLUME 1: Description of the industry's structures for all urban areas in November 1985 (40 pages).
- VOLUME 2: Results of call recording by day for all urban areas in November 1985. (The estimated number of calls for each day of November 1985 for all urban areas and each stratum).
- VOLUME 3: Results of call recording by day and by hour for urban areas by size in November 1985 (61 pages). (Number of calls by hour and for an average week by strata and for all urban areas).
- VOLUME 4: Results of a driver-completed survey for small and medium-sized urban areas in November 1985 (90 pages). (Results for each urban area surveyed).
- VOLUME 5: Results of a driver-completed survey for large and very large urban areas in November 1985 (64 pages). (Results for each urban area surveyed).
- Volume 6: Results of a driver-completed survey for various sizes of urban areas in November 1985 (32 pages). (Comparative results by urban area stratum).
- VOLUME 7: Results of a driver-completed survey for various urban areas and times of the week in November 1985 (57 pages). (Comparative results by time of the week with overall averages).

APPENDIX III

SUPPLEMENTARY BIBLIOGRAPHY

- BRECKE, Tryggve, Odd LINSTAD and Erik ORBECK, "Exploitation des taxis - conditions d'organisation, de circulation et de rentabilité", Transportation Economics Institute, Norwegian Scientific and Technical Research Council, September 30, 1974.
- CORNEILLE, Simon, Étude sur l'industrie du taxi, rapport d'analyse.
- DOCUMENT I: "Sondage auprès de la population", Multi Résó Inc., January 1985, 64 pages.
- DOCUMENT II: "Sondage auprès des milieux d'affaires", Multi Résó Inc., January 1985, 28 pages.
- DOCUMENT III: "Sondage auprès des touristes", Multi Résó Inc., January 1985, 34 pages.
- DOCUMENT IV: "Sondage auprès des chauffeurs", Multi Résó Inc., February 1985, 30 pages.
- "Faits saillants", Multi Résó Inc., January 1985, 45 pages.
- CURRIE, COOPERS & LYBRAND Ltd., "Review of taxicab industry licensing and fare-setting methods", Metropolitan Licensing Commission, Toronto, March 10, 1982, 52 pages.
- SHAW, L. Carol, Gorman GILBERT and Christine BISHOP, "Taxicab regulation in U.S. cities", University of North Carolina at Chapel Hill for the Department of Transportation, Urban Mass Transportation Administration (UMTA), Washington, D.C., October 1983.
- "Le rôle des taxis dans les transports urbains et les principales caractéristiques des usagers", Transitec Engineering Consultants for the Swiss Traffic Engineers Association (SVI), Lausanne, March 1984, 104 pages.
- GILBERT, G.G., R. BURBY and C.D. FEIBEL, "Taxicab operating characteristics", UMTA, Washington, D.C., September 1982 (DOT-1-83-55), 41 pages and appendix.

APPENDIX III (CONT'D)

BUREAU DE LA STATISTIQUE DU QUÉBEC

"PROJET TRANSPORT URBAIN DES PERSONNES"
(Urban Passenger Transportation Project)

NB This document is available in French only.

VOLUME 1 (12 reports)

1. Final report (Phase I), December 1978
2. Description of data base (Phase I), January 1979
3. Proposal report (Phase II), January 1979
4. Pilot survey texts, August 1979
5. Pilot survey plan, June 1979
6. Pilot survey activities and schedules, June 1979
7. Pilot survey report, August 1979
8. Surveyors report, August 1979
9. Specification of statistics for overall survey, September 1979
10. Survey plan, November 1979
11. Estimation formula for overall survey, January 1980
12. Carrying out the survey plan, January 1980

APPENDIX III (CONT'D)

NB This document is available in French only.

VOLUME II (7 reports)

13. Presentation of statistics for overall survey, February 22, 1980
14. Evaluation report, June 1980
15. Taxi service demand, November 1980
16. Analysis of the statistics from the taxi industry survey conducted during November 1979, March 1981
17. Evaluation of costs of operating a taxi, April 1981
18. Description and validation of data from the taxi industry survey conducted in November 1979, June 1981
19. Simulation of the variation in the number of taxi permits in Québec's urban areas, June 1981

APPENDIX IV

DIVISION OF QUÉBEC'S URBAN AREAS INTO STRATA ACCORDING TO SIZE

Small-sized Urban Areas	Population Served	Number of Permits
Candiac-Laprairie	19 300	15
Cowansville	12 400	14
Lachute	14 830	18
Matane*	16 109	23
Mont-Joli	8 390	13
Rivière-du-Loup	16 410	16
Thetford-Mines	22 580	9
Côte-Nord	28 410	34
La Baie	20 900	11
Dolbeau-Mistassini	15 600	11
Gaspé	17 500	14
Amos*	13 350	19
Chibougamau	10 600	11
Matagami	3 700	5
Val d'Or	21 600	34
La Tuque	11 500	11
Sept-Iles*	29 002	41

TOTAL: 17 urban areas: 282 181 299

* Urban areas participating in survey.

NB: Québec's urban areas, other than area A-11, Montréal-Centre, were grouped according to 5 criteria: total population, number of permits, population density, surface area and the presence or lack of a public transit system. These criteria were used to define 4 urban area strata. We used the size of these urban areas to qualify and distinguish groupings.

APPENDIX IV (CONT'D)

DIVISION OF QUÉBEC'S URBAN AREAS INTO STRATA ACCORDING TO SIZE

Medium-sized Urban Areas	Population Served	Number of Permits
Boucherville	30 000	18
Joliette*	38 080	32
Saint-Eustache	47 600	35
Saint-Jérôme	42 180	50
Sorel	43 330	55
Terrebonne*	56 100	28
Victoriaville	29 100	32
Alma	26 500	18
Beloeil	35 860	22
Saint-Bruno	30 600	14
Charlesbourg	72 360	38
Châteauguay	49 930	56
Drummondville	37 000	41
Granby	38 500	50
Lévis-Lauzon	37 300	48
Rimouski	35 310	46
Saint-Hyacinthe*	47 410	42
Saint-Jean*	44 400	58
Shawinigan	56 170	33
Valleyfield	39 540	43
Rouyn-Noranda*	25 800	47
Saguenay ouest	60 100	40
Saguenay*	60 100	38
Sainte-Thérèse	68 400	36
Gatineau	75 200	40

TOTAL: 25 urban areas: 1 126 870

960

* Urban areas participating in survey.

APPENDIX IV (CONT'D)

DIVISION OF QUÉBEC'S URBAN AREAS INTO STRATA
ACCORDING TO SIZE

Large-sized Urban Areas	Population Served	Number of Permits
Beauport**	61 500	63
Hull*	58 850	84
Sainte-Foy - Sillery	111 700	100
Trois-Rivières	102 920	91
Sherbrooke*	98 900	80
TOTAL: 5 urban areas:	433 870	418
Very-Large-sized Urban Areas	Population Served	Number of Permits
Longueuil	284 000	344
Montréal-Est*	272 400	332
Laval*	270 900	215
Montréal-Ouest*	212 920	271
Québec	191 800	441
TOTAL: 5 urban areas:	1 232 020	1 603

* Urban areas participating in survey.

** Pre-test

STUDY OF SUPPLY AND DEMAND IN THE TAXI INDUSTRY
DRIVER SURVEY - INTERVIEW

QUESTIONNAIRE A

RESERVED FOR DEPARTMENT USE

Identification number:

Date:

Planned hour for start of survey (specify AM or PM):

Location of assignment:

Observer's name:

Urban area:

Association:

Car number in association:

Type of survey: Following call On the street "Fly" At stand

Time of call (specify AM or PM):

Time taxi arrived (specify AM or PM)

Real time survey began (specify AM or PM):

Driver agreed to participate: Yes No

Reason for refusal:

Observer's comments:

License plate number:

Driver's age group: Under 30 years
 30-39 years
 40-49 years
 50 years or over

Driver's number of years of experience:

Languages spoken: French Yes No
 English Yes No
 Other (specify)

Vehicle's year:

Vehicle's number of cylinders: 4 cylinders 6 cylinders
 8 cylinders other

Fuel: Gasoline Diesel Other (specify)

Number of seats (excluding driver's):

Make of vehicle:

Model of vehicle:

Radio transmitter? Yes No

Airport permit? Yes No

Driver's status: Full-time Part-time

Car: owner: lessee:

If lessee, is the car's owner:

- . a company in which the lessee is not a shareholder
- . a company in which the lessee is the major shareholder
- . an individual of the same household
- . an individual outside the lessee's household

Odometer unit: kilometres miles

Odometer reading (before survey period):

Time of odometer reading:

Taximeter unit: kilometres miles

Type of taximeter: mechanical electronic

Make of taximeter:

Taximeter reading (before survey period):

Units

Number of trips

Total mileage

Paid mileage

Time working period began:

Number of hours of work today:

Occupation before this trip:

Returning from a trip

Waiting at a stand

Cruising in the area

Returning from a break

Other (specify)

General aim after a trip:

Taking dispatcher's calls

Returning to previous area

Cruising in the area

Going to a stand

Other (specify)

Have you taken any calls from your dispatcher today?

Yes No

Which taxi stands do you use?

Reserved stands

Common stands

Both

No stands

Other (specify)

If this is a trip made following a call, obtain the time when the driver receives his calls (time for each call) from the distributor.

Write the vehicle's number within the association (reminder):

Write the time of the call (specify AM or PM)

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.
- 7.
- 8.
- 9.
- 10.

Survey to be completed by driver

QUESTIONNAIRE B

For each trip, indicate the following:

TRIP NO.	Time when call was received	Time of start of trip
Time of end of trip	Amount of trip	

CHECK THE BOX INDICATING THE TYPE OF TRIP

- 1 Made following a call
- 2 Customer picked up on the street
- 3 Customer picked up at stand

WRITE THE NUMBER FOR THE TYPE OF TRANSPORTATION

Number of passengers
Number of packages
Trip as part of a contract with a handicapped person

Reserved for Department use

Identification	Odometer	Time	Units
Trips	Total mileage	Paid mileage	Sector

Call	Start	End	Amount	CO	TR	HC
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STUDY OF SUPPLY AND DEMAND IN THE TAXI INDUSTRY

Survey to be completed by customer

QUESTIONNAIRE C

RESERVED FOR DEPARTMENT USE

Identification number:

- 1) How often do you use the taxi on the average?
(Check the answer that best corresponds to your situation)

5 times/year or less	1 time/week
10 times/year	5 times/week
25 times/year	10 time or more/week

- 2) Right now, why are you taking a taxi?
- . to go to or from work
 - . in the course of your work
 - . to go shopping or get groceries
 - . in the course of recreation
 - . to go to an educational institution
 - . other

- 3) Identify the intersection nearest:
the departure point of the trip by taxi:

the destination of the trip by taxi:

- 4) Sex: Female Male

- 5) Age: Under 18 years 40 to 64 years
 18 to 39 years 65 years or over

- 6) What is your occupation?

Executive or professional	Student
Office personnel or service employee	Pensioner
Day labourer or manual worker	Other (specify)
Homemaker	

- 7) In which municipality do you live?

If you live outside Québec, indicate the province (in Canada), the state (in the United States) or the country (if elsewhere):



Gouvernement du Québec
**Ministère
des Transports**

