



Changes in the Adelaide Taxi Industry in 1998 Compared With 1996

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Abstract

The two year-long studies were conducted in 1996 and 1998 by the Transport Systems Centre of the University of South Australia to provide meaningful statistics describing the operational characteristics of the industry for use by people working in the industry. They were funded by the South Australian Passenger Transport Research and Development Fund administered by the Passenger Transport Board of South Australia.

The 1996 study was the first time such a comprehensive array of data relating to the operational characteristics of the Adelaide taxi industry had been gathered. Derived statistics included the mean trip fare, the number of trips undertaken throughout the year, the revenue per total kilometre travelled and per total working time, the quality of service for passengers (waiting times and rank queues), the ratios of trips originating through centralised booking services and ratios of active versus non-active time and distance travelled for taxis. These statistics were derived from data collected from taxi worksheets, centralised telephone booking services and through observations taken at taxi ranks. These data provide the core operational statistics of the industry and were repeated in the 1998 study.

This paper gives a brief outline of the methodology used in each study. Key trends are identified and discussed. The importance of mobile phones and competition from hire cars are discussed as possible explanations for the recorded downturn in taxi activity. Improvements for future studies are explored taking into consideration improved data collection techniques and information processing methods. Advances in information collection and processing will be investigated to improve future studies.

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Introduction

Two year-long studies of Adelaide's taxi industry were conducted in 1996 and 1998 by the Transport Systems Centre of the University of South Australia. They were to provide statistical information on the operational characteristics of the industry for use by people working in the industry and for policy-makers. Funding for the studies came from the South Australian Passenger Transport Research and Development Fund, administered by the Passenger Transport Board (PTB) of South Australia.

The 1996 Baseline study was designed to provide a baseline of statistics so that future researchers and policy-makers could identify trends in the industry. The second study was the first to provide trend data for Adelaide's taxi industry. These trends are reported and discussed within this paper.

One of the issues that the industry and the researchers were interested in was the impact of hire cars (known as small chartered vehicles in Perth) on the taxi sector. In 1991 the SA Labor government opened entry into the hire car sector. Taxi owners and drivers feared that an expanded hire car sector would damage their business. This paper will also discuss the impact of hire cars on the taxi sector, using the evidence of the two studies. Before doing so general information on the methodology and the key findings of the studies are presented, leading to an outline of the rationale for the decision to open entry for hire cars.

The Adelaide Taxi Industry Studies

Background

The 1996 Adelaide Taxi Industry Baseline study was originally commissioned in 1995 to examine how well taxis were meeting demand, in order to determine the appropriate number of licences. The study went well beyond this, gathering a range of data about the operations of the taxis themselves, about customer opinions on the taxi service and even on the demand for taxi drivers (Primerano, 1997). The study highlighted the relatively low earnings of drivers and the generally high availability of taxis (Transport Systems Centre, 1997). Possibly as a result of these findings, the Government discontinued the policy of issuing fifteen new general licences each year. No data were collected for hire cars.

The 1998 study was commissioned to provide trend data. The range of data was not as extensive as in the 1996 study, but data for key indicators were collected. The methodology behind the second study is reported in Transport Systems Centre, 1999. The three main sources of data were booking records from centralised telephone booking services, worksheet data filled in by drivers and rank observation data recorded by staff. The data gathering for the last two of these were conducted over seven week-long surveys in 1996 and three in 1998. The three of 1998 were at the same time of the year as three of the 1996 surveys, to enable direct comparison of the three main data groups.

Of the data collected, those for jobs originating through telephone booking companies are the most comprehensive. Total bookings for each day of 1996 and 1998 were recorded.

Rank observation data is reliable, but necessarily limited to those ranks and times selected by the study. Ranks and times chosen in the initial surveys of 1996 were designed to portray a cross-section of rank activity. Later surveys and those of 1998 focussed more on those ranks and times that had a reputation for high activity and/or delays for passengers. A policy of revisiting the same rank/times in 1998 as those observed in 1996 allowed comparisons to be made.

Worksheets provide the richest source of data but are least reliable (Clement, Radbone and Primerano, 1999). Structured samples of taxis were chosen and for these the filling in of worksheets was made compulsory. Nevertheless doubts remain as to the veracity of the information provided. But assuming that the level of integrity of the data was about the same in 1998 as it was in 1996, the trends should be accurate.

Fleet and operator data

The total number of taxi licences issued in metropolitan Adelaide at 1 July 1996 and at 7 October 1998 were 1011 and 1047 respectively. In 1998 there were 20 more standby licences and 15 more 'general licences with special conditions (accessible)' than in 1996. Standby licences are only operational when a general or special taxi licence is temporarily out of service due to a mechanical breakdown by one of the taxis in the regular fleet.

Between 1996 and 1998 there was a change in the licensing structure of taxis to which 'accessible licences' were attached. Accessible licences must be attached to vehicles capable of carrying at least one person with a wheelchair or mobility aid. The changes concerned the conditions under which the licenced operators could transfer their licences: details can be found in Transport Systems Centre, 1999.

Rank observations

During the rank observations of all 1996 and 1998 surveys, queues were counted at the end of every 15-minute period. It was rare that a queue for taxis and a queue for passengers existed simultaneously. This only occurred during extremely busy times. Therefore the average queue length was calculated as the total of the queue lengths for an entity (taxi or passenger) divided by the number of 15-minute periods in the observation. The number of departures for each entity was recorded throughout the observation period. Counts of departing taxis were split into those with a fare and those without. Average occupancy was calculated as the total number of passengers that departed the rank divided by the total number of taxis that departed the rank with one or more passengers.

The overall rank observation method for the 1998 study was similar to that used in the 1996 study, with a small modification used for the second and third surveys. This applied to the method of recording the waiting times during the 15-minute periods. For the 1996 surveys and the May 1998 survey, the waiting time for either a taxi or a passenger was recorded after the queues were counted. If the taxi queue was one or more cars long, then the waiting time was recorded for the next taxi to join the rank queue. Similarly, if a passenger queue was counted then the waiting time for the next passenger to join the queue was recorded. Hence the waiting time for both passengers and taxis was not recorded at the end of each 15-minute period – it was recorded for either a passenger or a taxi but not both. The average waiting time for an entity was calculated by adding the waiting times and dividing by the number of 15-minute periods in the observation. This was recorded as a value in minutes and seconds.

The variation used in the second and third surveys of 1998 for recording the waiting times was an effort to make the procedure simpler for the observers. After the queues were counted at the end of each 15-minute period, observers were asked to record the waiting times for both the next passenger and the next taxi to arrive at the rank. In some instances where the rank was extremely busy, this proved difficult as the passenger rank could queue and dissipate very quickly. This level of activity did not occur often during any of the 1998 surveys and was not considered a problem. One criticism of the method of recording waiting times once every fifteen minutes is that on a busy rank with passenger departures upwards of 120 per hour, the sampling rate is less than one in thirty. A flexible sampling scheme such as the current once every fifteen minutes plus sampling every (say) fifteenth passenger during busy periods would result in a richer data set. But it would likely tax most observers since the times of the observations where ranks are busy are often in the small hours of a morning and the extra load may prove too much of a burden. Having two observers for the known busy times would then be required if the extra sampling were desired.

The rank observations of the 1998 surveys were chosen to be comparable in place, day of the week and time to many of those of the 1996 surveys. Thus meaningful parallels could be drawn though evidence from the rank surveys cannot be provided in a convenient summary. In both studies, observation places and periods were designed to try to ascertain when the taxi industry was not coping with demand.

It was clear that the typical taxi rank had taxis waiting at it, not passengers. Waiting times for passengers tended to occur in the early hours of Saturday and Sunday near entertainment venues and occasionally at suburban shopping centres during weekdays. Apart from the early hours of New Years Day 1996 (when customer waits of over an hour were recorded) the longest average customer waiting time in any fifteen minute period in either study was just over fifteen and a half minutes. This was recorded at the Casino rank from midnight to 0400 on a Sunday morning in November 1998. (The equivalent 1996 survey recorded a maximum average waiting time of only one minute and forty seconds.) In the equivalent 1998 survey the average queue length was 66 and departures were reasonably steady at nearly four per minute throughout the observation period and the rank was still busy at 4am. For the same rank and time comparison, passenger departures increased 258% while taxi departures increased 459%.

Interestingly the mean occupancy fell from three to two passengers per taxi. At the same rank in the May surveys, the average waiting time for passengers fell from just over 8 minutes down to just 19 seconds. This variation highlights the somewhat stochastic nature of the activity at taxi ranks and reinforces the contention that a higher sampling rate for measuring passenger wait times at busy ranks may be required. The Casino rank during November and December is particularly volatile.

Telephone bookings

Between the 1996 and 1998 studies the structure of the telephone booking operation in Adelaide changed. In 1996 there were three major companies and one smaller company, each of which ran its own booking system. In addition to these, there was one company concerned solely with work for the wheelchair accessible taxis and handled all calls of this genre. Another company of about twenty taxis ran its own booking system during Tariff 1 (weekday) periods and contracted one of the major companies to handle its calls at other times.

By the time of the 1998 study, the three major companies were handling all the telephone bookings, including those for the accessible taxis. These companies had invested heavily in computer-based despatching systems which have decreased the despatch time of calls to the extent where in periods when taxis are readily available, jobs may often be accepted by a taxi driver before the caller has finished the call. Telephone booking data were collected from each of the major companies for both of the study years. The data collected were daily totals for 1996 and 1998 and the daily total of telephone bookings for each company was aggregated to give the figure for the industry for each day.

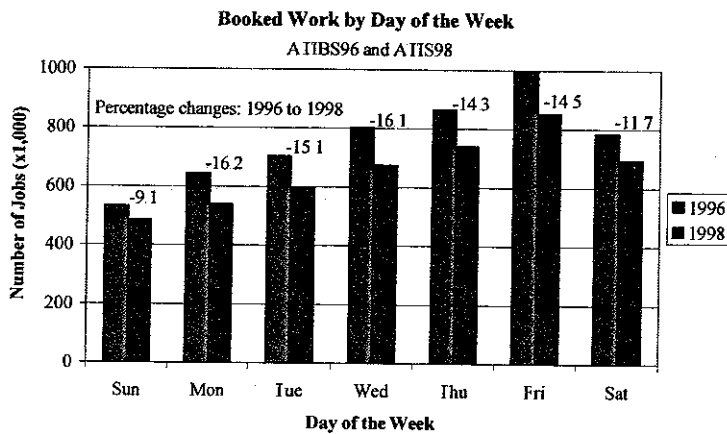


Figure 1 Comparison of telephone booking work by day of the week (source: Transport Systems Centre (1999), p 21)

There was a decline in the total number of booked jobs from 5.35m in 1996 to 4.61m in 1998. This represents a fall of 13.8%. Weekdays experienced the most severe decline with no less than a 14% decrease recorded on any of the five days (see Figure 1).

Worksheet data

Throughout the taxi study in 1998, 250 operators were asked to participate by completing worksheets for a specific one-week period.

Table 1 Comparing the return rates of worksheets from taxi operators in the 1996 and 1998 studies.

Survey	Requested (1998)	% Returned (1998)	% Returned in 1996
1	60	67.7	61.7
2	82	50.0	61.0
3	108	48.9	44.4

Return rates were similar for equivalent surveys over the two years (Table 1). Past experience has indicated that at least twenty complete records of a week's activity are needed for confident findings to be drawn. But while findings for all taxis over a survey week as a whole can be confidently made, findings for individual shifts are more uncertain – due to the smaller sample size – and were aggregated over all the surveys for the year.

Table 2 provides summary information from the two studies. Further comparisons can be obtained from Transport Systems Centre (1997), Transport Systems Centre (1999) and from Clement, Radbone and Primerano (1999). Note that the figures for active time per shift shown in Table 2 and denoted with an asterisk do not include breaks for meals or the time to repair mechanical faults etc. The trip-related statistics of Table 2 are for live trips only and do not include no-job trips. A no-job trip was recorded on the worksheets by drivers when:

- the passenger was not at the address given in the telephone booking (often called a no-show); or
- when no payment was made at the completion of the trip.

The figures of Table 2 indicate that the amount of work as measured by the number of trips per taxi has stagnated if not declined over the two years. We discuss below the caution needed when calculating the total amount of work. Bearing this in mind, the estimated number of jobs was 8.76m in 1996 and 7.93m in 1998. This represents a fall of 9.5%. The first three months of 1998 recorded the highest decline of about 23% over those months while the last three recorded an increase of about 3%. The remainder recorded a decrease of about 8%. Using the estimated number of jobs and the number of passengers per trip, the number of passengers carried by the taxi industry was 13.1m in 1996 compared with 12.3m in 1998. This represents a drop of just over 6%.

Table 2 Revenue and operational statistics (source: Transport Systems Centre (1999), p iv)

Statistic	ATIBS96	ATIS98	% change
<i>Revenue statistics</i>			
\$ per total kilometre	0.66	0.72	9.1
\$ per kilometre with passenger(s)	1.34	1.44	7.5
\$ per working hour *	15.42	16.39	6.3
\$ per hour with passenger(s)	44.97	47.22	5.0
\$ per shift	155.60	167.86	7.9
\$ per trip	9.79	11.17	14.1
<i>Trip statistics</i>			
passengers per trip	1.49	1.55	-
distance with passenger(s) per trip (km)	7.3	7.8	-
average trip duration (minutes)	13.1	14.4	-
<i>Shift statistics</i>			
live distance per shift (km)	115.7	116.4	-
total distance per shift (km)	236.9	231.6	-
working time per shift (h:min)*	10:06	10:14	-
passengers per shift	23.5	23.2	-
live (revenue) trips/shift	15.9	15.0	-
<i>Proportions of live distance and time</i>			
% total kilometres with passengers	48.8	50.3	-
% working time with passengers*	34.3	34.7	-
<i>Origin of work</i>			
% trips booked through the telephone	62.1	57.7	-
% trips hailed	10.5	12.1	-
% trips off rank	27.3	30.1	-

The working time per shift has slightly increased but the number of trips per shift has decreased. In contrast, the revenue figures have increased. While it is true that the length of trips in terms of both time and distance has increased, the main reasons for the increase in revenue are the fare increases that occurred during this period. That of 17 February 1997 comprised a 2.5% increase plus a 1% safety levy. The adjustment of 17 February 1998 eliminated the 'free' travel component of the distance charges for both Tariff 1 and Tariff 2. Previously about 100 metres of initial travel could be taken without the fare increasing. The adjustment of 17 February 1998 also increased the Tariff 2 flagfall from \$3.00 to \$4.00. The results of these changes meant an increase in Tariff 1 7km fare from \$8.30 (in 1996) to \$8.70 (from 17 February 1998) and from \$9.70 to \$11.10 for a 7km fare in a Tariff 2 period.

Two indicators of taxi work period efficiency were measured in both studies. These are shown in Table 2.

- the proportion of shift time carrying one or more passengers (% live time); and
- the proportion of total distance travelled while carrying one or more passengers (% live distance).

There was no change in these indicators between the two years: in 1996 the proportion of live time was 34% and the proportion of live distance was 49% while the corresponding figures for 1998 were 35% and 50%. These figures are within the bounds of expected survey variation. Future studies may pick up a trend in these indicators.

The evidence of a decline in telephone bookings over the two years is firm. What is in more doubt is the level of total work. The worksheets indicated that in 1998 a higher proportion of work originated from rank and hail than was the case in 1996. The lower number of booked jobs represents a lower proportion of the total work in 1998. Worksheet proportions from each survey were used to calculate multiplication factors that were in turn used to estimate total work from the daily booking totals for the entire year. This total work figure is therefore sensitive to the proportions used and the days to which each is applied. Booked work represented 60.1%, 60.9% and 52.5% in the three worksheet surveys of 1998. Researchers used the patterns in factor values from the seven worksheet surveys of 1996 to determine the months to which each of the three 1998 factors would be applied. This resulted in the total work estimate figure of 7.93m jobs. A sensitivity analysis revealed that possible variations in total work ranged from 12.4% to 8.4%. Interestingly, prior to the release of the final 1998 report, industry sources estimated the decline in work to be around 10%.

From the foregoing discussion it is clear that some caution has to be expressed regarding some findings from the studies but it can be confidently stated that between the years 1996 to 1998:

- jobs through centralised booking services declined by 13.8%;
- total revenue increased slightly due to the metered fare increases; and
- total work as measured by the number of jobs declined by about 10%.

Taxis and hire cars

On the face of it, taxis are perhaps the most notorious example of the pernicious effects of government regulations to restrict competition. Restrictions on taxi numbers by governments have led to a market in taxi licences that has seen taxi 'plates' changing hands for a quarter of a million dollars in some cities and upwards of \$150,000 in Adelaide (see Transport Systems Centre, 1997 for a list of plate prices in the major Australian cities). It is argued that these amounts serve no economically useful purpose at all and simply drive up the cost of a taxi fare. The restrictions themselves result in customers having to wait for taxis longer than they otherwise would. It is no wonder then that there have been many calls for taxi deregulation by both academic economists and government advisory bodies (for example Swan, 1979; Gaunt and Black, 1994; Industry Commission, 1994; Findlay and Round, 1995; Soon, 1999).

Despite these calls, and despite the generally favourable evidence from at least one New Zealand city which has opened entry (Morrison, 1997), Australian state governments have been impervious to change. The high licence prices themselves have created a political constituency with a very strong vested interest that would be expensive to buy out. Also defenders of limited entry point to the evidence of numerous cities in the

United States which deregulated in the 1970s and 1980s, only to reintroduce controls when the results of deregulation appeared worse than before (Dempsey, 1996; Teal and Berglund, 1987). Recently the generally disappointing evidence from Sweden has bolstered the defence of retaining the existing controls (Gaerling, Laitila, Marell and Westin, 1995).

The classic argument to explain the utility of taxi controls has been made by Chanock Shreiber (Shreiber, 1975). He examined the increasing price of taxi fares in New York up to the imposition of controls in 1937 and concluded that stability thereafter was due to the taxi market being subject to chronic oversupply that lowers the efficiency of taxi services. With drivers having to wait so long for a fare, they will have to charge high prices to cover their waiting time. An oversupply of taxis will create congestion and lower the quality of service, particularly as customers usually cannot make an informed choice between competing suppliers. But Williams pointed out that this applied only in the cruising sector of the taxi market, estimating that in Melbourne at that time only one sixth of trips were initiated through hailing (Williams, 1979; Williams, 1980). The advantages of telecommunications have all served to give the consumer choice and render quality controls less necessary. Shreiber's rejoinder – pointing out that in New York the bulk of taxi trips are initiated by hailing – indicates the importance of specific conditions (Shreiber, 1981 p 82). Shreiber also belittled the significance of ranks in promoting choice, given the convention that customers take the first cab off the rank.

In 1991 the South Australian government chose to open entry into Adelaide's hire car sector. At that stage there were fifty licensed vehicles providing limousine services, each carrying a licence market value of about \$30,000. The hire car owners were not compensated for this, but protest was muted because some of the larger operators felt restricted by the limit on numbers and turned themselves into franchise operations, charging high prices to become a franchisee. The defence of the open entry policy was that the arguments in favour of taxi regulation applied only to taxis that were hailed or engaged off a rank. They did not apply to cars booked by telephone, where customers could exercise choice, and booking companies would have a motivation to maintain quality and avoid over-supply (Radbone, 1991).

The arrangement was confirmed with the passage of the South Australian Passenger Transport Act, 1994, which defined taxis by certain rights including:

- the right to be called a taxi;
- the right to carry a taxi meter (a concession to the taxi industry that was not considered important); and
- the right to ply for hire in the streets, including the right to use a taxi stand.

Both the South Australian Labor government that existed in 1991 and the Liberal government elected in 1993 pursued a possibly contradictory policy of issuing new taxi licences. Both governments were perhaps convinced by the telephone booking companies that the extra licences were needed to meet the new competition posed by the hire cars.

The number of hire car licences expanded dramatically to the point that at one stage there were about 900 – almost as many as there were taxi licences. The bulk of these were taken out by people who used the hire car status to reduce tax by claiming deductions for the cost of their expensive car. Higher accreditation costs and new requirements imposed by the Passenger Transport Act reduced the number of hire cars to about 600, though most of the owners used the vehicle only occasionally for commercial service.

There are no available official figures on hire cars regularly competing with taxis. Private estimates of the number of hire cars working each day range from 70 (a modest estimate from a taxi source) to 200 (a government source). Sources within the industry estimate that the average hire car would do about eleven jobs a day, therefore the number of jobs done by hire cars would be between 770 and 2,200 per day. This compares with about 14,600 booked taxi trips per day. Note that the decline in taxi telephone bookings was 13.8% from 1996 to 1998.

The evidence of hire car competition

Although neither study directly examined hire cars, the two studies do provide evidence of the impact of these on the taxi sector. The most obvious evidence is the decline in booked work. Hire cars themselves are confined to work from telephone bookings. The decline in booked jobs for taxis can clearly be attributed to hire cars, particularly given that the proportions of rank and hail work have increased. Another possible factor is that taxis are being booked directly through a driver's mobile phone.

Until the 1996 Baseline study was conducted there was no accurate data on what proportion of Adelaide's taxi jobs were booked through calls to a booking company. It is generally believed that the lower the number of taxis available, the more likely they will be booked using a telephone. People in New York will hail a cab in the street; people in a country town will ring for one. It was also assumed that as the telephone became more widely available in the community, so was the reliance on booking companies. By 1994, when legislation made it compulsory for taxi operators to be allied to a telephone booking company, only eighteen of the nine hundred or so cabs were not thus affiliated. The government estimate at that time was that as much as 80% of jobs originated from telephone bookings.

It came then as somewhat of a surprise to find only 62.1% of jobs were recorded in the 1996 worksheets as being booked by phone. Were the estimates always too high, or had there been a significant decline? The still lower figure of 57.7% in 1998 suggests the latter, but to what extent hire cars and/or the drivers' mobile phones are contributing to the decline is unknown.

Certainly taxi drivers were quick to adopt mobile phones and by 1991 there were established informal networks of taxis that would feed work to each other using mobile phones. Findlay and Round (1995) argued that mobile phones can obviate the need for regulation by allowing customers to directly ring taxis of their choice. Adelaide

telephone booking company executives are concerned about mobile phones, with private estimates of the proportion of work through the drivers' mobile phones being as high as 15%.

The ISC study worksheets did not ask drivers to indicate when they obtained a job through a mobile phone, deeming that to request such sensitive information may have jeopardized cooperation with the study. Therefore the studies provide no direct evidence on the question. But it is probable that the proportion has not significantly increased since the early 1990s. The reason for this is that unless customers have a regular arrangement, they are unlikely to find the taxi they want available and in their area. The complications and cost of 'ringing off' calls to other cabs in a better position to serve a customer has effectively limited the size of each mobile phone group to no more than a handful of operators. These groups are nowhere near big enough to match the response times of the centralised booking services that have access to a fleet spread across the metropolitan area.

On the other hand rank observers noted that taxis were more likely to leave a rank without a customer in 1998 as they were in 1996. The observation of one reasonably busy stand in the Central Business District (CBD) recorded a taxi departure rate of 20% without a fare in 1996 and 48% in the equivalent survey of 1998. Presumably the taxis departed because they had received a booking. Given the decline in centralised booking jobs, the increase in rank departures without a passenger can be reasonably attributed to mobile phones.

What evidence is there to support the theory that hire cars are the reason for the decline in booked work? It appears that hire cars have captured a considerable proportion of the corporate market. Although entry barriers to the hire car sector were lifted in 1991, the Passenger Transport Board (PTB) adopted policies that effectively ensured that hire car services were of a 'higher quality' than taxi services. These policies included PTB approval of business plans put forward by applicants for accreditation and PTB approval of the vehicles used. In 1998 the South Australian parliament approved new controls on hire cars. Vehicles now have to have six cylinders or more, with a wheelbase of at least 2.8 metres. It must also be a 'higher class of vehicle' – presumably higher than a taxi – though the age limit for taxis is 6.5 years. Owners of hire cars that compete with taxis must also pay \$211 per year, plus \$1000 per year for each vehicle, a fee unrelated to the cost of any 'service' provided by the PTB. 'Traditional' hire cars must charge at least \$20 a trip and this is enforced through checks of hire car company booking records.

The effect of such policies has been to confine hire car competition to quality factors, not price. Hire car services provide a higher quality vehicle than taxi services, but fares are rarely cheaper and in most cases are more expensive. This means that hire cars appeal to corporate users but not to the transport disadvantaged users of the taxi market. This hypothesis is supported by evidence from the 1998 study. The biggest decline in booked work has been during weekdays when companies are most likely to be engaging taxis (see Figure 1).

In contrast to the decline in booked work, estimated total work during weekends increased when hail and rank work was included (see Figure 2)

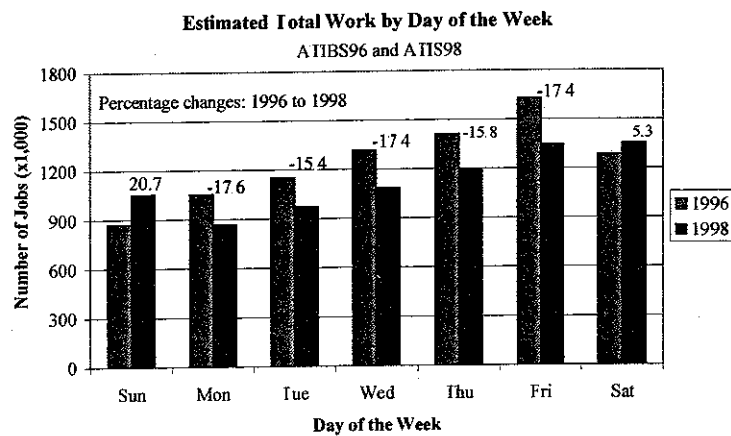


Figure 2 Estimated total work by day of the week (source: Transport Systems Centre (1999), p 44)

The estimated number of jobs from hail work increased slightly from 0.92m in 1996 to 0.96m while the estimated number of jobs from rank work remained constant at just under 2.4m. In addition the proportions of telephone booked work completed in tariff one (day) and tariff two (night and weekend) time periods changed from 1996 to 1998. In 1996 half of the bookings were for tariff one jobs (2.68m tariff one and 2.67m tariff 2) and by 1998 the figure had fallen to 45% (2.07m tariff one and 2.54 tariff 2). Interestingly, this is despite a much larger increase in taxi fares for tariff two (night and weekend) than for tariff one.

Data collection techniques for future studies

Issues that continued from the 1996 study to the latest study were the problems of:

- worksheet response rates (as discussed above);
- quality of responses; and
- uniformity of information from telephone booking companies.

Improved and more abundant information on the industry is achievable through the telephone booking companies. Since 1996 Global Positioning Systems (GPS) and automatic despatching systems have become an integral part of the telephone booking companies' operations. Depending on the despatching system used, GPS allows the location of vehicles to be known in real-time or, by using telecommunications, the drivers can advise the centralised booking companies of their location. This information is used to despatch jobs automatically and evenly across the fleet affiliated to a booking company.

From the point of view of future studies, this technology could enable the collection of information that was previously only available from worksheets filled out by taxi drivers. This could be achieved when combining the positional data from GPS and the information from other systems on-board taxi cabs, in particular the meter. Thus the distance travelled and the time taken for each job could be calculated and these matched with the farebox time, distance and fare data to link the revenue statistics with the operational statistics. But this would rely on the driver having the systems (GPS and meter) switched on at all times. In addition to the number of telephone jobs despatched to each taxi being determinable through the despatching system, the split of jobs between rank and hail can be ascertained using the geocoded location for each of the ranks. The number of passengers for each trip could be gathered through on-board video systems if such systems were to be installed.

Furthermore, as mentioned in Primerano, Clement and Radbone (1997), the problem with collecting information from telephone booking companies (in that paper known as radio booking companies) is that for the sake of confidentiality the semantics of the information collected must be common to all the companies. In 1998 this was achievable for daily booking totals but not hourly booking data as this was only available from all three companies for the last of the surveys. Accurate trip origin-destination data could not be gathered from all of the booking companies.

Despite these drawbacks, it is likely that accurate inferences can be drawn for some of the data. In conclusion, the telephone booking companies have indeed advanced with the latest technologies available, which should benefit future studies.

Conclusion

From 1996 to 1998 there was a significant decline in the number of jobs for Adelaide's taxis that originated through telephone booking companies. By contrast the taxi work engaged by rank held constant and that by hail increased slightly. The explanations for this may be an increase in the number of direct bookings through drivers' mobile phones or because of increased competition from hire cars. The decline in total work was estimated at 10%. A longer term study may also indicate the importance of wider environmental factors, such as increasing access to the private car.

Observations of rank activity during times when passengers would be expected to wait revealed that, as in 1996, taxis did most of the waiting. In addition, passenger waiting times had generally decreased. Overall the taxi industry in 1998 catered to demand from rank and hail work at least as well as it did in 1996 though the location of some of the peak work appeared to have changed from some parts of the CBD to others.

Comparing 1998 statistics with those of 1996, taxis are doing fewer jobs, but are spending longer carrying passengers and travelling further with them per shift. Revenue values per job and per shift have increased due largely to two farebox increases since the 1996 study.

The opinions expressed are those of the authors and are not necessarily those of the Passenger Transport Board, nor of the representative bodies of the taxi and hire car industries.

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