

Analyzing User Perception and Satisfaction on Car Sharing Experiment*

A Case Study of Second Car System in Tama New Town*

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1. Abstract

This paper aims to investigate user characteristics, perception/attitude and satisfaction on the use of Second Car System experiment, launched by JSK, in September 1999. By utilizing quantitative analysis of revealed preference survey techniques including database collected during the field trial, the results represent significant elements in helping to realize the potential niche of car sharing in practically feasible aspects.

2. Background

A field trial of the Second Car System in Tama New Town began in September 1999, by the Association of Electronic Technology for Automobile Traffic and Driving or JSK. The experiment was 2 years of operation which divided into five phases. Table 1 indicates the operational phases, vehicles, users, and port system. It was decided from the outset that fees would not be charged during the first four phases of the project, but would still estimate the cost of actual mileage use during a rental trip. This estimated cost information was determined in real-time by the system management center and transmitted to the vehicles at the end of the trip, where it was displayed on a screen so that users could know the realistic cost before entering the fee charge period (which was only 3 months time). The rationale was to investigate the users' response and

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interaction/acceptance towards the fee. The SCS field trial was to use environmentally-friendly electric vehicles (EVs) fully equipped with advanced technology (i.e. ITS, GPS, car navigation system, etc) using IC card to access (i.e. locked and unlocked) to a car. The Second Car System demonstrated in Tama New Town, Tokyo was designed primarily for housewives, whose families could not readily own a second family car due to parking constraints. The System made it possible for local residents to drive errands in the Tama New Town residential areas and other locations within the system. The system provided users with an advanced reservation-basis (1).

3. Survey techniques

A questionnaire survey of all pre and post free of charge period of SCS members was carried out in Inagi City, Tama New Town area after the project ended. Period of collecting a survey data was divided into 3 phases started from August, September, and November, 2002. Revealed preference questions were asked in the following 4 sections: socio-economic characteristics, routine travel behavior, mode choice and alternatives, car sharing perception and Second Car System usage.

Various survey methods were applied to explicit/identify the most effective technique. It was found that the most effective way was a combination of a telephone and a postal mail survey by first informing SCS members in advance through a phone call that a survey after SCS experiment was conducted and then posted the questionnaires directly to members' house with pre-paid postal stamp and asked them to return after completed all the answers in the questions given. 250 samples were distributed and 103 validated samples (44%) had returned.

Table 1 Second Car System (SCS) Characteristics

| Descriptions | 1 st phase (Sep. 99) | 2 nd phase (Jan. 00) | 3 rd phase (Sep. 00) | 4 th phase (Jan. 00) | 5 th phase (12/01-2/02) |
|---------------------|------------------------------------|------------------------------------|------------------------------------|------------------------------------|---------------------------------------|
| No. of EVs | 30 Daihatsu EV | 50 Daihatsu and Toyota EVs | 30 Daihatsu EV | 30 Daihatsu EV | 28 Daihatsu EV |
| No. of users | 88 users | 217 users | 210 users | 300 users | 35 users |
| No. of stations | 8 stations | 8 stations | 8 stations | 8 stations | 8 stations |
| Vehicle usage ratio | 2.9/vehicle | 4.3 users/vehicle | 7.0 users/vehicle | 10.0 users/vehicle | 1.25 users/vehicle |
| Fee charged period | None | None | None | None | Charged |
| System policy | Round-trip only | Round-trip only | Round-trip only | Round-trip only | Round-trip only |

4. Results of the survey

Based on 44 percent of the returned samples of both pre and post charge period members, the results on their characteristics are outlined below.

(1) Gender and age distributions

The gender proportion of SCS members tends to be relatively 67% female and 33% male. The age brackets are varied among 18 to 61 and above. The major SCS users were in the age bracket of 36 – 40. Most of them are married.

(2) Person per household and living status

Results from a survey indicate that 91 percent of members are nuclear family (i.e. husband, wife and children) and 9 percent are extended family (i.e. husband, wife, children, and parents). 27 percent of members live in their owned house whereas 46 percent live in their owned apartment and 26 percent live in rental apartment.

(3) Employment and vehicle ownership

SCS members are full-time and part-time employment as well as retirees and home makers. The results show that 61 percent of SCS members were home makers/housewives, 26 percent were office workers, and 11 percent were self-employment and retirees. A share of approximately 90 percent of SCS members owned at least one car prior to be membership and 10 percent owned no car. 43 percent accounted for Station Wagon

vehicle type (2000-3000cc), 24 percent for sedan (1300-2000cc), 17 percent for compact vehicle type. Evidence shows that the number of car ownership in Inagi City is relatively high. The number of vehicle registration for passenger car, as of March 2001, was 7,641 and for small-compact car was 12,232. In comparison with the number of households in Inagi City (28,851 households as of August 2002), the number of auto ownership of both vehicular types are more than halves a number of households (1). This factual data reflects the need of a second family car when family members tend to be increased. However, in reality, this issue crucially reversed the expectation in that a small number of non-auto-owners which we ignored or considered as a secondary target group tended to be a crucial determinant for evaluating the net impact of car sharing usage (they were a major share of SCS usage).

(4) Importance of specific attributes in choice of means of transport

Serving as one of public transport modes, SCS program provided specific attributes: accessibility to stations and SCS operation and management center, convenience and comfort, flexibility, booking system, technological assistance, and environmentally-friendly vehicles. These attributes play essential role in affecting decision making of users whether which mode is the most attractive to choose among available alternative modes. From data collection and observation, it is found that members would choose either their own car or SCS car depends upon the trip purpose, travel distance, existing weather condition and availability of their own car.

The results indicate that most SCS vehicles were used for only driving on errands (average distance driven per rental was 9.22 km) (1). This was due probably to battery capacity of EV. Nearly 80 percent of SCS vehicle usage was for shopping trip purpose and almost 40 percent was for pick up and drop off husband to the station and children to the school. And the rest was for going social activity and public facility purposes. The average hour per rental was 1.95 hours and rental frequency was 2.29 times a week. The peak rental time was between 10:15-11:45 and 13:15-16:15 which

depended upon area of each station (1). The operating time of SCS system started from 8:00 am to 8:00 which was not responded to the need for commuting of work trip or park and ride. Also, there was no SCS vehicle parking station closed to railway stations (e.g., Inagi station and Wakabadai station). As a result, the attractiveness for the use of SCS vehicle of this target group was relatively very small.

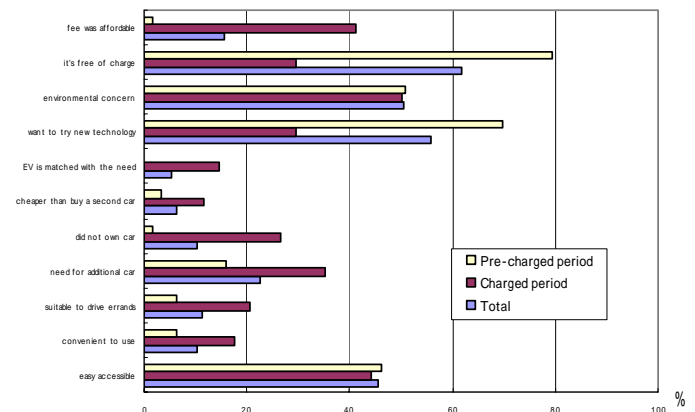
94 percent of members accessed to SCS stations on foot, 5 percent by bicycle and 1 percent by auto-bike. The average access time was 4.36 minutes within 318.77 meter-walking distance. In comparison with existing modes, most of members stated that their access time to the nearest railway station was 16.91 minutes, 3.21 minutes to bus station, 1.97 minutes for private car and 8.99 minutes for waiting until taxi came and rode away. The average access time to SCS station seemed reasonable and dominated over taxi but competitive with private vehicle. The questions on alternative modes were placed. Based on the segment of pre-charge period members group, 44 percent will use train and 22 percent will use bus when their current mode is not available. For the segment of charge period members group, both train and bus share the same percentage which was 37 percent.

(5) Motivation/reasons for joining SCS membership

SCS members were asked to state their motivation for membership. And according to the survey, it was found that more than 60 percent of overall members did know nothing about car sharing system. To clearly identify the motivation of SCS members, 11 explicit reasons were given. Both pre-and-post charge members prioritized the reasons to join SCS program in interestingly distinctive characteristic (2). The top three reasons that the segment of pre-charge member group stated were 1) because of the system was free of charge, 2) wanted to try new technology, and 3) environmental concern. For the post charge period members group, they stated the reasons as follow: 1) environmental concern, 2) easy accessible (i.e. SCS stations close to their living place), and 3) the fee was affordable. Figure 1 represents the reasons for joining SCS program. The motivations identified by

members represent the crucial factors that affected the use of car sharing in terms of environmental concern, station accessibility and fare affordability which can contribute to form car sharing organization in future (2).

Figure 1 Reasons for joining SCS program



(6) Perception/satisfaction on SCS system

All SCS members were asked how they perceived car sharing through SCS system before, during, and after the experiment. Interestingly, both pre and post charge period members indicated identical perception on environmentally friendly system of EV. For the fee collective period members, they perceived SCS system as economic at first and so did pre-charge period members. However, during the experiment, this perception has declined from 28 percent to 18 percent in the fee collective period members' view and from 24 percent to 8 percent in the pre charge period members' view. For the perception on inconvenient compact car of SCS vehicles of the later group, this continued to rise sharply while the prior group perceived more and more convenient on the use of SCS system during and after the experiment. This may imply that because of the pre charge period members' vehicles are available at disposal, the need to plan for next trip and book the car for next use seemed inconvenient and inflexible when frequent use of SCS vehicles took place.

All SCS members were asked to rate their satisfactory level on SCS usage based on the operation and service feature items given from 1 to 5 (1: very satisfied, 5: very unsatisfied). Both pre and post charge period members

indicated no difference on their level of satisfaction. Those were 1) able to contact the control center, 2) fully hi-technological devices (e.g. using IC card, car navigation system, and locked-unlocked system), 3) car ran smoothly and always cleaned, 4) booking system and accessible to station as well as update information on time usage. These items are in between very satisfied and satisfied. The ability to access or contact the operation and management control center play an essential role in SCS system. Users felt safe to communicate with human rather than robot or unmanned operation, particularly, from the outset of car sharing organization. This can imply in numbers of reasons such as ability to reach the operational control center official when having unexpected incident like battery running out during driving or system malfunction and so on. However, all SCS members had identical perception on the service area. They were very unsatisfied with the insufficiency of service areas which was not covered in their residential areas. This factor has significantly impacted on the attractiveness of the use of car sharing on the shift to use other alternative modes. Nevertheless, 38 percent of all SCS members were satisfied by the overall SCS system. And 44 percent of fee collective period members answered that they will relatively consider to use car sharing again if it reestablished. As observed, some of fee collective period members already started selling their own car.

(7) Drop out members

In the questionnaire, reasons for drop out have been raised. Based on 61 percent of the returned samples of pre charge period members, 60 percent indicated the limitation of battery capacity of EV, 45 percent indicated no need for second car as they already owned one, 42 percent stated they wanted to try new technology without paying any cost, and 40 percent claimed the fees were too expensive.

5. Conclusion

In conclusion, there are issues that can be drawn here from the SCS experiment. First is accessibility and

second is attractiveness of product and service features. These two key indicators play a very significant role to form future experiment of car sharing or viable car sharing business in order to gain its users or members. The attributes provided by car sharing organization (CSO) will have to be dominated over other transport modes or at least equivalent to their current mode, particularly, its competitive mode like private transport in this case. A diversification of vehicle types including conventional and low emission vehicle, e.g., electric vehicle or hybrid electric vehicle and sedan or compact or recreational car, in a fleet should be taken into consideration so that users can feel free to choose which car can match with their trip purposes. An accessibility to public transport by a feeder of car sharing is a good combination to stimulate using mass transit such as having car sharing stations nearby railway stations within possible walking distance. In this case, car sharing can attract more markets beside housewives and hence, can reduce the need to buy a second family car. The provision of an integrated ticketing system or smart card to access to public transport as well as other public facilities is also another marketing strategy. By providing the accessibility to products and services, users will feel exclusive and privilege of being a member of CSO. This can be trade off between the foregone benefit in terms of convenience and flexibility of the sunk cost of vehicle ownership and the shared use vehicle in terms of accessibility and no fixed cost effect but no vehicle possession.

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