FROM THE USERS' AND THE OPERATORS' PERCEPTIONS: THE POTENTIAL OF CARSHARING IN HONG KONG

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Traffic congestion has been a severe issue in Hong Kong. The traffic issues have decreased the satisfaction of living and the quality of the environment. Hence, finding a solution for current issues is a top priority. The emerging trend of car-sharing has attracted attention all over the world. To explore the potential of car-sharing services in Hong Kong, it is essential to understand car-sharing services from the public and the operator's point of view. This study conducts an online survey that aims to identify the factors, such as demographics, driving habits, and car-sharing service attributes, etc., that influence the likelihood of people using carsharing services. The survey collected 213 responses for the multiple regression model to identify the factors that affect people using a car-sharing service. The results indicated that people with less monthly income, fewer owned vehicles, less reliance on public transport, and believe more in car-sharing service is an alternative to car ownership and online booking is an advantage to car-sharing service are more likely to use car-sharing service in Hong Kong. In addition, the attitude toward the carsharing service of most of the respondents is positive. However, the survey results and interview findings show that the publicity of car-sharing is inadequate, and lack of support from the local government is causing low familiarity of the concept, which resulted in low participation of the public in car-sharing services. Therefore, recommendations to the operators are given at the end of this paper to better develop the car-sharing service in Hong Kong.

CCS CONCEPTS • General and reference~Document types~Surveys and overviews • General and reference~Cross-computing tools and techniques~Empirical studies • General and reference~Cross-computing tools and techniques~Estimation

Additional Keywords and Phrases: Car-sharing, Transportation survey, Multiple linear regression model

1 INTRODUCTION

1.1 Car-sharing services

Car-sharing services provide customers access to the vehicle fleet for their occasional need, charging only for the duration of time of each trip, in some cases as short as half an hour. Customers are required to join membership to make a reservation through their online booking system, website, or mobile application and search for the nearest available vehicle. Most of the vehicles can be unlocked by an electronic key card which allows the customer to enjoy flexible and convenient procedures before driving. The car-sharing service can be a good choice for saving insurance and other maintenance costs, as the carsharing operator is responsible for all the cost of repairs, service, maintenance, and insurance [1]. Car-sharing is a service that an organization provides to its members with a fleet of vehicles to access, which usually charge on an hourly basis [2]. Car-sharing has been defined as a "short-term" rental for occasional use [3]. Those who choose to use a car-sharing service can enjoy the benefits of having a car without paying the costs and fulfilling the responsibilities of owning a vehicle [4]. The only difference to other car rental systems is that cars can be rent for less than an hour, even as short as 15 mins [5]. To access a vehicle, members need to make a reservation through a telephone or online booking system [6]. Depending on its model of car-sharing and the arrangement of the organization, the user is required to return the car to a specific location [7]. Car-sharing services significantly increase in popularity in recent years. Being able to share the fixed costs of a vehicle by using a car-sharing service represents the principal economic benefit of the service [8]. After joining a round-trip car-sharing in North America, members saved $154 to $435 monthly on average compared to driving their car [9].

Figure 1: Impacts of car-sharing [10]

Figure 1 summarizes the results of an aggregate level study in which more than 6000 respondents who joined the car-sharing service in Canada and the US participated. Twenty-five percent of members sold out their vehicles, and another 25 percent of them postponed the purchase of a car. In addition, it illustrates that one car-sharing vehicle can be shared with 9-13 members, which implied there would be 9-13 vehicles fewer on the road [10].

1.2 Car-sharing service in Hong Kong

Hong Kong entered the car-sharing market in 2013. There used to be three car-sharing companies in Hong Kong: YourCar, Carshare.hk, and Cove. Carshare.hk was founded in 2013; it is the first large-scaled car-sharing company that was founded in Hong Kong and the only one that provided peer-to-peer car-sharing service [11]. However, in April 2019, it had been sued for owing the insurance fee for about a year. They announced that they would stop processing rents, soon after they closed the company. On the other hand, Cove started up in 2017, and the company is committed to promoting local car-sharing and leasing services, providing mobility-related hardware and software technical solutions, and online parts trading services [12]. As for Yourcar, it was founded in 2017 and aims to provide their members with high-quality and convenient char-sharing service where its members can enjoy an automated platform for making a reservation. Over ten vehicles are serving 24/7, with numerous pickup points all around Hong Kong [13]. They have set up a Facebook page, Instagram account, and YouTube channel to make a connection with the netizens and update the latest promotion on it. Up to March 2021, their Facebook page contains almost 1,600 followers and received over 1,400 likes on the page [14].

1.3 Current Problems of Hong Kong Traffic

According to "report on study of road traffic congestion in Hong Kong" by the Transport Advisory Committee (TAC), the growth rate of the vehicle fleet has reached an alarming rate, which increased by about 40% in private cars (15). By the end of 2015, the number of licensed private vehicles is around 569,600, with an average annual growth rate of over 3 percent [15]. It also stated that if the growth of the number of private vehicles continues, in the long run, it will be unsustainable in terms of land demand for new roads, highways, parking lots, and auxiliary facilities. Especially as more and more cars share limited road space in urban areas, traffic congestion will become more serious, travel speed will decrease, and pollutant emissions will increase. According to the report issued by Transport Advisory Committee (TAC), the tendency of average car journey speeds on Hong Kong Island, Kowloon, and the New Territories during the peak hours in the morning is declining with an average of 20 km per hour by the end of 2013, which was the lowest in the record. The difference in growth rates of vehicle and road length is increasing day by day, where the vehicle has grown much more than the road length and causing the competing of the limited road in Hong Kong (15). Lack of sufficient parking space is also another serious traffic problem in Hong Kong. In recent years, the fleet size has increased rapidly, while the supply of parking spaces has lagged far behind. As a result, in 2013, although the number of licensed vehicles was 475800, there were only 39700 parking spaces that could be given in private residential areas. The problem of illegal parking at both household and non-household ends has exacerbated local road congestion and has become a growing concern for the community [15].

Considering the increase in transportation demand brought by the expanding global population and the pressure of time efficiency, the transportation network of Hong Kong has been facing an increase in overloading. Traffic congestion can erode the competitiveness and sustainability of the city. More people owning a private car in recent years have caused more severe road congestion. The increasing number of vehicles competing for road space is another factor causing road congestion. Parking space in Hong Kong is insufficient for the

current vehicle fleet size. Cars are queuing for parking everywhere, especially downtown. Cars that are circulating on the road and finding a parking space are contributing to unnecessary use of road space. In addition, air pollution due to traffic in Hong Kong has remained at a critical level in recent years, which lead to an increased number of days reaching the very high level of the roadside air pollution index [15]. The longer the car drive due to congestion, the more pollutants will be released. The extra time and resources consumed in road congestion are uncountable; instant action is necessary to solve the problem. Along with the growing severity of the traffic problems, the opportunity for car-sharing has emerged in Hong Kong.

2 LITERATURE REVIEW

Many researchers investigated the factors that influence the acceptance of car-sharing services in their country. To explore the attitudes of China's citizens toward car-sharing services, a study surveyed 271 respondents in Shanghai [16]. The results of this study indicated that those interested in car-sharing services are with higher education levels, younger, travel a long distance to work, and owned fewer cars compared with those who are less interested in car-sharing services. A similar study examined the success factors of car-sharing services in China and shared the same view; it also conducted a survey to determine the factors that hinder the development of car-sharing services in China. It pointed out that China's citizen has a positive attitude toward car-sharing but low familiarity with the concept [17]. The study conducted in Wellington provided evidence that people with the four characteristics - households without children, at a younger age, living in apartments and occasionally drive - are more interested in car-sharing service in Wellington [18]. A study performed in Greece had conducted a survey, with the respondents were aged between 18 and 35, and concluded that the flexibility to return the vehicle to another station where it was picked up is a critical factor to joining a car-sharing scheme [19].

Car-sharing service is relatively a new service and its acceptance is different in different countries and regions. Literature review shows us that factors that determine acceptance of car-sharing may vary from one city or country to another. It is therefore necessary to find the factors that determine the acceptance of car-sharing service in Hong Kong. Car-sharing service in Hong Kong is an emerging business that lacks research on the service in Hong Kong. Moreover, the potential problems that hinder the development of car-sharing in Hong Kong are also missing from the literature. Hence, this study will examine the influencing factors that affect the likelihood of using car-sharing services by users and identify the potential problems from the perspective of the operators on the development of car-sharing services in Hong Kong. Suggestions to the operators will also be given according to the identified problems.

3 RESEARCH METHODOLOGY

The methods used in this project adopted three approaches as shown in Figure 2, in which desk research is used to supplement the information that was unclear or missing in the survey and interviews.
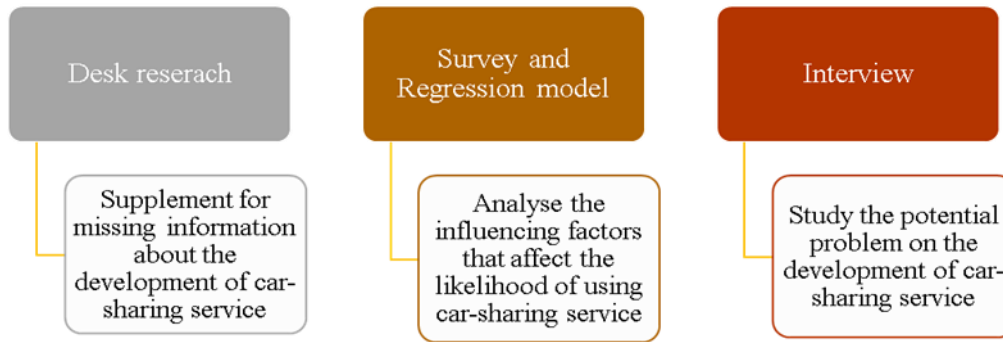

Figure 2: Relationship between research methods and the study objectives

Websites of car-sharing operators in Hong Kong were used for analyzing and investigating their business model characteristics. For example, social media pages of car-sharing operators, such as Facebook page and Instagram account, were also used for references as they reflect their relationship with customers through interactions and comments. Since an online survey allows to be more visual, flexible, and interactive [20], an online survey approach is used for this study. An online survey with 37 to 42 questions (length of the survey depends on the respondents' answers) about driving habit and familiarity of car-sharing service of Hong Kong people were released at the beginning of March 2021. The survey was opened for two months to collect responses via sending a link to widespread the survey to get as many as responses. To ensure the survey is consistent and balanced across different age groups, regions, and genders, street promotion was done by asking people on the street randomly to complete the survey for data collection. In this survey, respondents were asked about their driving habits, the daily modes of transport, the views toward car-sharing services, and the experiences on car-sharing service before. After the outbreak of Covid-19, lots of daily activities have been affected. Therefore, the perceptions toward car-sharing under Covid-19 were also asked in the survey.

A semi-structured interview is a type of verbal interchanges where the interviewer extract information from the interviewee with a series of prepared questions but unfolds in a conversational manner to explore further during the interview [21]. A semi structured interview was conducted with two of the car-sharing operators separately. Th interviews were held in March 2021. This includes an email interview with a representative from Cove and a phone interview with a representative from YourCar. An email was sent, and a phone call was called to the company and asked for an interview with them about the car-sharing operation in Hong Kong. The information gained in the interviews differed from the accessible public data as the interviewees expressed the actual barriers in operating the business, the effort already put in sustainable mobility, and expectations on car-sharing. The interviews were used to validate the findings in the results of the survey and the information of the desk research. Due to the pandemic of Covid-19, businesses in every industry have a profound loss. The impacts of Covid-19 and the corresponding responses were also asked in the interview.

3.1 Survey Design

The objective of the survey is to analyze the likelihood of Hong Kong people using car-sharing services by examining the data collected in the survey. A questionnaire is a valuable approach to collecting extensive information from many individuals. With appropriately structured and responsibly managed, a questionnaire can be a critical instrument to a survey as it can be used to make statements about specific populations or groups [22]. The survey is divided into four main parts, Part 1 talk about Vehicle ownership and driving habits of respondents, Part 1A asked questions from users who owned vehicles, Part 1B is designed for respondents who don't owned cars, Part 2 asked about the perception towards car-sharing, Part 2A is to collect opinions about concerns under covid-19, Part 3 inquired of any car-sharing experience in Hong Kong, Part 3A further collects data for car-sharing experiencer, Part 3B is for non-car-sharing experiencer, Part 4 at the end collects personal information.

Roopa and Rani (2012) pointed out that the items that appear at the beginning of the questionnaire should bear a strong connection to the topics. Therefore, the questionnaire starts with asking the respondents about vehicle ownership instead of their background and demographic characteristics. Moreover, since the closed-ended question is easier to code and analyze [23] most of the questions were designed to be the close-ended question in the survey. Before conducting the survey for data collection, testing the effectiveness of the questionnaire is one of the most vital parts of completing the survey. Pretesting was also conducted to examine whether the question wordings or the order of question may affect the respondent's responses using a small group of people from the survey population with the same questionnaire structure and settings.

4 RESULTS AND DISCUSSIONS

4.1 Data Analysis and Statistical Method

To determine the relationship between the likelihood of using a car-sharing service and the factors that influence the customer's choice, the dependent variable y, which is the likelihood of using car-sharing service, and the independent variables x, which are the factors that influence the customer's choice, are analyzed by the regression model. There are 14 independent variables in total in this regression analysis. Independent variables or predictors are the factor affecting the dependent variable y. The descriptive statistics of the factors are presented below in Table 1, showing the mean, standard deviation, minimum and maximum values for the influencing factors.

Table 1: Descriptive statistics of the factors

Factors	Mean	Standard deviation	Min	Max
Age	2.6291	1.3312	1	5
Monthly income	1.6713	0.6833	1	4
Number of vehicles owned	0.2160	0.4454	0	2
Driving habit	2.3953	0.7283	2	4
Familiarity of car-sharing service	1.0188	0.7201	0	2
Waiting time for car-sharing vehicle	1.9155	0.7785	1	4
Belief in car-sharing worsens congestion	2.2300	1.2584	0	4

Factors	Mean	Standard deviation	Min	Max
Belief in carsharing is alternative for car ownership	1.2394	1.0479	0	4
Belief in online booking is an advantage	1.3615	0.7176	0	4
Flexibility of accessing and returning	1.5117	0.7045	0	4
Flexibility of renting	1.478	0.7518	0	4
Convenient location	1.5258	0.6906	0	4
Public transport dependency	1.3850	0.8254	0	4
Marital status	3.0142	1.5561	1	5
Likelihood to use car-sharing service	1.0896	0.6860	0	2

4.2 Regression Model

Regression analysis allows statisticians or researchers to make predictions by predicting the relationship between independent variables and dependent variables, which have cause-effect relations. How will different independent variables, x, affect the regression is tested in this study to find out the likelihood of using a car-sharing service. Multiple independent variables are regressed in this study; therefore, a multiple linear regression model is conducted in SPSS, a functional, statistical analysis software, to determine the most influencing factors of the likelihood of using car-sharing services in Hong Kong. With regards to the adjusted R-squared, it will be considered as a reference to determine if the model is fit or not. If some inappropriate data sets are added to the model, it will be reflected by a lower value of the adjusted R-squared. As a result, the higher adjusted R-squared indicates the data sets used in the model are more fitted in. By comparing the adjusted R-squared value in stepwise, forward selection, and backward elimination regression model, the one with the highest adjusted R-square is the 10th model in the backward elimination mode as shown in Table 2, which indicated the factors in the 10th model are the most influencing factors of the likelihood of using car-sharing service in Hong Kong.

Table 2: Values of S, R-squared, adjusted R-squared from the regression model

Regression Model	S	R-Squared	R-Squared (Adjusted)
1	0.701	0.648	0.268
2	0.675	0.648	0.32
3	0.653	0.647	0.365
4	0.632	0.647	0.404
5	0.618	0.642	0.431
6	0.602	0.639	0.459
7	0.59	0.634	0.48
8	0.581	0.627	0.496

Regression Model	S	R-Squared	R-Squared (Adjusted)
9	0.574	0.617	0.508
10	0.574	0.6	0.509
11	0.583	0.569	0.494

Hence, we concluded that from the 10th model in the backward elimination regression model, five independent variables, which are monthly income, the number of vehicles owned, the agreement on car-sharing service is an alternative for car ownership, the agreement on online booking car-sharing service is an advantage, and the public transport dependency are the most influential factors for the likelihood of using car-sharing in Hong Kong. The descriptive statistics of these factors are shown in Table 3.

Table 3: Calibration results of the multiple linear regression model

Independent variables	Unstandardized Coefficients		Standardized Coefficients Beta
	B	Std Error	
Constant	4.668	0.577	
Monthly income	-0.324	0.154	-0.339
No of vehicles owned	-1.119	0.462	-0.358
Belief in carsharing is alternative for car ownership	-0.373	0.100	-0.514
Belief in online booking is an advantage	-0.277	0.212	-0.195
Public transport dependency	0.312	0.195	0.261

In table 3, the unstandardized beta (B) represents the slope of the line between the independent variable and the dependent variable. The next column is the standard error for the unstandardized beta. This value is like the standard deviation for a mean. The third column is the standardized beta (β). This works very similarly to a correlation coefficient. It will range from 0 to 1 or 0 to -1, depending on the direction of the relationship. The closer the value is to 1 or -1, the stronger the relationship.

4.3 Interpretation of Results

After the report is generated from SPSS, the regression model equation can be obtained from the value of the unstandardized B column for each factor from Table 3. The regression equation for the likelihood of using car-sharing services in Hong Kong is given by

$$y = 4.668 - 0.324x_1 - 1.119x_2 - 0.373x_3 - 0.277x_4 + 0.312\,x_5$$

Note that:

x_1 = Monthly income

x_2 = The number of vehicles owned

x_3 = The agreement on car-sharing service is an alternative for car ownership

x_4 = The agreement on online booking car-sharing service is an advantage

x_5 = The public transport dependency

In what follows, we will explore how these influencing factors affect the likelihood of using car-sharing service in Hong Kong. Assuming all other conditions remain the same, with every decrease in twenty thousand in the respondent's monthly income, the number of people who are willing to use the car-sharing service increased by 32%. The result shows that car-sharing service attracts the people with relatively lower income in Hong Kong, which is true that people would like to purchase their car instead of using car-sharing when they have more purchasing power. As for the number of vehicles owned, the result shows that a decrease in a unit of a vehicle increases 101 % chances of someone interested in using the car-sharing service in Hong Kong. Indeed, the more vehicles they owned, there will be less demand for car-sharing services. People who agree more about the statement "car-sharing service is an alternative for car ownership" are 37 percent more likely to use car-sharing services. An individual who agrees more about the online booking of car-sharing service is an advantage made him/her 28 percent more readily to use car-sharing service. A person who does not prefer to take public transport rather than driving in peak hours increases 31.2 percentage points of interest in joining the car-sharing service in Hong Kong. It indicates the people with less dependency on public transport will have more interest in using car-sharing services.

To summarize the conclusion for the results of the regression model, Figure 3 is made for clarifying the relationship of those five individual influencing factors and the likelihood of using car-sharing services in Hong Kong
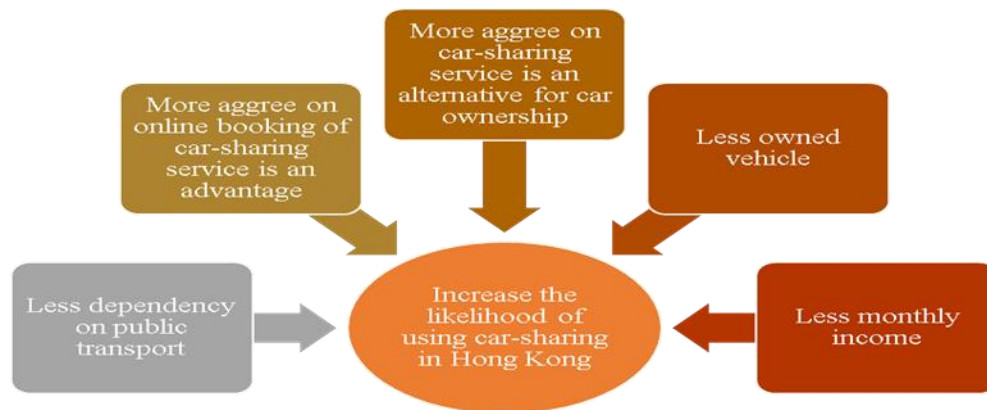

Figure 3: Relationship of the influencing factors and the likelihood of using carsharing service

4.4 Survey Findings

Our survey asked numerous questions related to car-sharing that will help policy makers and investors to understand the perception of users towards this service. Results show that 73.3% of people are not aware of car-sharing service, and almost 50% of those respondents even never heard of car-sharing service at all. In another question, the respondents were asked about their perception of car-sharing and given two choices to choose for defining car-sharing service. 58.2% of the respondents chose the correct answer for car-sharing services. However, there are also an enormous amount of people who do not understand the term of car-sharing service or feel confusing about the term. The explanation of car-sharing service was provided to give a better understanding of car-sharing service for the respondents before they continue the survey.
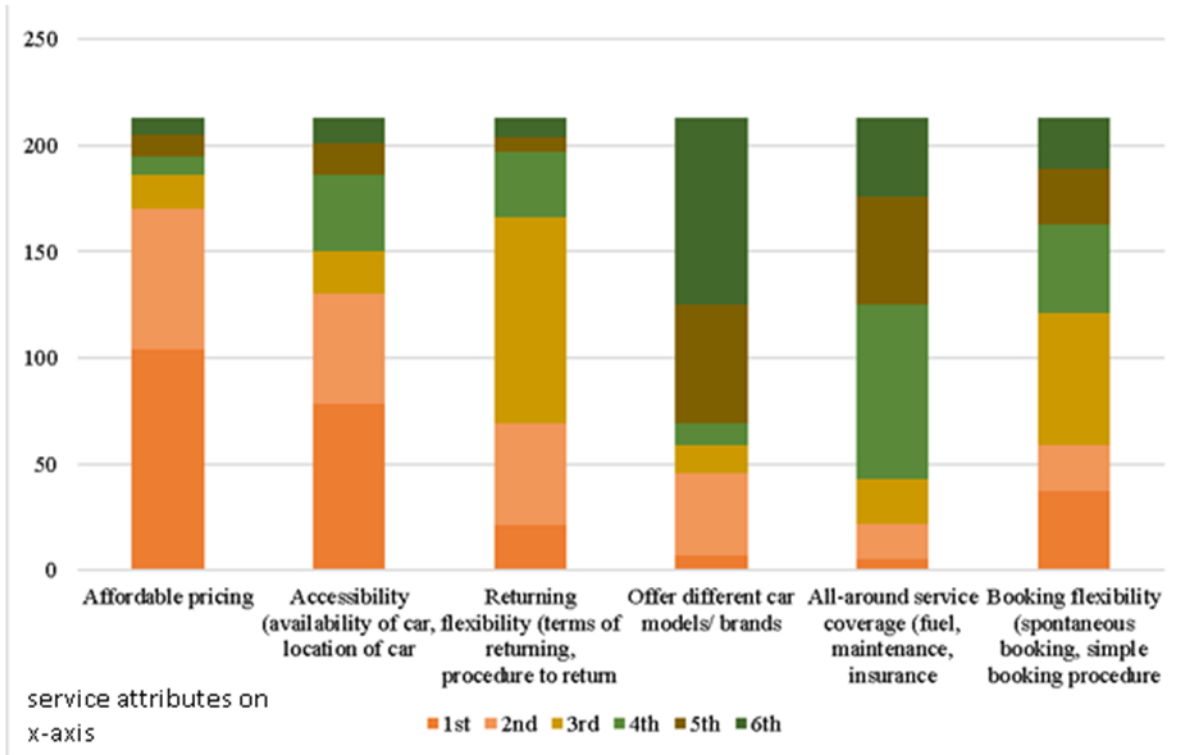
Figure 4: Ranking of car-sharing service attributes

Six car-sharing service attributes were asked to be ranked in order of their importance of using car-sharing service. According to Figure 5, people consider affordable pricing the most critical factor in deciding to use car-sharing service or not, while different car model or brand is the least important factor.

Our survey concluded that 89.7% of the respondents do not seem aware of the carsharing company in Hong Kong, and 84.5% expressed they have no experience with car-sharing services. Among the 15.5% of respondents who have experience with car-sharing services, only 4.7% of respondents used car-sharing services in Hong Kong, which reveals the fact that the familiarity of car-sharing services in Hong Kong is insufficient and thus causing low participation in it.

An interesting finding from the survey is that among the respondents who indicated they own vehicles, 88.4% of them refused to rent out their car in couple of hours, or as short as half an hour, in a day. 52.5% of them are concerned about the risk of their car getting damaged. In the future if Hong Kong car-sharing operators decides to include peer-to-peer car-sharing services in Hong Kong, this could be a reference for them to aware of the concerns of the car owners. The survey also examined the possibility of using car-sharing services of the respondents, a majority of 57.2% replied maybe, and 22.2% responded yes. This implied that most of the respondents are willing to try car-sharing service. 71.7% of respondents showed their possibility of using car-

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sharing service from 20% to 70%, which indicated most of the people are open to the car-sharing service to different degrees.

4.5 Interviews Findings

4.5.1 The Traffic Problems of Hong Kong

The traffic problems of Hong Kong, such as severe congestion and insufficient parking spaces, are a double-sided blade to car-sharing business. When the representative of Cove being asked why the model of car that they choose to provide are usually the high-end model, she claimed the carsharing market in foreign countries is different from that in Hong Kong because foreign carsharing is mainly used as a substitution for walking. However, in Hong Kong driving is not as much faster than taking public transportation. Congestion and the trouble of finding a parking space result in a situation where it is impossible to enjoy driving. Mostly people drive on the weekend for a leisure trip or for business purpose to pick up visiting customers or senior executives. These scenarios are more favored by luxury brand cars. The traffic problems make Hong Kong people do not enjoy driving; therefore, there is no need to own a car. Nevertheless, if more people in future choose not to own a car, a car-sharing service will be an excellent option for them.

4.5.2 The Difficulties of Promoting Car-Sharing

The lack of the idea of sharing has made the promotion of car-sharing in Hong Kong difficult. Hongkongers who are not familiar with the concept of sharing, do not understand the benefits coming with this service. Social media and webpages algorithm show only the most search item of that end-user and therefore relevant items will appear to the end-user. When one has never heard a car-sharing service and with no intention to search for such service, car-sharing service is difficult to reach the public. Yourcar's representative also validated the difficulties in promoting their service and claimed that most of their customers found their business when they really needed this kind of service and with clear intention. He also mentioned that it is almost impossible to see a customer who suddenly comes across and rents a car for substitution of a walk. He restated that car-sharing is not yet the common mode of transportation that is generally accepted. Hence, the promotion of carsharing is not strong enough to reach the public. Interview with the representative of Cove, disclosed the understanding of the situation of low popularity in the "sharing" concept in Hong Kong, which is the reason for choosing business-to-business mode to start its business. The representative of YourCar shared the same view when he mentioned that they believe it will take time to let people adopt the idea of "sharing." Once people are familiar with the concept, this culture can be developed in Hong Kong. Both believe that Hong Kong people are not refusing to accept the sharing culture, but they need more time to experience the benefits of sharing.

4.5.3 Covid-19 and their Reaction

Regarding the outbreak of the Covid-19 pandemic, both companies expressed their frustration towards the situation. The pandemic decreased a lot of their number of successful booking as the hygiene concerns of the shared car are more obvious under this specific condition. In response to this, YourCar chose to reinforce the cleaning and sanitizing of the car after every use to build trust and relationship with their customer. In addition, both companies expanded their business to keep their profits balance with the costs. YourCar expanded their business to daily rental on the conventional truck, allowing their customers to have an extra option for business use. As for Cove, they provide services of more technical solutions and cooperate with many car manufacturers,

car agencies, etc., to provide users with a variety of cars and brand choices. Since they are cooperating with merchants, particularly with commercial and residential buildings, customers and residents of these specific places can use App exclusively to rent cars. They are relatively less affected by the pandemic as their customers are limited to a fixed area in which the concern of hygiene problem is relatively less.

4.6 Recommendations to Car-Sharing Operators

Here are some recommendations, which are based on the literature review and interview results, as well as analysis of the factors that affect customers to join car-sharing services found in the survey.

4.6.1 Seek for More General Assistance and Financial Support

Operators can try to reach out more and seek more help for developing their businesses. The aim would be to widespread the good practice. It is possible to increase the quality of service by collaborating with or being invested by other companies after showing them the positive impacts of car-sharing. They may find other organizations useful in promoting the use of car-sharing services, especially eco-friendly organizations whose objective is to reduce air pollution. Under the pandemic condition, financial support for the car-sharing operators is essential. Organizations with strong corporate social responsibility may show more willingness to cooperate or support. The provision of general assistance can be accomplished in the following ways:

- Assist in design and distribution of the publicity material.
- Organize and design on-the-job training to improve the quality of service.
- Provision of training for cultivating the possible operators.
- Assist in getting resource for Car-sharing service (e.g., parking Space).

The methods mentioned in this section might help to increase the membership of car-sharing companies and the overall quality of the service.

4.6.2 Develop Analytic Ability to Predict the Potential Impact of a Measure to Promote Car-Sharing

Car-sharing service is new to the Hong Kong market, and the experience of the relevant project with the same concept "shared bike" did not went well. Therefore, it is difficult to estimate whether the measures proposed will successful or not. There is a need for the operators to explore the potential impacts of a certain measure being applied to promote car-sharing beforehand. This will boost their confidence and will result in better utilization of their resources. It is suggested to develop new tools to predict for their plans for instance:

- A standardized market research tool which can be used for understanding the level of interest toward car-sharing.
- An analyzing tool for investigating the composition of the traffic on the link or the route.
- The analysis of the minimum population size for a successful car-sharing operation.

4.6.3 Publicity of Car-Sharing Service

The survey conducted has shown the people in Hong Kong are unfamiliar with the concept of "sharing" or the concept of the car-sharing company. It is the main reason for the low popularity of car-sharing service. It is also a critical factor in deciding to use a car-sharing service or not. Hence, it is necessary to use the approach of targeted promotion to help the potential organizations and sponsors familiarize themselves with the concept of car-sharing service and to emphasize the positive impacts of developing the business. For example, leaflets can be provided to the employer describing car-sharing benefits and encouraging them to reduce the use of parking lots, gaining access to a broader human resource, and enhancing company image and improving the welfare of the employees.

4.6.4 Work with Government Departments to Introduce Initiative specifically to promote Car-Sharing

To introduce the concept of "sharing" and the idea of car-sharing, operators and investors can collaborate with local transport authorities. These types of initiatives will emphasize the benefits car-sharing may bring to the ecosystem in Hong Kong. It has been discussed that the severe problems of traffic in Hong Kong right now, such as the overflowing of a private vehicles causing road congestion and parking issues along with increasing air pollution. Introducing car-sharing can help in reducing traffic problems in Hong Kong. Therefore, the outcome of the collaboration could be very attractive to the government. Car-sharing is just the right option to make use of the technology and start establishing smart mobility. The government and agencies can assist car-sharing business in the followings:

- Assist in the promotion of car-sharing service, such as advertisement shooting, related promotion events.
- Collaborate with car-sharing operators to operate a car-sharing program for citizens to experience the car-sharing service.
- Organize the operation of car-sharing in Hong Kong.
- Regulation for car-sharing service for formulating the services in Hong Kong.
- Aid in marketing research for the car-sharing service, such as record the statistic of the number of members and analyses of the success factors.

5 CONCLUSIONS AND FUTURE RESEARCH

In this study we surveyed 213 people about their perception of car-sharing service in Hong Kong, containing both vehicle owners and non-vehicle owners, to provide a more comprehensive insight about car-sharing service. From the survey results, the willingness to try the car-sharing service that many respondents expressed had shown a positive attitude toward the service. However, there is less awareness due to poor publicity of car-sharing services. The survey revealed that affordable prices are an essential factor in the use of car-sharing services about car-sharing service attributes. Vehicle owners in Hong Kong tend not to rent out their vehicle while it is not in-used; most of them had expressed their concern about getting damage to their car. Furthermore, it is analyzed, by the multiple regression model, that there are five individual influencing factors affect the likelihood of using car-sharing service in Hong Kong. People with lower monthly income, less owned vehicles, less reliance on public transport, believe in carsharing as an alternative to car ownership, and agree with the online bookings attribute is an advantage of car-sharing service are more likely to use car-sharing service in

Hong Kong. Integrating the survey results and the interviews, three problems, which hinder the development of car-sharing services in Hong Kong, were identified as insufficient awareness toward car-sharing service, lack of support from the government, and inadequate opportunities to publicize car-sharing service.

Since car-sharing service is still a new concept in Hong Kong with limited public exposure, the survey can only explore the responses up to certain level, which could have been more in-depth if the services had developed in Hong Kong. In addition, an online survey is used in the project, therefore responses may result in a bias towards certain demographic groups such as younger age with more access to the internet. For further research on car-sharing services in Hong Kong, it is recommended to research other factors, for example, policy, economy, social factors etc., that affect the development of car-sharing services in Hong Kong. Furthermore, as the car-sharing operators in Hong Kong are all adopted the fixed station-based model, there is no need for discussion on a common issue of relocating the vehicles. If car-sharing service expands their business in the future and develops to include free-floating car-sharing service in Hong Kong, an effective relocation system will be needed to be developed to support the operation. Thus, the relocating issue can be researched in the future when the car-sharing operators are required to relocate the vehicles. Apart from the free-floating car-sharing system, there is an emerging trend of electric vehicles in the carsharing market in recent years and increasing popularities of adopting electric vehicles in Europe, North America, and even in China. Because of environmentally friendly impacts of using an electric vehicle, more and more regions showed their support by introducing electric vehicle into their carsharing market. However, it has not been well introduced in Hong Kong yet, and the use of electric vehicle is not popular in Hong Kong. Research on the potential of electric vehicles in Hong Kong can be conducted in future.

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Authors' background

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