Stakeholders' Perspectives on Feasibility of Cooperation among Them in Carsharing Market: Evidence from Japan

Hironori KATO [a], Satoshi SUZUKI [b], Shinsuke KAYAMA [b], Takashi KAWANOBE [b], Jun KUSUMOTO [b]

[a] *Graduate School of Engineering, The University of Tokyo, Tokyo, 113-8656, Japan; kato@civil.t.u-tokyo.ac.jp*
[b] *Graduate School of Public Policy, The University of Tokyo, Tokyo, 113-8656, Japan*

Abstract: This study surveys and analyzes the characteristics of the carsharing market in Japan, focusing on cooperation among the stakeholders in the Japanese market. Twenty-three individuals from ten organizations associated with the carsharing industry were interviewed, including carsharing operators, rail operators, bus operators, and local and central government representatives in July to August 2010. The results show that the stakeholders recognize two types of carsharing: a primary-mode-based system and a secondary-mode-based system. No carsharing operator has any plan to cooperate with the other operators currently, and the perceptions and expectations of the operators are different from those of the national government. Although local governments have willingness to promote the carsharing, they find difficulties to do so because they worry about the uncertainties regarding the effects of carsharing. Finally, this study summarizes three potential cases where cooperation is required among stakeholders in the urban carsharing market.

Keywords: Carsharing, Cooperation among stakeholders, Interview survey, Metropolitan area, Japan

1. INTRODUCTION

Recently, the carsharing market has been growing in many developed countries (Shaheen and Cohen, 2007; Barth and Shaheen, 2002; Shaheen et al., 2004; Nobis, 2006; Shaheen et al., 2006; Burkhardt and Millard-Ball, 2006). This is the case in Japan, where the number of carsharing users has increased since 1998 (Barth et al., 2006). Many carsharing services are provided by private operators in Japan. The rapid growth of carsharing demand has created tough competition among these operators, and this competition is expected to improve the quality of service (e.g., lowering service charges, increasing accessibility and mobility, and promoting social inclusion). It may also contribute to the reduction of private car use and overall automobile emissions (Zhou et al., 2008). On the other hand, too much competition may harm the accessibility and mobility of urban travelers. For example, competition among carsharing operators may reduce the compatibility between different carsharing services. The lack of integration between carsharing networks and public transportation networks may generate barriers/seams in the transportation network. Thus, some types of cooperation among the carsharing operators and/or between the carsharing operators and other stakeholders may be critical for a sustainable carsharing market. Examples of such cooperation include service integration in ticketing systems, coordinated location planning for public transportation and carsharing facilities, a quality partnership between carsharing operators and local governments, and flexible membership strategies shared among the different carsharing

operators. The quality partnership means that the different organizations make some agreement on the service for bringing about the significant improvement in the quality of urban/regional transportation service. This study surveys the characteristics of the carsharing market in Japan by interviewing the stakeholders and analyzes them—particularly with regard to potential cooperation among the stakeholders. The study team interviewed twenty-three individuals from ten major organizations, including national and local government officials, mangers of the different types of carsharing operators, and the managers of the public transportation operators in the Tokyo metropolitan area. To the best of our knowledge, no study has reported stakeholder opinions regarding the carsharing market in the context of Asia. The lessons from Japan may be useful to other nations/regions where the carsharing market will emerge and grow in the near future.

The paper is organized as follows: first, the motivation and goals of the study are presented. Next, the recent carsharing market in Japan will be reviewed. Then, the method used to interview the stakeholders is presented along with the results. The findings are summarized and implications are discussed in terms of cooperation among stakeholders. Finally, the study is concluded with a discussion of future research issues.

2. CARSHARING IN JAPAN

The general concept of having multiple users share a fleet of vehicles emerged in Japan in the late 1990s (Barth et al., 2006). Honda (ICVS) and Toyota (Crayon) were the first to pioneer the idea in Japan, but their efforts were limited demonstration projects. Initial demonstration programs flourished from 1998 to 2002. Many of Japan's initial shared-use vehicle systems used electric vehicles exclusively rather than conventionally powered vehicles. The first joint-venture carsharing system was established in February 2002. The ITS-CEV City Car system began as a government-sponsored MM21 (Minato-Mirai 21) demonstration project and has since been spun off as a separate company that operates primarily in Yokohama and Tokyo. The key shareholders of this company (CEV Co.) are Orix Rent-a-Car Corporation, Suzuki Motor Corporation, and NEC Corporation. Initially, there were 12 stations with 27 vehicles and approximately 550 members. The primary target for this system was business use. By 2007, CEV Co. had expanded its business to 44 stations, 60 vehicles, and about 1,000 members. In April 2007, CEV Co. merged with Orix-Carsharing Co. Toyota began a carsharing business of its own in November 2007. After the deregulation of the carsharing industry in 2006, the carsharing market has grown rapidly in Japan. New types of operators such as condominium owners, urban rail operators, and parking-place operators have also started carsharing services. Currently, thirty carsharing operators supply carsharing services independently. Major carsharing operators include ORIX Auto Corporation, Times 24 Co., Ltd., and Car Sharing Japan Co., Ltd. Table 1 presents data concerning the numbers of members and vehicles participating in carsharing in Japan from 2002 to 2011 (Foundation for Promoting Personal Mobility and Ecological Transportation, 2011). The list of carsharing organizations in Japan as of January 2011 is presented in APPENDIX.

Table1. Vehicles and members of carsharing in Japan from 2002 to 2011

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Vehicles	21	42	68	86	118	237	510	563	1,300	4,174
Members	50	515	924	1,483	1,712	2,512	3,245	6,396	16,177	79,993

Source: Foundation for Promoting Personal Mobility and Ecological Transportation

So far, there is no law/act directly regulating carsharing in Japan. The carsharing industry is regarded legally as part of the rent-a-car industry; thus, it is regulated by the Road Transport Act and the Garage Act under the supervision of the Ministry of Land, Infrastructure, Transport and Tourism (MLIT). Section 79 of the Road Transport Act stipulates that rent-a-car operators must apply for permission from the Regional Transport Bureau of MLIT to start a new business. Section 1 of the Government Ordinance of Garage Act also states that a rent-a-car station must be located within 2 km of an office with staffs. The "Official Notice on Rent-a-car" specifies that a car borrower is required to present or submit a copy of their driver's license to the car leasing organization when leasing a car. This means that staff(s) must always be present at rent-a-car depots/stations. Then, the Restructuring Special Zone (RSZ) was introduced in April 2003, when Prime Minister Junichiro Koizumi was in office. Carsharing was included as one of the policy matters in the framework of the RSZ in 2004. Under this framework, the "Note on interpretation of Section 80 (2) of Road Transport Act in applying for the rent-a-car-based environmentally-friendly carsharing program under RSZ law" was issued by MLIT in 2004. This allows car-leasing services to occur without the need for face-to-face contact between customers and staffs. Rent-a-car-based carsharing is defined as "a business to lease a car to an individual belonging to a specific carsharing organization." However, one-way carsharing services are not allowed by the Garage Act, which requires any registered vehicle to be parked at the pre-registered fixed parking space every day. In 2006, the carsharing industry was deregulated further, allowing new carsharing businesses to start if the following conditions are satisfied: (1) environmentally-friendly automobiles are used, and (2) a real-time data collection system is introduced for carsharing services using information communication technology (ICT) devices. Note that the key-box system is not permitted under this scheme. It should also be noted that a 2 km parking regulation is still active today. However, in practice, when ICT-based devices and facilities are present, services at carsharing stations occur as if they had offices with staffs. A local police agency evaluates whether this condition is satisfied or not, but one-way carsharing services are still not allowed.

3. STAKEHODLER INTERVIEWS ON CARSHARING IN JAPAN

The study team interviewed the major stakeholders about the carsharing market in Japan. First, the term "stakeholder" was defined as a participant who can influence or who can be influenced by the corresponding transportation problem. To select potential stakeholders, we first held discussions with academics and experts on carsharing in Japan. Then, the potential stakeholders were sequentially interviewed in order to comprehend their problem perceptions. We used the cognitive maps in the interviews. The cognitive map is a graphical representation of an influence network between notions. A notion is described by a text. We prepared hypothetical cognitive maps by collating their profiles via literature surveys or Web searches. Then, we interviewed the stakeholders with their hypothetical maps. The interview consisted of both structured and open questions. The structured questions included the following three questions:

- What is (are) your or your organization's goal(s)?
- What is (are) the major constraint(s) preventing you from reaching the goal(s)?
- In what way(s) do you cooperate with other stakeholders in your industry?

On an average, each interview took around two hours; after asking the structured questions, the interviewers requested that the interviewees speak freely about the current problems and future of the carsharing market in Japan. In most cases, two or three people

were interviewed; most of these people were chief executives or officials responsible of managing their organizations. When an additional stakeholder was identified during the interviews, they were sequentially included in the list of interviewees. The cognitive maps were revised on the basis of the interview results. We deleted the incorrect or less important factors or actions from the hypothetical map and inserted additional factors or actions, if necessary. Finally, the maps reveal the following three perceptions of the stakeholders: causal flows in relation to the problem, impact flows in relation to the stakeholder's current actions, and interactions with the other stakeholders. The details of the method used in the interviews follow the method presented by Kato et al. (2009). Finally, twenty-three individuals from the following ten organizations were interviewed: a rent-a-car-based carsharing operator (one interviewee), a parking-space-based carsharing operator (two interviewees), a gas-station-based carsharing operator (four interviewees), an urban rail operator (one interviewee), a rent-a-car operator (two interviewees), an urban bus operator (three interviewees), the Department of Transport Planning of the MLIT (two interviewees), the Department of New Transport Service of the MLIT (two interviewees), a prefectural government (four interviewees), and a ward government (two interviewees). The interviews were carried out from July 2010 to August 2010.

3.1 Rent-A-Car-Based Carsharing Operator

This private company operates car leasing and rent-a-car businesses. Its primary strategy is to provide cars to users. It gave two reasons for starting a carsharing business: (1) conventional car leasing has declined because of the decrease in demand by business customers due to the long economic recession, and (2) the company wants to capture young customers with its rent-a-car or carsharing services because car ownership among young people has experienced a significant decline in Japan. Its final goal is to develop an integrated car service that combines car leasing, rental, and carsharing services. The company considers it important to encourage individuals to change their consumption behavior from car ownership to smart car use through a multimodal transportation system and/or modal shift from private car to public transportation incorporating carsharing. It assumes that the main effect of introducing a carsharing system is that car users can reduce their direct costs, including fuel cost, car-ownership cost, and car-insurance cost. It also supposes that carsharing users drive less than private car users because they are more aware of their transportation cost since the service charge is explicitly shown to users during the carsharing drive.

The company forecasts that the carsharing supply will grow to 50,000 cars in Japan. With the assumption that one car is shared by fifty customers per year, about 2.5 million people may use the carsharing service annually. Although the demand is expected to grow, the company has a supply-driven strategy to increase the number of carsharing users rather than a passive strategy of waiting for demand growth in the future. Thus, it has been actively investing in carsharing stations all over the nation. Currently, it does not consider integration or standardization of its carsharing system with other carsharing operators. However, it is now examining the feasibility of working with public transportation to supplement the public transportation network with its carsharing service. Although it regards urban bus operators as one of its competitors in the urban transportation market, it feels there is room for negotiation with them to establish a partnership to achieve a sustainable market. It has no plans to work with an advertising agency, but may consider the option if the market grows sufficiently. The main constraint of its business is the financial burden caused by a large investment in parking spaces. The investment cost for parking spaces is the largest component among the three major cost factors: vehicle cost, parking-space cost, and operating cost. Although it considers

that on-street parking spaces are available for carsharing businesses, Japanese regulations do not currently allow for such an assumption. Although it understands the importance of introducing electric vehicles (EVs) due to global environmental concerns, the recharging devices for EVs are too costly for the company to invest in. Thus, it strongly requests that the national government provide subsidies for supporting investment in recharging devices for EVs.

The company also considers that the transportation system should be restructured over the long run by coordinating private-based services with public regulation. It has requested the government to introduce land-use planning in which the land-use pattern is changed into a physically compact style where public transportation is the main means of transportation for local mobility.

3.2 Parking-Space-Based Carsharing Operator

This private company originally operated parking spaces. It owns a number of off-street parking spaces in Japan, particularly in urban areas. Recently, the company actively invested in small-scale parking spaces in residential areas. It regards these spaces as if they were public transit stops. It assumes that the urban transportation network is divided into two categories: (1) carsharing as a primary transportation network and (2) carsharing as a secondary transportation network with access stations at origins and with egress stations at destinations. It considers that a well-planned secondary transportation network will support the primary public transit network. In order to improve the secondary transportation network, parking spaces should be well developed, particularly those that are open twenty-four hours a day. Since the company already has parking-space monitoring systems and an active maintenance system as part of its parking-space business, it can use these systems in its plan to integrate the parking-space business with a carsharing business.

The company is greatly concerned about the sustainability of the parking-space market. It is afraid that young consumers in Japan have recently lost interest in automobiles (Japan Automobile Manufacturers Association Inc., 2009). It has a marketing strategy to increase consumers' motivation by providing carsharing users opportunities to drive high-quality cars. It also considers that the provision of appropriate information related the location of carsharing stations is one of the most critical issues for achieving carsharing customers. The dynamic optimization of car allocation among the stations is also one of its important strategies. Additionally, it estimates that parking-space charges and vehicle purchase costs will be critical among the fixed cost elements. It predicts that carsharing vehicles can be resold in the second-hand market at considerable prices; thus, the vehicle purchase cost could be smaller in the carsharing business than in the rent-a-car business. This is because the period in which a vehicle is used for a carsharing service is short enough to incur less damage during normal use when compared to that for a rent-a-car service. Currently, the company is focusing on expanding its business by making the best use of its original business: parking-space operation.

3.3 Gas-Station-Based Carsharing Operator

This company primarily imports crude oil, refines it, and sells gasoline and other oil products in the Japanese market. It has a number of service stations throughout Japan. Its goal is to support its customers and society as a whole as an energy solutions provider. It has been extending its business to include alternative energy resources, reflecting the recent worldwide decline of oil consumption due to the high cost of oil production and environmental concerns.

The company started its carsharing business only as a pilot scheme, and it is examining the current situation to determine the feasibility of this new business. One of the motivations for starting a carsharing business was to make use of its existing service station network. The company supposes that it will be difficult to earn a positive return from the carsharing business alone, so it intends to gain new customers at its service stations by adding the value of its carsharing service to that of the service station. In addition to the simple carsharing service, other services such as vehicle maintenance and retail services are planned for introduction at the service stations.

The company also considers that it will be difficult to run the carsharing business with EVs because it has poorer performance with regard to cost, running distance, and refueling/recharging efficiency when compared to conventional gasoline vehicles. Although some customers might choose EVs because they simply wish to experience driving an EV, the company does not expect them to be sustainable customers. It should be noted that gas stations generally have an advantage concerning installation of quick-charging devices compared with other operators; in Japan, the legal regulation requires service stations to obtain permission to install such devices on-site. However, the current fire regulations in Japan do not allow cars to be parked at service stations for long periods due to safety concerns. The company expects the government to deregulate fire regulation. It has not yet fixed a strategy concerning partnership with other stakeholders in the carsharing business because it is still in the testing stage. Although it expects cooperation in the future among carsharing operators in terms of service contracts, it is afraid that current regulations will not permit a simultaneous contract between customers and multiple operators. This is because the current law requires customers to make independent contracts with each operator, even if the operators establish a consortium consisting of multiple operators. The company also expects one-way carsharing service to be deregulated.

3.4 Urban Rail Operator

This company is a major urban rail private operator in the Tokyo metropolitan area, and it has a number of umbrella businesses, including bus operation and real estate. Furthermore, it already has a partnership with three carsharing operators. Its motivation for the partnership is to utilize the remaining land plots around the rail stations and the existing parking spaces that are not used efficiently. For example, the company provides an EV-based carsharing service in cooperation with a carsharing operator at a building complex that includes an office, a hotel, and a parking space. Its intention is to make use of the empty parking space in the building complex and earn a better reputation among its customers by supplying an environment-friendly service. This service is mainly used by the office workers, but is operated at quite a low level. Although one of its umbrella companies has also started a carsharing service, it does not run the business proactively. This is chiefly because it feels the carsharing market is still small in Japan, and the role of carsharing in the urban transportation network is not yet clear. The rail operator has not yet established its own carsharing department, but it is carefully watching the movement of the market.

3.5 Rail-Business-Based Rent-A-Car Operator

This company is an umbrella company of a large rail operator. Its carsharing business includes the access and egress transportation to/from its rail stations. A new carsharing service has just been started in several stations in the Tokyo metropolitan area. It has already set up a rent-a-car business that combines its rail service with the new carsharing service. It expects a

high level of carsharing demand at the urban rail stations, where accessibility is poor due to the unavailability of local bus access service. One of its motivations for introducing the carsharing service was the utilization of existing vehicles from its rent-a-car service that are not in use during the time when the rental service is closed. The company also expects a potentially significant carsharing demand at rail stations where there is no rent-a-car office. However, it has no plans to extend its carsharing business at present due to the difficulty of forecasting carsharing demand and the uncertainty about the carsharing market in the future. The company does not feel that it competes with other carsharing operators or other public transportation operators. It is afraid of a decline of public transit ridership in the future, reflected by the recent popularization of in-home working. It is also afraid that in-home leisure activities such as Internet shopping reduce the out-of-home travel frequency of consumers, which will lead to a decline of public transit demand.

3.6 Urban Bus Operator

This company is a private bus operator with a number of umbrella companies under it, such as a hotel, a real estate business, and a coach service. It believes that its bus transportation contributes to the effort to save the global environment and improve the quality of transportation services. It is also positively inclined toward introducing environment-friendly technologies such as low-emission buses. It recognizes that carsharing is not a public transportation mode but rather a personal transportation mode, meaning that carsharing is a direct competitor to its bus operations. It also considers rail services to be a primary transportation service, whereas the bus service is a secondary transportation service in the context of multimodal public transportation network. It complains that it is unclear whether the government's past carsharing-related policy moves were intended to improve individuals' mobility or reduce CO2 emissions from automobiles. The company may support carsharing if the government presents a clear strategy in its future transportation policy, but it will probably lobby for additional conditions such as a new subsidy scheme for the urban bus operators.

3.7 Department of Transport Planning in the Central Government (MLIT)

This department of the national government is in charge of general transportation planning. Its goals are (1) infrastructure development for economic growth, (2) regional development for realizing local autonomy, (3) sustainable landscape development and the promotion of tourism on the basis of history and local culture, (4) contribution to the global environmental issues, and (5) establishment of reliable society with safety and security.

The government supported carsharing in its early stages by subsidizing pilot schemes and demonstration projects. The department recognizes that the stage when government support is necessary is past and that the carsharing market is now at the stage of private-based development. It clearly understands the importance of setting goals for the carsharing policy. Carsharing may contribute to a reduction in gas emissions due to the modal shift from personal car use to shared car use, but it may increase car use due to the improvement of service quality of car use in carsharing market. If the carsharing service increases car use, it may be an attractive business opportunity for private operators. In reality, carsharing demand has been growing sharply, particularly in metropolitan areas in Japan. However, there is no scientific data explaining the extent to which carsharing will assist in the efforts against global warming. Additionally, the department is afraid of the negative economic impacts of carsharing on automobile ownership in Japan. As automobile industry is one of the main industries in Japan, the promotion of carsharing may damage the domestic economy by

reducing automobile sales in Japan. Thus, the government has carefully examined the consequences of supporting the carsharing market, and has some expectations concerning its future development. It has recognized the importance of preparing infrastructure for market growth, but considers that there is no urgent requirement to support it proactively. The Department of Transport Planning has requested further scientific research on the impacts of carsharing on the environment and the economy.

3.8 Department of New Transport Service in the Central Government (MLIT)

The Bureau of Automobile Transport, to which the Department of New Transport Service belongs, is a bureau under the control of the MLIT. It is in charge of car registration, reduction of noise and environmental impact, and promotion of public transportation. It regulates the rent-a-car industry, including carsharing, under the authority of the Road Transport Act. The Act requires current and potential rent-a-car business operators to obtain permission from the authorities to start a new business. This requirement is intended to prevent transportation operators from operating illegally. The department knows that there are requests for further deregulation of the carsharing industry; however, as the carsharing market was deregulated in 2006, it does not think it is necessary to implement any further deregulation at present.

3.9 Department of Environmental Issues in a Prefectural Government

The main task of this organization is to plan and implement a transportation policy that reduces car traffic volume. The scope of its policy implementations includes travel demand management such as the promotion of efficient car use, a modal shift from automobiles to public transportation, travel generation control, and the dynamic control of traffic demand. It recently completed a carsharing demonstration project that examined the impacts of carsharing in its prefecture. This demonstration project introduced a tentative carsharing program under the cooperation of the prefectural government, a public transportation operator, and a carsharing operator. The project showed that the carsharing program increases individuals' time spent driving of carsharing cars while it decreases the driving of one's own car. Although the department expects that the reduction of private car use will be greater than the increase of car use in the carsharing system, it found that the impact mechanism might be dependent on certain conditions, including a user's personal attributes, location, travel purpose, etc. This result suggests that it should support carsharing only when there is explicit evidence that it will contribute to a reduction of environmental impacts. Private carsharing operators have requested that prefectural governments support them by leasing publicly owned parking spaces and/or open spaces to them, but there are few spaces that can be used for carsharing. If evidence of a positive impact on the environment is explicitly presented, the department may introduce new policies intended to promote carsharing instead of government-owned public transit. This policy would include the introduction of a mileage point system for carsharing use. The mileage system assumes a kind of loyalty program offered by carshraing operators. The customers enrolled in the program accumulate miles corresponding to the distance used in that carsharing operator. Acquired miles can be redeemed for other goods or services; or for free use of carsharing service, etc. There is currently no clear evidence that carsharing has a net positive impact on the environment, but it is clear that the use of EV has such an effect. Thus, the department considers that the public support of EV-based carsharing businesses may be encouraged by the local taxpayers.

3.10 Ward Government

This ward is located in the central business district of the Tokyo Metropolitan Government. Since the business sector consumes a large volume of electricity in the ward, the ward government has made great efforts to reduce overall energy consumption. It uses EVs for official activities to reduce gas consumption. It has also collaborated with a private operator to use these EVs for carsharing services during periods when they would not be in official use. This carsharing service is provided to local residents and businesses. Additionally, it has exempted membership charges and introduced a discount system for carsharing use for the local residents and businesses. In this program, the ward government gives the exclusive right to use its EVs and parking spaces to a private carsharing operator, and the carsharing operator installs recharging devices and manages the carsharing system. They work together under a contract in which the operator can earn a predetermined fixed profit; any excess profit gained from the project will be reimbursed to the local residents through the ward government. The contract shows that the operator is not allowed to receive any financial support from the government, even if it earns a negative profit. The introduction of the carsharing system increased the annual maintenance cost of the ward's official cars by 150,000 Japanese yen (nearly equal to 180 US dollars) per vehicle. This is mainly because the legal regulations in Japan require carsharing operators to carry out regular automobile inspections every year. The taxpayers in the ward have accepted the cost increase as one of the expenses of promoting EVs. Additionally, the EV recharging devices installed for the carsharing service are open to public EV users free of charge. Although the government put forth a great deal of effort to promote carsharing, the service is financially sustainable. In order to promote carsharing, particularly those services that use EVs, it has strongly requested the national government to provide financial support to similar local government projects.

4. DISCUSSION

4.1 Findings from Stakeholder Interviews

The interviews reveal the various opinions of stakeholders in Japanese carsharing market. The main findings are summarized as follows. First, the expected uses of carsharing services according to the stakeholders can be explained by one of the following two modes: (1) a primary transportation mode in which carsharing users travel from an origin to a destination directly and (2) a secondary transportation mode in which users access and/or egress public transit services. The parking-space-operation-based carsharing operator, the gas-station-based carsharing operator, and the bus operator saw carsharing as a primary mode, while the rent-a-car-based carsharing operator and urban rail operator viewed it as a secondary mode. If carsharing were regarded as a primary mode of transportation, carsharing stations would be located near origins, such as residential areas, as well as destinations, such as shopping areas. If it were regarded as a secondary mode of transportation, carsharing stations would be located both near public transit stops and near the origins/destinations. The assumed method of carsharing also influenced stakeholders' attitudes toward carsharing. When the bus operators assumed carsharing would be a primary mode, they regarded it as a competitor in the local transportation market. When they assumed it would be a secondary mode, they regarded it as a potential partner in integrating the urban transportation network.

Second, currently no carsharing operator has any plan to cooperate with other operators for the following two reasons: (1) because of the carsharing market's continued

growth, operators believe they can make a profit without a partnership; (2) often, the motivation to start a carsharing service is the option to manage a side business in which they utilize their existing excess facilities from their main business. This may mean that the carsharing market is currently driven by the supply side rather than the demand side in Japan. The operators compete by investing in carsharing stations, carsharing cars, and related devices to expand their own market share rather than contribute to sustainable market growth by improving compatibility among the different carsharing services.

Third, the perceptions and expectations of carsharing operators are different from those of the national government. The carsharing operators expect the government to support the carsharing market, but the government has not found a clear reason to do so. The support expected by the operators includes subsidies to the operators, financial support for the installation of EV-related facilities, and deregulation of existing legal framework concerning the rent-a-car industry. There are several reasons for this difference in opinion, one of which is that carsharing operators regard carsharing as a public service while the government regards it as a private service. Thus, the government expects the private operators to make more efforts to enhance the carsharing market through market competition rather than via controlled operation under government regulation. Furthermore, the carsharing services vary among the different types of operators, but the government assumes that they are similar. Thus, the different types of operators make different requests to the government, but the government cannot deal with them properly. Additionally, some carsharing operators forecast that carsharing may become a major transportation mode in the future, but the government probably thinks that carsharing is a niche product. Thus, the operators suppose that the current urban transportation policy should be changed fundamentally to accommodate carsharing; however, the government does not agree at present. Moreover, the carsharing operators focus on the positive impacts of carsharing concerning environmental issues, while the government is unsure whether carsharing will have a positive impact. In addition, carsharing operators assume that carsharing will not reduce domestic car ownership significantly, but the government fears that it may have a negative impact on the car industry. Finally, some carsharing operators consider that the related regulations are quite strict, while the government expects operators to manage their business flexibly under the given regulations.

Fourth, the local governments have tried to introduce carsharing systems as part of their transportation policy, but they suffer from uncertainties regarding the effects of carsharing. They have received requests from their taxpayers to clarify whether carsharing contributes to their transportation policy targets (e.g., the reduction of gas emissions from cars). However, the evidence is unclear at present, even after a demonstration project by the Department of Environmental Issue in a prefectural government. They have requested that further scientific research be performed on the impacts of carsharing.

4.2 Implications of Interview Results for Cooperation between Stakeholders

The carsharing market emerged about a decade ago in Japan. It is still regarded as a new means of transportation by many stakeholders. Additionally, thus far, the carsharing industry has developed independently from the conventional transportation planning process in Japan. Consequently, its role and significance in the urban transportation system are not well understood and not shared among the stakeholders, including the operators, government, and transportation planners. Should one stakeholder cooperate with another stakeholder in the context of the carsharing market? This depends on the conditions that are being considered. According to the above stakeholder analysis, this study proposes three potential cases in which cooperation among stakeholders could be required in the urban carsharing market.

The first case is one in which poor cooperation harms the benefit of carsharing users. One reason for this is that the technological incompatibilities among the different operators' systems could deteriorate the quality of service. For example, many carsharing operators currently use different membership systems, ticketing systems, and reservation systems, independently. This is partly intended to retain their customers within their own services, but it will ultimately have a harmful effect on the carsharing network. A member of one carsharing operator cannot use the carsharing services of other operators when the individual does not hold the multiple memberships. Individuals also need to understand the different reservation systems simultaneously in order to use the different operators' carsharing services. The integration of membership, ticketing, and reservation systems could lessen the inconvenience to the customer. Furthermore, poor-cooperation under independent operations results in ineffective economies of scale. The initial investment for parking spaces is costly for a single operator; however, the accessibility of carsharing is highly dependent on the density of carsharing stations. If existing carsharing stations are shared or new stations are jointly invested in among different operators, accessibility of those stations may be improved significantly. Additionally, sufficient economies of scale may create savings in investment costs, which could result in reduced carsharing charges. This also benefits the users. It should be noted that the carsharing markets in US and Europe have so far developed well although the compatibility of the carsharing system is not coordinated.

The second case is one in which poor coordination increases the external costs from the transportation market, mainly negative environmental impacts and traffic congestion. As shown earlier, the Department of Transport Planning and the Department of Environmental Issues are concerned about the negative impacts of carsharing on global warming. It may be true that public transportation users will shift to carsharing, and this may increase total car use if carsharing operators provide primary transportation mode services to the customers. However, if the carsharing operators provide secondary mode services under joint business planning with public transportation operators, private car drivers may shift to using both carsharing and public transportation; this could contribute to a reduction of in the total environmental impact. The results of our stakeholder analysis suggest that there is no guarantee that the market-oriented strategy will lead to the secondary-mode-based carsharing service in Japan. This may imply that the government needs to promote the secondary-mode-based carsharing service rather than the primary-mode-based carsharing service in order to reduce the possible external costs. Note that there has been little evidence that the carsharing reduces the negative environmental impacts as mentioned earlier. Thus, this case should be highlighted only when such the contribution of the carsharing to the environment is empirically supported.

The third case is one in which poor coordination slows down economic growth. For example, the Department of Transport Planning in the MLIT worries about the negative impacts of carsharing on the automobile industry. However, carsharing could be used for advertising automobiles to the customers. If automobile producers establish a partnership with the carsharing operators, they could have a good opportunity to demonstrate a new brand of automobiles, which may encourage car ownership. Theoretically, the promotion of car ownership does not necessarily mean the promotion of car use. The motivation of some car owners, particularly those who want to buy a new brand car, may be to gain a status symbol rather than to purchase a new primary mode of transportation. Actually, many car owners in the Tokyo Metropolitan Area drive on weekends only. In this sense, the sales promotion of automobiles through carsharing may be acceptable.

5. CONCLUSIONS

This study presented the current carsharing market in Japan through interviews with major stakeholders. It showed that the stakeholders recognize two types of carsharing: a primary-mode-based system and a secondary-mode-based system. No carsharing operator has plans to cooperate with other operators at present, and the current perceptions and expectations of the operators are different from those of the national government. Although local governments have willingness to promote the carsharing, they find difficulties to do so because they worry about the uncertainties regarding the effects of carsharing. Furthermore, this study summarized three potential cases where cooperation is required among stakeholders in urban carsharing markets: (1) when poor cooperation harms the benefits received by carsharing users; (2) when poor coordination increases the external costs of the transportation market; and (3) when poor coordination slows down economic growth.

Finally, because the scope of this paper is limited to carsharing markets in urban areas, the interviewees were selected from stakeholders in the Tokyo metropolitan area. However, the feasibility of cooperation among stakeholders in rural carsharing markets should also be explored. Additionally, a limited number of stakeholders were interviewed. We should extend the list of stakeholders to that including other actors such as other carsharing operators, parking-space operators, and carsharing users.

APPENDIX: List of Carsharing Organizations in Japan (As of January 2011)

Carsharing organization	Name of carsharing service	Start of month-year	Stations	Vehicles	Members
Orix Auto Corporation	Orix Car Share	April-02	888	1,274	30,000
Free Wheel	Our Car	February-03	1	3	30
Nishio Rent All Co. Ltd.	Mobisystem	November-03	34	300	1,860
Hankyu Hanshin Holdings Inc./Hankyu Realty Co. Ltd.	Saito Carsharing System	April-04	3	5	60
JR Nishinihon Rent-a-car & Lease	Eco-Nori Club	April-04	4	8	140
Shiki-no-Wa	Shiki Tedukuri Carsharing	May-04	1	1	5
UPR Corporation	Car Cherry	December-04	6	10	100
Town Mobile Network Kitakyusyu	Chocomo Club	January-05	7	10	168
Times 24 Co. Ltd.	Time Plus	February-05	936	1,256	29,719
Windcar Inc.	Windcar	March-05	95	119	1,958
ASQ Co. Ltd.	CATERA	November-05	37	48	1,487
Hokusei Sangyo/Tsuji Shoji	Carshare Kanazawa	November-06	11	12	109
Eco Village "Kinoka-No-Ie"	Kinoka-No-Ie VS Clus	April-07	1	2	6 HHs
Eki Rentacar Shikoku Company	Car Share Shikoku	March-08	7	7	165
Nippon Parking Development Co. Ltd.	Ecoloca Carsharing	March-08	45	67	800
Quicar Inc.	Qui Car	May-08	6	9	55
Car Sharing Japan Co. Ltd.	Careco Car Sharing Club	January-09	389	407	7,769
Cleaty Co. Ltd.	Withree	March-09	9	12	130
JR East Rental & Lease Co. Ltd.	Eco Renta	March-09	3	6	*
Gulliver International Co. Ltd.	Gulliver Carshare Mate	April-09	9	9	120
Gulliver International Co. Ltd.	Leo-Gulliver Carsharing	November-09	500	500	3,100
Nissan Car Rental Solutions Co., Ltd.	Nissan Rent-a-carsharing Club	July-09	1	2	10
RHYME Auto Lease Co. Ltd.	Carshring Sallato	August-09	9	9	60
AKTIO Corporation	AKTIO Carsharing	October-09	2	2	12
Japan Car Sharing Inc.	i share	October-09	33	33	1,000
Shares	ekispress	November-09	6	11	*
Meitetsu Kyosho, Ltd.	cariteco	November-09	28	32	750
Sanpuku Sougou Fudousan	Sanpuku Car Sharing System	November-09	5	5	63
Showa Shell Sekiyu K.K.	Machinori-kun	December-09	3	5	70
TOYOTA Rent-A-Lease Tokyo/Aichi	Casual Rent-a-car	January-10	5	10	247

Co. Ltd.			
Total	3,084	4,174	79,993

Note: * means the service is under preparation as of January 2011; HH means household.
Source: Foundation for Promoting Personal Mobility and Ecological Transportation (http://www.ecomo.or.jp/environment/carshare/carshare_list.html)

ACKNOWLEDGMENTS

We deeply thank the interviewees in our survey, although their names have been withheld at their request. We are also thankful to Professor Shiroyama, H. (University of Tokyo) and Dr. Matsuura, M. (University of Tokyo) for their useful suggestions.

REFERENCES

Barth, M., Shaheen, S. A. (2002) Shared-use vehicle systems: Framework for classifying carsharing, station cars, and combined approaches, *Transportation Research Record: Journal of the Transportation Research Board*, 1791, 105–112.

Barth, M., Shaheen, S. A., Fukuda, T., Fukuda, A. (2006) Carsharing and station cars in Asia: Overview of Japan and Singapore. *Transportation Research Record: Journal of Transportation Research Board*, 1986, 106–115.

Burkhardt, J. E., Millard-Ball, A. (2006) Who is attracted to carsharing? *Transportation Research Record: Journal of the Transportation Research Board*, 1986, 98–105.

Foundation for Promoting Personal Mobility and Ecological Transportation. http://www.ecomo.or.jp/ environment/carshare/carshare_graph2011.1.html. Accessed January 23, 2013 (in Japanese).

Japan Automobile Manufacturers Association, Inc. Passenger Car Market Trends (2009) Summary of results of JAMA's fiscal 2008 survey, Press Release, April 8, 2009.

Kato, H., Shiroyama, H., Nakagawa, Y. (2009) Qualitative survey in transportation planning: Cognitive mapping approach. Presented at the 88th Annual Meeting of the Transportation Research Board, Washington, D.C., January 2009.

Nobis, C. (2006) Carsharing as key contribution to multimodal and sustainable mobility behavior: Carsharing in Germany. *Transportation Research Record: Journal of the Transportation Research Board*, 1986, 89–97.

Shaheen, S. A., Cohen, A. P. (2007) Growth in worldwide carsharing. *Transportation Research Record: Journal of the Transportation Research Board*, 1992, 81–89.

Shaheen, S. A., Cohen, A. P., Roberts, J. D. (2006) Carsharing in North America: Market growth, current developments, and future potential. *Transportation Research Record: Journal of the Transportation Research Board*, 1986, 116–124.

Shaheen, S. A., Schwartz, A., Wipyewski, K. (2004) Policy considerations for carsharing and station cars: Monitoring growth, trends, and overall impacts. Transportation Research Record: Journal of the Transportation Research Board, 1887, 128–136.

Zhou, B., Kockelman, K. M., Gao, R. (2008) Opportunities for and impacts of carsharing: A survey of the Austin, Texas market. Presented at 87th Annual Meeting of the Transportation Research Board, Washington, D.C., January 2008.