

# Impact of Social Involvement on Car Ownership among Young Japanese

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This study identified young people's attitude to own a car and their car purchase desire. We investigated their relationship among Japanese young people's with psychological attitudes, their life style as well as residential area environment in order to verify why young people no longer intend to have cars (*Wakamono no Kuruma Banare*). We hypothesized that the raise of online activities has an impact on attitudes towards cars. Our estimated model confirmed as well as interrelationships towards environmental attitudes. Policy and social implications are discussed.

**Key Words :** *Car ownership, Social involvement, Car use, Life style, Wakamono no Kuruma Banare*

## 1. INTRODUCTION

There is growing body of research showing that young people in developed countries have been losing interest in owning a car compared to prior generations. In Japan many articles in business books and newspapers note that young people no longer intend to have cars (“Wakamono no Kuruma Banare”, in Japanese). The Japan Automobile Manufacturers Association (JAMA) found by their own survey that, although 79% of young people (age 18-29) in Japan had drivers' license and 75 % of them had been using cars in general, 54% of them did not have his/her own car. Also, they found that the younger they were, the less their strong preferences (“Kodawari”, in Japanese) of having cars, choosing car types and purchasing new cars (JAMA, 2008). In 2012, CNNMoney which is CNN's exclusive business site, reported that the proportion of 18 to 34 years old in the US new car purchasers has dropped by 30% in the past five years.

There are several reasons towards a drop of car ownership among young people. Some studies noted that urbanization and spread of internet use are main factors for this (Yotsumoto, 2012; Chatterjee et al., 2018). When the residence is in major metropolitan areas, there is daily life sufficiently with travel convenience only by bicycle or public transportation.

In addition, communication devices by mobile phones, smart phones and personal computers, game machines, and diversification of hobbies other than automobiles could be factors to reduce young people's interests in car ownership. In order to understand the role of these factors better, this study investigates the impacts of young people's attitudes towards cars, their individual tendency for social involvement, and their resident area type. Here, attitudes is defined as psychological tendency that is measured by some degree of favor or disfavor.

## 2. LITERATURE REVIEW

A large number of studies have pointed out attitude as an important determinant of car ownership (Belgiawan et al., 2014; 2016; Gatersleben, 2011; Weinberger and Goetzke, 2010; 2011). This study considers new factors to understand young people's car ownership behavior. We hypothesized that young people's non-Internet social participation and vehicle availability as a means to avoid environmental pollution affect their car ownership.

Firstly, according to Chatterjee et al. (2018), it is noted that changes to social-economic conditions and living circumstances are the main factors to drop in car ownership among young people.

They also identified that growing urbanization and a preference for young people to communicate online, rather than face to face, are other contributory factors to lose their interest in owning a car. They suggest that the social importance of having a car is diminished with the rise of social media on the Internet. Even without going out on a car, young people are able to meet and interact with others through the net in these days (CNNMoey article, 2012).

Related to our hypothesis of car usefulness in order to avoid pollutants, some studies have demonstrated that public transport facilities usually are exposed more to air pollution because of their proximity to the roadway. According to Moore et al. (2012), while waiting at bus stops, transit patrons may be exposed to greater amounts of vehicle-based pollution including particulate matter (PM). Won et al. (2012) analyzed the distribution of particulate matters including PM<sub>2.5</sub> in public facilities and identified that subway stations had the highest indoor level of particulate matters and the waiting area in bus terminals, railway terminals, indoor parking lots had followed in order. It appears therefore reasonable that people avoid pollution by using (an air-conditioned) car even if they can not accurately estimate air pollution levels but rely on visual cues to evaluate air quality (Barker, 1976; Evans et al, 1988).

### 3. DATA

#### (1) Data Collection

In order to understand young people's attitude towards having cars and decision to choose car types, we conducted the web-survey and the data were collected between in three types of cities in Japan. The survey was conducted between October 10th to 24th in 2017. We included metropolitan areas, mid-size cities, and rural area. The metropolitan area we targeted are respondents living inside Tokyo prefecture with a population of 13.6 million (excluding population in surrounding prefectures that are still part of the Tokyo metropolitan area). Especially compared to Tokyo, we consider Kyoto City with a population of about 1.5 million as a mid-size city. "Rural areas" are here defined as prefectures without cities that have a population of more than 400 thousand.

We collected samples from Toyama, Aomori, Iwate, and Akita prefectures that all fit this description. The total number of the respondents was 1,125 with 350-390 samples from each city type (i.e. metropolitan, 391; mid-size, 340, and rural area, 394 respondents). The targets of this study are the young people between 18 to 25 years. We set a minimum age as 18 years old since this is youngest when one can obtain a driver license in Japan.

#### (2) Determinants

We surveyed the ownership at the time of the investigation and asked respondents in addition whether they have intention to purchase a vehicle within the next five years. The latter question was measured with 7-point Likert scale (No purchase intention – neutral – Will certainly purchase). This measured factor was transformed into binomial based on mean value (3.73) and used to estimate the model. For example, if the response is 4 (neutral) or higher point, the value is converted to 1, while the value is converted to 0 if the response is 3 (Perhaps I would not purchase) or lower than that.

The respondents are given a range of questions regarding their general attitudes toward cars. The questions of this study are based on previous research by Steg (2005), also it is modified considering Japanese culture and translated into Japanese. Here, we considered "instrumental" and "independence" factors which were demonstrated important determinants for car use decisions in previous researches (Stradling et al., 1999; Steg, 2005; Belgiawan, 2015). Each question is posed on a 5-point Likert scale with verbally defined endpoints (strongly disagree – strongly agree). Reliability analysis showed acceptable Cronbach's alpha for all attitudes variables (Instrumental, 0.838 and Independence, 0.860).

We define social involvement in this study as the degree of one's actual and potential participation in the activities of a social group (e.g. doing outreach activities with others). Along with established questions, we develop our original questions and scales for social involvement in consideration of living circumstances with social media on the Internet. This is also measured by a 5-point Likert scale (strongly disagree – strongly agree) and its value of Cronbach's alpha is acceptable with 0.708.

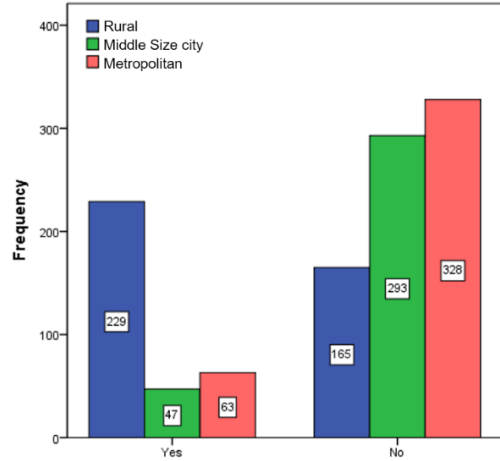
It is also hypothesize that people more concerned about the effect of environmental pollution might in fact use the car more. Though clearly the car is not the only cause of pollution and climate change, but the conflict that those who want to avoid exposure to PM, UV and extreme weather caused climate change might perceive the benefits of car more. The reliability test could be acceptable since Cronbach's alpha of usefulness of car at pollutant is 0.804.

**Table 1** Questionnaire for Car Ownership Attitudes

Factor	Questions	Reliability Test
Instrumental ( $\delta_{ins}$ )	I do not care what kind of car I have	0.838
	For me, cars only bring me from A to B	
	The functional quality of a car is more important than the make	
	I only would buy a car if I really need one	
Independence ( $\delta_{ind}$ )	A car gives me freedom and independence	0.860
	It is important for me to be able to choose my own route	
	A car helps me to save time for travel	
	A car allows me to travel anywhere and anytime	
Social Involvement ( $\delta_{si}$ )	I do a lot of online shopping	0.708
	I spend much time on the smart phone	
	I enjoy having time alone	
Usefulness of car at pollutant ( $\delta_u$ )	Car is useful to avoid exposure to PM 2.5 or Yellow sand from China	0.804
	Car is useful to avoid exposure to UV in the summer	
	Because “extreme rain” is becoming more frequent, car is useful	

**4. DESCRIPTIVE ANALYSIS**

Survey results show that about 30.1% (339 persons) of young people own cars. Figure 1 indicates the car ownership by region. As expected significant variations exist with car ownership in the rural areas being significantly larger with 58.1% versus only 16.1% in Tokyo and 13.8% in Kyoto owning cars. Table 2 shows the car types owned by the respondents. 28 young people own two cars so that there are in total 369 responses. The proportion of those who own a kei car is over 56% which is understandable as kei cars are a common first buyer choice. Compact cars and mid-size cars are the next most frequently purchased groups which also shows that most young people own with high probability relatively small size cars.



**Fig.1** Car ownership by regions

**Table 2** Car ownership by types

Car Type	Ownership	Car ownership (%)
Kei	192	56.6
Compact	56	16.5
Mid-size	49	14.5
Large size	20	5.9
Foreign	19	5.6
SUV	20	5.9
Hybrid	9	2.7
Others	2	0.6
Total	367	13.5

**5. MODEL ESTIMATION**

We define  $\pi_i$  as the probability of car ownership for individual  $i$  which is estimated separately with a binary logistic regression (BLR).  $\delta_i$  is a vector of the  $T$  explanatory (exogenous) variables for individual  $i$ . Our BLR for car ownership can be presented in the following form;

$$\pi_i = \frac{e^{\delta_i^T \gamma}}{1 + e^{\delta_i^T \gamma}} \tag{1}$$

$$\log\left(\frac{\pi_i}{1 - \pi_i}\right) = \delta_i^T \gamma + \epsilon_i \tag{2}$$

where  $\beta_i, i = 0, 1, \dots, m$ , are logistic regression coefficients. We estimate two models for car ownership, one is for investigating a probability of present car ownership,  $\pi_{p,i}$  and the other one is for understanding the probability of future car ownership that young people are going to purchase a car within 5 years,  $\pi_{f,i}$ .

In Table 3, we show the estimated coefficients and results of standard error. Furthermore, the

last column contains odds ratio, that is, logistic regression coefficient exponents of the considered predictor. As explained we estimated two BLR for present and near future car ownership. In estimated present car ownership model, all of hypothesized independent variables are significant. For future ownership, we find that usefulness of car and regional effects are not significant.

When we see the result of present car ownership, the most influential psychological determinant is the Independence value of the car with 1.59 odd ratio. This implies that if the independence attitudes is increased by 1 unit, the odds of car ownership increase 1.59 times. Usefulness of car at pollutant shows also strongly impact on present car ownership. Instrumental and Social involvement show negative sign of impacts on present car ownership. The negative signs of both factors mean that those who are more likely to consider car as instrument for movement and enjoy time alone have a lower probability of (currently) owning a car. Finally, the impact of regional dummy (rural) is the strongest among the other variables showing 7.31 of odd ratio. This indicates that young peoples in rural areas are 7 times more likely to own a car than those in Kyoto or Tokyo. Figure 3 shows the ROC curve which represents the prediction accuracy by the estimated model as a curve. It is shown that the model with 5 determinants has the highest predictive accuracy compared to others. The models which did not consider dummy variables for rural area were found to be significantly less accurate.

The model for near future car ownership shows that regional effect and car usefulness at pollutant are not significant factors. Instrument and Independent are still an influential variable and young people’s life style which can be represented by social involvement is also significant. The impact of these factors have increased. We suggest that these results are reasonable and illustrate that for future car ownership decisions one considers “vague” aspects more.

Young people who are willing to buy a car in near future are less likely to have a car now. Therefore, their car purchase decision might be influenced by the image of car use and their lifestyle rather than the factors related to environment and experience of car use.

## 6. CONCLUSION

This study investigated the relationship between various aspects influencing the vehicle purchase decisions of young Japanese. We showed that attitudes towards the car in general, environmental attitudes, the urban situation as well as social engagement all impact car purchase decisions.

In more detail, our major findings are as followings. Through establishing the car ownership model, we demonstrated that young people’s attitudes related to Instrumental, Independent, Social involvement, and Usefulness of car use at pollutant affect on present car ownership. Based on this result, our first hypothesis was demonstrated. We demonstrated that factor of social involvement which indicate living circumstances with social media on the Internet use, has negative impact on having a car. In addition, regional effects also was verified by showing that rural area dummy variables influences on present car ownership positively. The respondents in rural areas, are more likely answer to own car already. This is larger exceedingly than the number of car owners in metropolitan area and middle size city. As we mentioned in Introduction part, urbanization with high spread of internet use are main factors to make young people lose their interest in owning a car. We believe that our model results support this observation.

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Table 3 Model estimation result

Dependent Var.		Present car ownership				Near future car ownership *within 5 years			
Explanatory Var.		Coeff	S.E	Wald	Odd ratio	Coeff	S.E	Wald	Odd ratio
$\delta_{ins}$	Instrument	<b>-0.415</b>	0.085	23.987	0.66	<b>-0.239</b>	0.070	11.731	0.79
$\delta_{ind}$	Independence	<b>0.466</b>	0.097	22.867	1.59	<b>0.612</b>	0.074	68.354	1.84
$\delta_{si}$	Social Involvement	<b>-0.336</b>	0.101	11.024	0.71	<i>-0.172*</i>	0.080	4.564	0.84
$\delta_u$	Usefulness of car at pollutant	<i>0.151</i>	0.090	2.801	1.16	-			
$d_{sm}$	Dummy_rural area	<b>1.990</b>	0.154	167.968	7.31	-			
c	Constant	<b>-1.789</b>	0.109	266.927	0.17	<b>0.415</b>	0.064	42.724	1.51
-2 Log Likelihood		1091.1				1429.8			
Cox Snell R <sup>2</sup>		0.224				0.076			
Nagelkerke R <sup>2</sup>		0.318				0.102			

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