Jurnal Bina Praja 10 (2) (2018): 287-302

JURNAL BINA PRAJA

e-ISSN: 2503-3360 | p-ISSN: 2085-4323

Accreditation Number
21/E/KPT/2018

http://jurnal.kemendagri.go.id/index.php/jbp/index

THE INFLUENCE OF URBANIZATION AND SOCIO-ECONOMIC CONDITIONS TO VEHICLE OWNERSHIP IN DEVELOPING CITY

Candra Aji Kusuma*, Multifiah, Wildan Syafitri
Universitas Brawijaya

Received: 18 July 2018; Accepted: 6 November 2018; Published online: 13 November 2018

DOI: 10.21787/jbp.10.2018.287-302

Abstract

Malang is a thriving city and destination of migration from rural areas. Vehicle ownership is one indicator of prosperity, but it has a negative effect on city traffic. In 2017 the city of Malang was the third most traffic jam city in Indonesia. This study used the 2016 National Socioeconomic Survey and aimed to see the influence of urbanization and socioeconomic conditions on the preference of owning a vehicle. Income is considered as a budget constraint to the ability to buy a vehicle and is related to the socio-economic conditions of each person. This study used an ordered probit method to measure the level of prosperity with 4 levels of output; those who have no vehicle, who owned at least one motorcycle, who owned at least one car, and who owned at least one car and one motorcycle. The result of the study showed that migration has a negative effect on vehicle ownership. While age has no significant effect, other socio-economic factors have a significant effect. The highest level of vehicle ownership in Malang Raya was one motorcycle, which means that the community in developing cities like Malang Raya was classified as a middle class. This study might be used by the government of Malang to control the growth of vehicles, by considering population growth and socio-economic conditions, to reduce the congestion problem in Malang Raya.

Keywords: Urban Migration, Socioeconomic, Vehicles Ownership, Malang Raya

I. INTRODUCTION

Transportation is an important activity in human life as a dynamic and social creature. Mobility is done in various ways and modes of transportation (Sani, 2013, p. 2). Related to urbanization, Kingsley Davis defines "Urbanization" to describe not merely the growth in the population of cities but a relative change between the urban and rural (farming) population.

The migration phenomenon is usually inseparable from the comprehensive change of the life of the global economy. Mulyoutami, Wahyuni, & Kolopaking (2014) found that economic factors were the main motivation of migrants to move (Tukiran, 2002, pp. 9–22). Most migration experts state that the main reason for migration is the economics aspect. While the non-economic aspects of migration are social and psychological aspects, such as status and comfort (Mulyoutami et al., 2014).

Malang Raya is a metropolitan area covering three administrative areas, consisting of two cities and one district, Batu City; Malang city; and Malang District, located in East Java Province, Indonesia.

Figure 1 shows that Malang has the highest HDI rank in East Java in 2016. The rapid development in education, economy, and health of Malang City attracts the outsiders to migrate into Malang Raya.

Malang Raya is a dynamic metropolitan area from the aspect of population mobilization, as shown by the high level of migration in and out of Malang Raya.

Congestion in the metropolitan area of Indonesia starts from the urbanization of people who move to improve the quality of life to meet the needs of clothing, food, and boards. Fulfillment of basic needs will attract people to migrate to the centers of economic growth (McGuckin & Srinivasan, 2005).

Figure 2 shows the increasing trend of vehicle ownership growth. The growth of private vehicles has the highest growth. The cause of the high ownership of private vehicles is prestige in owning

* Corresponding Author
Phone : +62 821 1145 5566
Email : xeyvra@gmail.com

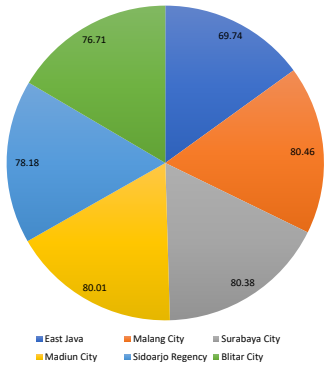

Figure 1. Level of HDI City/District in East Java

Source: Malang City Central Bureau of Statistics, 2017

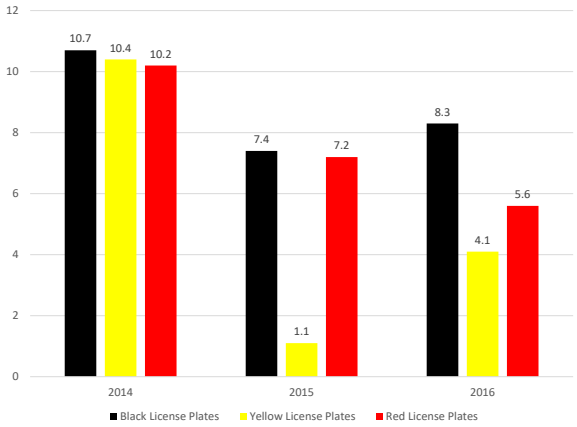

Figure 2. Vehicle Ownership Growth in East Java

Source: Malang City Central Bureau of Statistics, 2017

cars and motorcycles (Widyawan, 2011). Currently, most of the public transport passengers are the lower middle class, who have no choice but to use public transportation.

The level of congestion in Malang City beat Surabaya City, the capital city of East Java Province. Malang, as the second largest city in East Java, is the third city with the worst level of congestion in Indonesia. Private vehicles cause congestion due to the high growth of vehicle ownership, surpassing the growth of roads (Broaddus, Litman, & Menon, 2010).

Investment on roads often seems to be more cost-effective when compared to investments in public transport, but economically it is not correct because the cost of the road construction is only a fraction of the total cost that will eventually arise (Broaddus et al., 2010). Economic inefficiency due to the use of local budgets for highway investment reduces other investment budgets, such as for health, etc. This cannot be separated from the zero-sum game in the preparation of the budget.

Table 1.
The Trend of Migration in Malang City 2016-2017

No	Sub-district	Migration in 2016		Migration in 2017	
		In	Out	In	Out
1.	Kedungkandang	434	216	501	125
2.	Sukun	351	215	419	141
3.	Klojen	175	160	164	116
4.	Blimbing	324	308	412	240
5.	Lowokwaru	346	231	251	213
	TOTAL	**1,630**	**1,130**	**1,748**	**835**

Source: Department of Population and Civil Registration Malang City, 2017

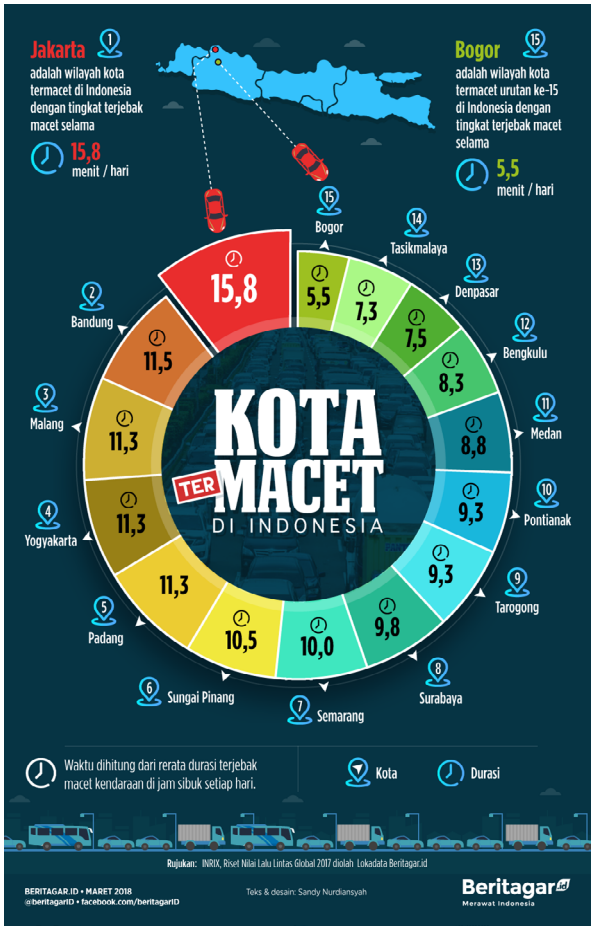

Figure 3. Malang City Ranked Third of Most Traffic Jammed City in Indonesia

Source: Rentjoko, 2018

Ownership of the mode of transport is not a random process but is influenced by various determinants of the available mode of transport (service attributes) (Warpani, 2002). Travel behavior which takes into account the above factors is called 'Smart Choice' by Cairns et al. (2004).

Immigrants tend to stay in places with higher densities. In particular, compared to indigenous peoples, immigrants are more likely to use other transportation modes in addition to self-driving, such as transit, carpooling, walking, and cycling (Blumenberg & Shiki, 2008; Chatman & Klein, 2009; Purvis, 2003; M. Smart, 2010; M. J. Smart, 2015; Valenzuela, Schweitzer, & Robles, 2005), especially in the first few years of their migration (Tal & Handy, 2010). Blumenberg & Shiki (2008) observed that Asians tend to assimilate by driving their own cars faster than other immigrants. Asian cultures appreciate hard work and education (Zhou, 2004, p. 147), which can mean more trips for work or school trips but fewer trips for recreation.

Socio-economic conditions refer to work and income of the population. The socio-economic conditions will also differ between non-migrant and migrant population. The non-migrants tend to have higher socioeconomic conditions than migrant populations since the very reason of migration is to get better economic conditions. On average, immigrants and their households have lower income (McGuckin & Srinivasan, 2005).

Age has been one of the variables related to transportation mode preference (Yavuz & Welch, 2010). Travel demand modeling generally assumed age-related travel (Figueroa et al., 2014). The number of trips changes with age, the younger persons would have more travel than the older ones (Gärling & Axhausen, 2003). Johansson-Stenman, Carlsson, & Daruvala (2002) found that travel distances peaked around the age of 50 years. However, today the elderly has the same amount of travel as the younger ones. van den Berg, Arentze, & Timmermans (2011) states that there is no difference in travel between young adults and parents in the Netherlands.

Income becomes the limitation of a person in consuming transportation (Yan, 2002). Public transport is usually used by a captive population (the low-income population that has no choice but to use public transport) (Sani, 2011). When the behavior of travel is associated with satisfaction in the choice of service, then consumers will choose those that have a high level of satisfaction (Dabholkar, Shepherd, & Thorpe, 2000). Just like the expression of "time is money", someone with high income tends to want the shortest possible travel time by having a private vehicle that can be used at any time (Sani, 2011).

There are differences in travel behavior between men and women (Curtis & Perkins, 2006; Gärling & Axhausen, 2003). Generally, women are less traveled than men (Root, Schintler, & Button, 2000) and their journeys are shorter (Fanning Madden, 1981). The pattern and timing of a woman's journey will be further complicated as career advancement increases (Root & Schintler, 1999; Wheatley, 2012), Gärling & Axhausen (2003) also state that women traveled less and in close distance to men.

Marital status has a connection with mobility (Luiu, Tight, & Burrow, 2017). Married people decrease their mobility (Haustein & Siren, 2014; J.-K. Kim, Ulfarsson, & Sohn, 2014; Musselwhite & Haddad, 2010; Nordbakke & Schwanen, 2015). The mobility of married people depends on the head of the family (Knight, Dixon, Warrener, & Webster, 2007; Scheiner, 2006) and children under 18 following the pattern of heads of households (J.-K. Kim et al., 2014; S. Kim, 2011).

With this background, the issues that we would like to find out in this study are the effect of population mobility (which includes migration) and socioeconomics (which includes age, sex, occupation, marital status, and income), to the ownership of vehicles in of Malang Raya.

II. Method

A. Data Selection

This study used the SUSENAS 2016 data with 2303 household consisting of 8 variables. The dependent variable in this study was vehicle ownership, while the independent variables were Migration Status, Age, Gender, Marital Status, Education, Occupation, and Income. This research used Stata 14.2. software for data analysis.

B. Identification and Definition of Variable Operations

The data used in this study was the 2016 National Socio-Economic Survey (SUSENAS) data, with variables that described the household condition in Malang Raya. Samples obtained were 2303 households from all over Malang Raya.

Table 2.
Type of Analysis

No	Analysis	Description
1	Descriptive Analysis	Graph
		Cross Tabulation
2	Inferential Analysis	Chi-Square Test
		Ordered Probit Analysis
		Marginal Effect Analysis

1) Dependent Variable

The dependent variable in this study was the household's vehicle ownership. The four categories in the dependent variable were: 1 = no vehicle (as a proxy of dependence on public transport), 2 = own a motorcycle, 3 = own a car, and 4 = own cars and motorcycles.

2) Independent Variables

The independent variables used in this study were:

a) Migration Status

The non-migrant resident = 0, and the resident status = 1.

b) Age

There were 2 categories in this variable: non-productive if they are over 64 years old, and productive if they are between 17-64 years old. In processing the data using the ordered probit method, the age variable is entered into the numerical variable by the ratio scale.

c) Gender

Female = 0, and Male = 1.

d) Marital status

Not married and divorce = 0 and Married = 1.

e) Education

Elementary and junior high school education = 0, and High school and above = 1.

f) Occupation

Occupational from the head of the household with two categories, no activities = 0, and work, schools and other activities = 1.

g) Income

The study used 3 categories of income, low (below IDR 1,000,000 per month), medium (between IDR 1,000,000 to IDR 1,500,000 per month), and high (above IDR 1,500,000 per month). In data processing using ordered probit method, the income variable is entered into a numerical variable with ratio scale.

C. Probit Ordered Analysis Hypothesis

Table 3.

No	H	DESCRIPTION	REFERENCE
1	H1	It is assumed that the migration status has a positive effect on vehicle ownership	• Hu, 2017 • Tal & Handy, 2010 • Blumenberg, 2009 • Chatman & Klein, 2009 • Valenzuela et al., 2005
2	H2	It is assumed that age has a positive effect on vehicle ownership	• Figueroa et al., 2014 • van den Berg et al., 2011 • Buehler, 2011 • Yavuz & Welch, 2010 • Gärling & Axhausen, 2003
3	H3	It is assumed that male gender has a positive effect on vehicle ownership	• Beirão & Sarsfield Cabral, 2007 • Curtis & Perkins, 2006 • Gustafson, 2006 • Gärling & Axhausen, 2003 • Root et al., 2000
4	H4	It is assumed that male gender has a positive effect on vehicle ownership	• Renne & Bennett, 2014 • Westman, Olsson, Gärling, & Friman, 2017 • McMillan, 2005
5	H5	It is assumed that employment has a positive effect on vehicle ownership	• Wang, Monzon, & Ciommo, 2015 • Bunel & Tovar, 2014 • Wang, 2012
6	H6	It is assumed that income has a positive effect on vehicle ownership	• Yan, 2002 • Dabholkar et al., 2000 • Bruton, 1975 • Moses et al 1963
7	H7	It is assumed that marital status negatively affects vehicle ownership	• Luiu et al., 2017 • J.-K. Kim et al., 2014 • Haustein & Siren, 2014 • Knight et al., 2007 • Scheiner, 2006

III. Results and Discussion

A. Graph Analysis

1) 5 Year Migration Status

Figure 4 shows in Malang Raya the sample is mostly non-migrant population based on 5-year migration data.

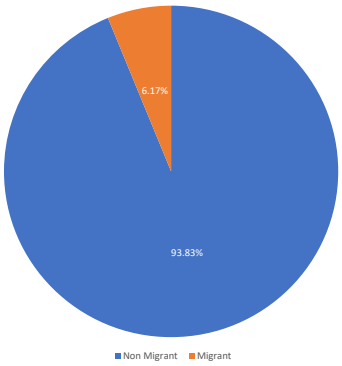

Figure 4. Migration Status of 5 Year Population

2) Population Age

Age is divided into 2 categories non-productive (over 64 years old), and productive (17-64 years old). Figure 5 shows non-productive age is 16.93%, and productive age is 83.07%.

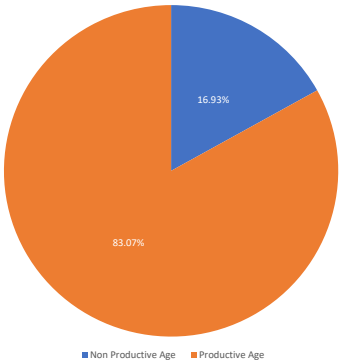

Figure 5. Population Age

3) Gender

Figure 6 shows that the sample consists of 82.89%, male and 17.11% female.

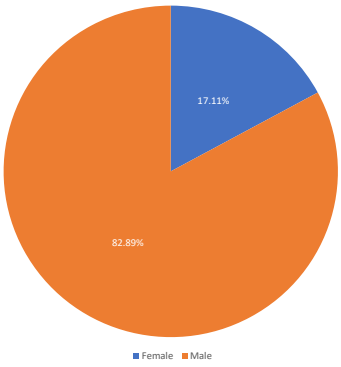

Figure 6. Population Gender

4) Marital status

Figure 7 shows that the sample consists of 6.21% unmarried, 76.34% married, 3.78%, divorce and widowed 13.68%.

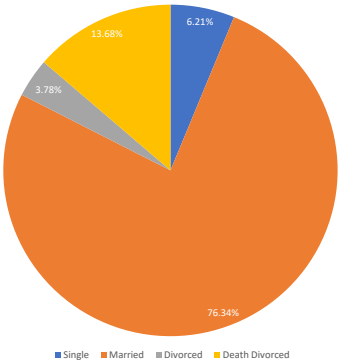

Figure 7. Marital Status

5) Education

Figure 8 shows that Elementary School and Junior High School education dominate the sample.

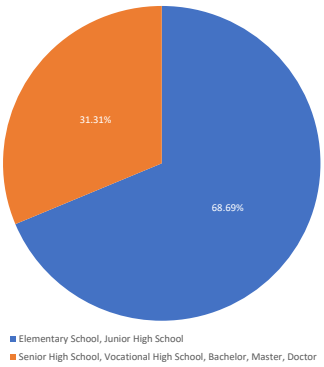

Figure 8. Education

6) Occupation

Figure 9 shows that the sample shows 9.38% respondent with no activities, 21.32% works, 40.12% going to school, 28.96% doing household care, and 0.22% with other activities.

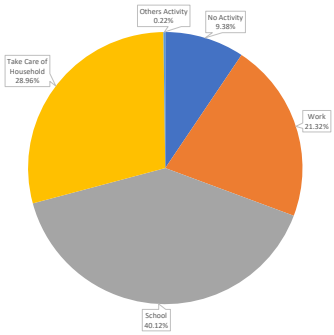

Figure 9. Occupation

7) Income

Figure 10 shows that the sample consist of 33.35% of low-income household (below IDR1,000,000 per month), 33.26% of middle-income household (between IDR1,000,000 to IDR1,500,000 per month), and 33.39% of high-income household (above IDR1,500,000 per month).

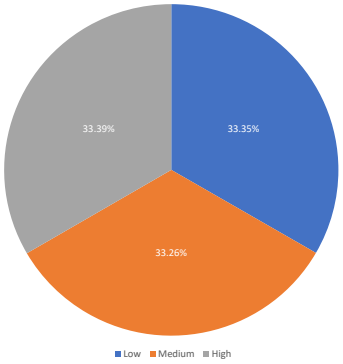

Figure 10. Income

8) Vehicle Ownership

Figure 11 shows that 18.54% have no vehicle, 65.87% own a motorcycle, 1.22% own a car, and 14.37% own car and motorcycle.

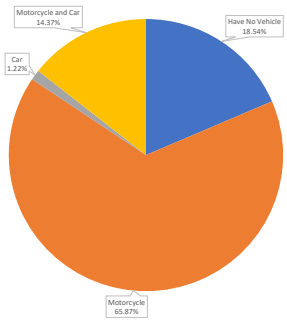

Figure 11. Vehicle Ownership

B. Cross Tabulation Analysis and Chi Square Testing Cross Tabulation Analysis and Chi Square Testing

1) Cross Tabulation of Migration Status and Vehicle Ownership

The cross-tabulation of migration status (Table 4) shows 2,161 non-migrants, of which 17.86% own no vehicle, 66.03% own a motorcycle, 1.25% own a car. There are 142 migrants, of which 28.87% own no vehicle, 63.38% own a motorcycle, 0.70% own a car and 7.04% own car and motorcycle. Chi-Square test results indicated that there was a difference in the proportion of vehicle ownership in terms of migration.

2) Cross Tabulation of Age and Vehicle Ownership

The result (Table 5) shows 390 samples were non-productive age, consisted of 42.05% who own no vehicle, 46.15% own a motorcycle, 2.05% own a car, and 9.74% own motorcycle and car. 1913

Table 4.
Cross Tabulation of Migration Status and Vehicle Ownership

Migration	Vehicle Ownership				Total
	No Vehicle	Own a Motorcycle	Own a Car	Own Motorcycle and Car	
Non-Migrants	386	1,427	27	321	2,161
%	17.86	66.03	1.25	14.85	100
Migrants	41	90	1	10	142
%	28.87	63.38	0.70	7.04	100
Total	**427**	**1.517**	**28**	**331**	**2,303**
%	**18.54**	**65.87**	**1.22**	**14.37**	**100**

Pearson value chi2 = 14.8391 Pr = 0.002

Table 5.
Cross Tabulation of Age and Vehicle Ownership

Age	Vehicle Ownership				Total
	No Vehicle	Own a Motorcycle	Own a Car	Own Motorcycle and Car	
Non-Productive	164	180	8	38	390
%	42.05	46.15	2.05	9.74	100
Productive	263	1,337	20	239	1,913
%	13.75	69.89	1.05	15.32	100
Total	**427**	**1,517**	**28**	**331**	**2,303**
%	**18.54**	**65.87**	**1.22**	**14.37**	**100**

Pearson value chi2 = 177.3709 Pr = 0.000

sample are of productive age, consists of 13.75% own no vehicle, 69.89% own a motorcycle, 1.05% own a car and 15,32% own car and motorcycle. Chi Square test results indicated that there was a difference in the proportion of vehicle ownership in terms of travel frequency.

3) Cross Tabulation of Gender and Vehicle Ownership

The cross-tabulation result (Table 6) shows 394 samples are women, 42.13% do not own a vehicle, 51.78% own a motorcycle, 0.51% own a car, and 5.58% own motorcycle and car. While 1909 are males, 13.67% do not own a vehicle, 68.78% own a motorcycle, 1.36% own a car and 16.19% own car and motorcycle. Chi Square test results indicated that there was a difference in the proportion of vehicle ownership in terms of gender.

4) Cross Tabulation of Marital Status and Vehicle Ownership

The cross-tabulation result (Table 7) shows 545 samples are unmarried/divorced, 38.35% of which do not own a vehicle, 55.96% own a motorcycle, 1.10% own a car, and 4.59% own motorcycles and cars. 1758 samples are married, where 12.40% has no vehicle, 68.94% own a motorcycle, 1.25% own a car and 17.41% own car and motorcycle. Chi-Square test results indicated that there was a difference in the proportion of vehicle ownership in terms of marital status.

5) Cross Tabulation of Education and Vehicle Ownership

The cross-tabulation result (Table 8) shows that from the 1582 samples with elementary and junior high school education, 22,63% have no motor vehicle, 67,51% own a motor, 1.07% own a car, and

Table 6.
Cross Tabulation of Gender and Vehicle Ownership

Gender	Vehicle Ownership				Total
	No Vehicle	Own a Motorcycle	Own a Car	Own Motorcycle and Car	
Female	166	204	2	22	394
%	42.13	51.78	0.51	5.58	100
Male	261	1.313	26	309	1,909
%	13.67	68.78	1.36	16.19	100
Total	**427**	**1,517**	**28**	**331**	**2,303**
%	**18.54**	**65.87**	**1.22**	**14.37**	**100**

Pearson value chi2 = 184.5124 Pr = 0.000

8,79% own motorcycles and cars. There are 721 samples with high school, S1, S2, and S3 education, which 9.57% do not have vehicles, 62.27% own a motorcycle, 1.07% own a car and 8.79% own car and motorcycle. Chi Square test indicated that there was a difference in the proportion of vehicle ownership in terms of education.

6) Cross Tabulation of Occupation and Vehicle Ownership

The cross tabulation (Table 9) shows that from the 216 samples that have no activities, 32.87% own no vehicle, 59.26% owned a motorcycle, 0.93% owned a car, and 6.94% owned motorcycle and car. While the 2,087 that has activities (work, school, etc.) 17.06% have no vehicle, 66.55% own a motorcycle, 1.25% own a car and 15.14% own car and motorcycle. Chi-Square test results indicated that there was a difference in the proportion of vehicle ownership in terms of occupation aspect.

7) Cross Tabulation of Income and Vehicle Ownership

The cross-tabulation result (Table 10) shows 768 of the sample were low-income household, with 25.26% own no vehicle, 17.66% own a motorcycle, 0.00% own a car, and 2.08% own motorcycle and car. While 1535 samples have middle and high income, with 15.18% has no vehicle, 62.48% own a motorcycle, 1.82% own a car and 20.52% own car and motorcycle. Chi Square test results indicated that there was a difference in the proportion of vehicle ownership in terms of income.

Table 7.
Cross Tabulation of Marital Status and Vehicle Ownership

Marital Status	Vehicle Ownership				Total
	No Vehicle	Own a Motorcycle	Own a Car	Own Motorcycle and Car	
Unmarried/ Divorced	209	305	6	25	545
%	38.35	55.96	1.10	4.59	100
Married	218	1,212	22	306	1,758
%	12.40	68.94	1.25	17.41	100
Total	**427**	**1,517**	**28**	**331**	**2,303**
%	**18.54**	**65.87**	**1.22**	**14.37**	**100**

Pearson value chi2 = 209.3600 Pr = 0.000

Table 8.
Cross Tabulation of Education and Vehicle Ownership

Education	Vehicle Ownership				Total
	No Vehicle	Own a Motorcycle	Own a Car	Own Motorcycle and Car	
Elementary and Junior High School	358	1,068	17	139	1,582
%	22.63	67.51	1.07	8.79	100
High School, S1, S2, and S3	69	449	11	192	721
%	9.57	62.27	1.53	26.63	100
Total	**427**	**1,517**	**28**	**331**	**2,303**
%	**18.54**	**65.87**	**1.22**	**14.37**	**100**

Pearson value chi2 = 158.1628 Pr = 0.000

Table 9.
Cross Tabulation of Occupation and Vehicle Ownership

Occupation	Vehicle Ownership				Total
	No Vehicle	Own a Motorcycle	Own a Car	Own Motorcycle and Car	
Has No Activities	71	128	2	15	216
%	32.87	59.26	0.93	6.94	100
Has Activities (work, school, etc.)	356	1,389	26	316	2,087
%	17.06	66.55	1.25	15.14	100
Total	**427**	**1,517**	**28**	**331**	**2,303**
%	**18.54**	**65.87**	**1.22**	**14.37**	**100**

Pearson value chi2 = 37.2933 Pr = 0.000

Table 10.
Cross Tabulation of Income and Vehicle Ownership

Income	Vehicle Ownership				Total
	No Vehicle	Own a Motorcycle	Own a Car	Own Motorcycle and Car	
Low-Income	194	558	0	16	768
%	25.26	72.66	0.00	2.08	100
Middle and High Income	233	959	28	315	1,535
%	15.18	62.48	1.82	20.52	100
Total	**427**	**1,517**	**28**	**331**	**2,303**
%	**18.54**	**65.87**	**1.22**	**14.37**	**100**

Pearson value chi2 = 171.1996 Pr = 0.000

C. Ordered Probit Analysis

Figure 12 is the basic theory where transportation is seen as a derivative requirement of one's socio-economic conditions. The uniqueness of this study is to reveal the application of the theory of the emergence of travel based on population status (migration of a person).

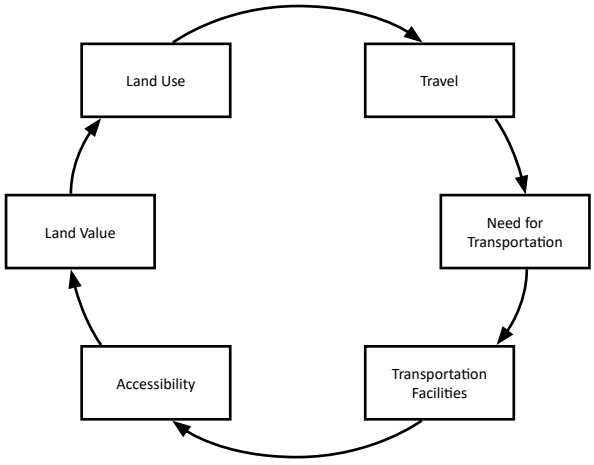

Figure 12. Theory of Travel Emergence

Source: Khisty & Lall, 1998

Table 11.
Result of Ordered Probit Analysis Effect of Population Mobility and Social Economics on Vehicle Ownership in Malang Raya

Vehicle Ownership	Coefficient	Standard Error	P > I z I
* Migrant Population	- 0.5963258	0.1929451	0.002
Age	- 0.0029232	0.0020414	0.152
* Male	0.3117393	0.0967193	0.001
* Married	0.727866	0.0888811	0.000
* Top Education (Senior High School, S1, S2, S3)	0.4726465	0.0647048	0.000
* Have a Activities	0.318774	0.1460499	0.029
Income	3.17e-07	2.60e-08	0.000
/cut 1	0.4272908	0.2100178	
/cut 2	2.68822	0.2161244	
/cut 3	2.752998	0.2165345	

The Ordered Probit regression equation:

P(y) = F(-0,596 mig + 0,311 sex + 0,727 mar + 0,40 edu + 0,318 occ + 3,17 inc - 1823,2794)

Log likelihood = -1823.2794
Number of obs = 2,303
LR chi2(9) = 590.34
Prob > chi2 = 0.0000
Pseudo R2 = 0.1393

It can be interpreted as follows:

1. Coefficient β of -823,2794 means there are not covered factors outside the independent variables that also affect vehicle ownership in Malang Raya.
2. Migrant status is negative and significant. This means that if the population has a migrant status it will have no vehicle. This study differs from previous studies, such as the one conducted by Blumenberg & Shiki (2008), where they found that Asians assimilate to the culture of driving their own cars faster than other immigrants. Likewise with research conducted by Lovejoy & Handy (2007), which explains that migrant residents prefer to drive their own cars rather than using public transport facilities. Even migrants who do not have a car expect to buy it, while those who cannot afford it will try to buy a used car. But this study is in line with studies conducted in the United States. According to Blumenberg & Shiki (2008), McGuckin & Srinivasan (2005), Purvis (2003) newly arrived migrants have different travel patterns than individuals born in the United States. This is reinforced by the research conducted by Beirão & Sarsfield Cabral (2007) which found that factors such as needs, limitations, preferences, attitudes, culture, and previous experiences influence the pattern of activity and travel behavior of migrant populations. Even according to research conducted by Blumenberg (2009) states that migrant residents have fewer financial resources to buy and maintain private cars. Also in line with Blumenberg, Bohon, Stamps, & Atiles (2008) which stated that the migrants do not have a budget to buy a car due to the difficulty to get a job. Whereas according to Chatman & Klein (2009) migrants tend to choose to walk, cycle, reach carpool, and transit.
3. Age is negative and insignificant. Age does not affect vehicle ownership in Malang Raya. The tendency of Malang residents to own a vehicle is not affected by age. The findings of this study are different from previous studies. Yavuz & Welch (2010) explained that age was a variable in the desire to own a vehicle, Figueroa et al. (2014) which found that modeling of traditional travel demand generally assumes age-related travel activities, Gärling & Axhausen (2003) which found that individuals between 25 and 50 years of age traveled more often than their younger and older colleagues, Johansson-Stenman et al. (2002) found that travel distances peaked at around the age of 50 years, and Collia, Sharp, & Giesbrecht (2003) and Somenahalli & Shipton (2013) explained that the peak travel distance could be observed after reaching retirement age.
4. Male is positive and significant. This means that the there is more tendency of men to have a vehicle than women. Similar to previous studies such as Gärling & Axhausen (2003) and Curtis & Perkins (2006) that found that there are differences in transportation preferences between men and women. Gärling & Axhausen (2003) found that women traveled less and closer than men. Empirical research on gender differences in travel behavior by Root et al. (2000) and Gärling & Axhausen (2003) showed significant differences in travel behavior, needs, and opportunities between men and women. Generally, women travel less than men and their work trips are shorter. Research conducted by Johansson-Stenman

et al. (2002) in Sweden also shows that there are differences in behavior between men and women in traveling. The results showed that men traveled more often by driving their own cars, while women more often used public transport services.

5. Marital status is positive and significant. This means that a married person has a greater tendency to own a vehicle than a person with unmarried status This is in line with research conducted by Haustein & Siren (2014), J.-K. Kim et al. (2014), Musselwhite & Haddad (2010) and Nordbakke & Schwanen (2015) who explained that life with a partner reduces the likelihood of mobility, especially for recreational and social reasons. According to Knight et al. (2007), Scheiner (2006) and S. Kim (2011) mobility of people living with a spouse or other person can also lead to dependence, if they are not the head of the family or when living with children under 18 years, these children will follow the travel pattern of the head of the family. Research conducted in South Korea by J.-K. Kim et al. (2014) explained that parents also experience problems where their travel needs are not met. This is due to the responsibility of parents to take care of children, so that a lot of time that previously used for recreation, is spent taking care of their children/families after marriage.
6. Top education (Senior High School, S1, S2, S3) is positive and significant. This means that the higher the education of a person, the greater the ownership of the vehicle. It is in line with work and income, the higher the education of a person the greater the probability to get a good job with a large salary so that more able to have a vehicle. This finding is the same as the study conducted by Renne & Bennett (2014) where car ownership and travel are positively related to income and education. Likewise, Westman et al. (2017) in Sweden found that travel satisfaction was related to education.
7. The occupation has positive and significant activity. This means the more people have activities, the greater the tendency to own a vehicle. This reinforces previous research. Gao, Mokhtarian, & Johnston (2008), Horner (2004), Grengs (2012) explained that accessibility to the workplace, the balance between work and housing and social inequality is the concern in urban areas. Bunel & Tovar (2014), Geurs, De Montis, & Reggiani (2015) showed that the accessibility of transportation modes to reach work site is a consideration for accepting work. van Wee, Hagoort, & Annema (2001), Wang et al. (2015) concludes that job accessibility is generally not only determined by the number of jobs but also influenced by spatial competition.
8. Income is positive and significant. This finding is similar to previous research that shows the higher one's income, the higher the value of time. The high value of time leads people to own their own vehicles because the length of time for personal vehicle travel is shorter than public transportation. This is the same as the research conducted by Yan (2002) which found that income is the limit of someone in consuming transportation, individuals with higher income will value their time higher. The higher a person's income, the higher the value of time. As the expression of time is money, someone with high income tends to want the shortest possible travel time by having a private vehicle that can be used at any time (Sani, 2011). This means that individuals with high income will choose a fast mode of transportation even though it is costly.

The Minister of Home Affairs Regulation Number 9 of 2009 has confirmed that the responsibility for managing social and public facilities has been transferred to the regional government. Article 22 paragraph (1) states that the management of infrastructure, facilities, and utilities that have been handed over to the regional government is entirely the responsibility of the relevant regional government. The lack of budget often becomes a scapegoat for the failure of the government in managing public facilities and social facilities, for example, the bus stop facility for public transport. The unavailability of public transport infrastructure is the cause of the high ownership of private vehicles.

Ministry of Home Affairs Regulation Number 9 of 2009 basically requires that the public facilities and social facilities handed over by the developer in a good condition. However, the facts in the field are that the developer only handed over some piece of land. Another problem is the failure of the developer to fulfill the promise to build several facilities in the residential areas, including transportation modes (transportation that connects the housing environment with public transport). In the migrant population group, this condition worsens. The results of this study show that the more a person is a migrant, the less likely to have a vehicle. With poor public facilities and social services in the transportation sector, it will further complicate the activities of migrant populations.

In Law Number 22 of 2009 concerning Article 93 of road transport from Ministry of Transportation, it is stated that the government should carry out

the priority setting of mass transportation and the integration of various modes of transportation. If the Act is implemented, the tendency of private vehicle ownership will decrease. The implementation of the law will improve the comfort of migrant residents in Malang who tends to not own a vehicle.

In Law Number 25 of 2009 concerning Public Service Article 5 from Ministry of State Apparatus Empowerment, it is stated that public service includes, are among others, the transportation sector and its procurement or distribution comes from the regional government budget. The intended public goods are facilities and infrastructure in the transportation sector. But in its implementation, the provision of facilities and infrastructure was not implemented by the government. This causes people to have no choice but to own private transportation. This condition worse since the results of the study found that vehicle ownership was no longer affected by age, although to have a driver license it was required to be over 17 years of age. Urgent needs in the field of transportation urge people of any age to own private vehicles.

D. Marginal Effect Analysis

Interpretation of an Ordered Probit model also done based on marginal effect.

Table 12.
Marginal Effect Analysis Results Have No Vehicles in Malang Raya

Have No Vehicle Ownership	dy / dx	Standard Error	P > l z l
*Migrant Population	0.1719361	0.06624	0.009
Age	0.0006646	0.00046	0.152
*Male	-0.0785698	0.02677	0.003
*Married	-0.1979766	0.02776	0.000
*Top Education (Senior High School, S1, S2, S3)	-0.0977395	0.0123	0.000
*Have a Activities	-0.0823953	0.04224	0.051
Income	-7.22e-08	0.00000	0.000

Marginal effects after oprobit
Y = Pr(kep==1) (predict)
= 0.1444457 ⇨ 14.44%

It indicated that the change in the value of each independent variable in 1 person will affect the probability of ownership of vehicles with the category of not owning a vehicle of 14.44%.

Table 13.
Marginal Effect Analysis Results Have a Motorcycle in Malang Raya

Have a Motorcycle	dy / dx	Standard Error	P > l z l
*Migrant Population	-0.0888537	0.04894	0.069
Age	-0.0000972	0.00008	0.201
*Male	0.0252001	0.01282	0.049
*Married	0.0855761	0.01876	0.000
*Top Education (Senior High School, S1, S2, S3)	-0.0040838	0.00642	0.525
*Have Activities	0.0297013	0.02236	0.184
Income	1.05e-08	0.00000	0.007

Marginal effects after oprobit
Y = Pr(kep==2) (predict, outcome(2))
= 0.74055703 ⇨ 74.05%

It indicated that the change in the value of each independent variable in 1 person will affect the probability of ownership of vehicles with motorcycle category of 74.05%.

Table 14.
Marginal Effect Analysis Results Have a Car in Malang Raya

Vehicle Ownership	dy / dx	Standard Error	P > l z l
*Migrant Population	-0.0756292	0.01625	0.000
Age	-0.0005238	0.00037	0.153
*Male	0.0489814	0.01333	0.000
*Married	0.1028973	0.01065	0.000
*Top Education (Senior High School, S1, S2, S3)	0.0946769	0.01447	0.000
*Have Activities	0.0482792	0.01844	0.009

Vehicle Ownership	dy / dx	Standard Error	P > l z l
Income	5.69e-08	0.00000	0.000

Marginal effects after oprobit
Y = Pr(kep==3) (predict, outcome(3))
= 0.01208859 ⇨ 1.20%

It indicated that changes in the value of each independent variable in 1 person will affect the probability of ownership of vehicles with the category of having a car of 1.20%.

Table 15.
Marginal Effect Analysis Results Have a Car and Motorcycle in Malang Raya

Have a Car	dy / dx	Standard Error	P > l z l
*Migrant Population	-0.0074531	0.00232	0.001
Age	-0.0000435	0.00003	0.164
*Male	0.0043882	0.0015	0.004
*Married	0.0095033	0.00202	0.000
*Top Education (Senior High School, S1, S2, S3)	0.0071464	0.00166	0.000
*Have Activities	0.0044148	0.00202	0.029
Income	4.73e-09	0.00000	0.000

Marginal effects after oprobit
Y = Pr(kep==4) (predict, outcome(4))
= 0.10290868 ⇨ 10.29%

It indicated that the change in the value of each independent variable in 1 person will affect the probability of ownership of vehicles with categories of cars and motorcycles of 10.29%.

IV. Conclusion

Migrants tend to have no vehicles, age does not affect vehicle ownership, and the most significant factors in vehicle ownership are marital status, education, and employment.

Based on research on vehicle ownership in Malang Raya, our suggestions are as follows:

1. For Policy Maker
   The government should provide a public transport service network, especially in areas of migrant populations. To make public transport attractive to them, the government should create a network of public transport services that reach educational areas, office areas, and household areas.
2. For Public Transport Operator
   If public transport wants to compete with the private vehicle then it is necessary to pay attention to the timeliness and speed of travel time in the service.
   Income and education also affect perceptions of facilities and convenience of public transport. Public transport operators should improve their facilities and comfort during their trip.
   Marriage also has a significant effect; public transport operators should provide family-friendly transportation.
3. For Academics in Preparing Further Research
   For further research is expected to increase the location of research. Further research is expected to cover aspects of online transportation as a hot topic from 2017 to 2018.

Acknowledgement

I would like to thank Bappenas for the scholarships, and my supervisors who have been providing directions, motivation and guidance: Dr. Multifiah and Wildan Syafitri Ph.D.

V. References

Beirão, G., & Sarsfield Cabral, J. A. (2007). Understanding attitudes towards public transport and private car: A qualitative study. *Transport Policy*, *14*(6), 478–489. http://doi.org/10.1016/j.tranpol.2007.04.009

Blumenberg, E. (2009). Moving in and moving around: immigrants, travel behavior, and implications for transport policy. *Transportation Letters*, *1*(2), 169–180. http://doi.org/10.3328/TL.2009.01.02.169-180

Blumenberg, E., & Shiki, K. (2008). Immigrants and Resource Sharing: The Case of Carpooling. In *TRB 87th Annual Meeting Compendium of Papers DVD*. Washington DC: Transportation Research Board. http://doi.org/10.3328/TL.2009.01.02.169-180

Bohon, S. A., Stamps, K., & Atiles, J. H. (2008). Transportation and Migrant Adjustment in Georgia. *Population Research and Policy Review*, *27*(3), 273–291. http://doi.org/10.1007/s11113-008-9075-8

Broaddus, A., Litman, T., & Menon, G. (2010). *Manajemen Permintaan Transportasi*. (Deutsche Gesellschaft fur, Ed.). Eschborn,

Germany: Technische Zusammenarbeit (GTZ) GmbH.

Bunel, M., & Tovar, E. (2014). Key Issues in Local Job Accessibility Measurement: Different Models Mean Different Results. *Urban Studies*, *51*(6), 1322–1338. http://doi.org/10.1177/0042098013495573

Cairns, S., Sloman, L., Newson, C., Anable, J., Kirkbride, A., & Goodwin, P. (2004). *Smarter Choices – Changing the Way We Travel*. *The influence of soft factor interventions on travel demand*. London: Department for Transport.

Chatman, D. G., & Klein, N. (2009). Immigrants and Travel Demand in the United States. *Public Works Management & Policy*, *13*(4), 312–327. http://doi.org/10.1177/1087724X09334633

Collia, D. V., Sharp, J., & Giesbrecht, L. (2003). The 2001 National Household Travel Survey: A look into the travel patterns of older Americans. *Journal of Safety Research*, *34*(4), 461–470. http://doi.org/10.1016/j.jsr.2003.10.001

Curtis, C., & Perkins, T. (2006). *Travel Behaviour: A review of recent literature* (Working Paper No. 3). *Impacts of Transit Led Development in a New Rail Corridor*. Retrieved from https://urbanet.curtin.edu.au/local/pdf/ARC_TOD_Working_Paper_3.pdf

Dabholkar, P. A., Shepherd, C. D., & Thorpe, D. I. (2000). A comprehensive framework for service quality: an investigation of critical conceptual and measurement issues through a longitudinal study. *Journal of Retailing*, *76*(2), 139–173. http://doi.org/10.1016/S0022-4359(00)00029-4

Department of Population and Civil Registration Malang City. (2017). *Development of Migration in Malang City 2016-2017*. Malang: Department of Population and Civil Registration Malang City.

Fanning Madden, J. (1981). Why Women Work Closer to Home. *Urban Studies*, *18*(2), 181–194. http://doi.org/10.1080/00420988120080341

Figueroa, M. J., Nielsen, T. A. S., & Siren, A. (2014). Comparing urban form correlations of the travel patterns of older and younger adults. *Transport Policy*, *35*, 10–20. http://doi.org/10.1016/j.tranpol.2014.05.007

Gao, S., Mokhtarian, P. L., & Johnston, R. A. (2008). Exploring the connections among job accessibility, employment, income, and auto ownership using structural equation modeling. *The Annals of Regional Science*, *42*(2), 341–356. http://doi.org/10.1007/s00168-007-0154-2

Gärling, T., & Axhausen, K. W. (2003). Introduction: Habitual travel choice. *Transportation*, *30*(1), 1–11. http://doi.org/10.1023/A:1021230223001

Geurs, K. T., De Montis, A., & Reggiani, A. (2015). Recent advances and applications in accessibility modelling. *Computers, Environment and Urban Systems*, *49*, 82–85. http://doi.org/10.1016/j.compenvurbsys.2014.09.003

Grengs, J. (2012). Equity and the social distribution of job accessibility in Detroit. *Environment and Planning B: Planning and Design*, *39*(5), 785–800. http://doi.org/10.1068/b36097

Haustein, S., & Siren, A. (2014). Seniors' unmet mobility needs – how important is a driving licence? *Journal of Transport Geography*, *41*, 45–52. http://doi.org/10.1016/j.jtrangeo.2014.08.001

Horner, M. W. (2004). Exploring Metropolitan Accessibility and Urban Structure. *Urban Geography*, *25*(3), 264–284. http://doi.org/10.2747/0272-3638.25.3.264

Johansson-Stenman, O., Carlsson, F., & Daruvala, D. (2002). Measuring Future Grandparents' Preferences for Equality and Relative Standing. *The Economic Journal*, *112*(479), 362–383. http://doi.org/10.1111/1468-0297.00040

Kim, J.-K., Ulfarsson, G., & Sohn, K. (2014). Transportation Deficiencies for Older Adults in Seoul, South Korea. *Transportation Research Record: Journal of the Transportation Research Board*, *2469*, 76–88. http://doi.org/10.3141/2469-09

Kim, S. (2011). Assessing mobility in an aging society: Personal and built environment factors associated with older people's subjective transportation deficiency in the US. *Transportation Research Part F: Traffic Psychology and Behaviour*, *14*(5), 422–429. http://doi.org/10.1016/j.trf.2011.04.011

Knight, T., Dixon, J., Warrener, M., & Webster, S. (2007). *Understanding the travel needs, behaviour and aspirations of people in later life*. London: Department for Transport. Retrieved from https://www.researchgate.net/publication/281864170_Understanding_the_travel_needs_behaviour_and_aspirations_of_people_in_later_life_London_Department_for_Transport

Lovejoy, K., & Handy, S. (2007). Transportation Experiences of Mexican Immigrants in California: Results from Focus Group Interviews. UC Davis: Institute of Transportation Studies (UCD). Retrieved from https://escholarship.org/uc/item/0jj8h2cf

Luiu, C., Tight, M., & Burrow, M. (2017). The unmet travel needs of the older population: a review of the literature. *Transport Reviews*, *37*(4), 488–506. http://doi.org/10.1080/01441647.2016.1252447

Malang City Central Bureau of Statistics. (2017).

Kota Malang dalam Angka 2016. Malang: Malang City Central Bureau of Statistics.

McGuckin, N., & Srinivasan, N. (2005). The Journey-to-Work in the Context of Daily Travel. In *Census Data for Transportation Planning Conference*.

Ministry Of Iternal Affair. (2009). *Peraturan Menteri Dalam Negeri Nomor 9 Tahun 2009 Tentang Pedoman Penyerahan Prasarana, Sarana, Dan Utilitas Perumahan Dan Permukiman Di Daerah*.

Ministry of State Apparatus Empowerment. (2009). Undang-Undang Republik Indonesia Nomor 25 Tahun 2009 Tentang Pelayanan Publik. Indonesia.

Ministry of Transportation. (2009). Undang-Undang Republik Indonesia Nomor 22 Tahun 2009 Tentang Lalu Lintas Dan Angkutan Jalan. Indonesia.

Mulyoutami, E. P., Wahyuni, E. S., & Kolopaking, L. M. (2014). *Jaringan dan Keputusan Migrasi Untuk Penguasaan Lahan Kajian Komunitas Petani Coklat Migran Bugis di Sulawesi Tenggara*. Bogor Agricultural University. Retrieved from https://repository.ipb.ac.id/handle/123456789/70870

Musselwhite, C. B. A., & Haddad, H. (2010). Exploring older drivers' perceptions of driving. *European Journal of Ageing*, *7*(3), 181–188. http://doi.org/10.1007/s10433-010-0147-3

Nordbakke, S., & Schwanen, T. (2015). Transport, unmet activity needs and wellbeing in later life: exploring the links. *Transportation*, *42*(6), 1129–1151. http://doi.org/10.1007/s11116-014-9558-x

Purvis, C. (2003). *Commuting Patterns of Immigrants*. *CTPP 2000 Status Report*. Washington D.C.: U.S. Department of Transportation, Federal Highway Administration, Bureau of Transportation Statistics, Federal Transit Administration.

Renne, J. L., & Bennett, P. (2014). Socioeconomics of Urban Travel: Evidence from the 2009 National Household Travel Survey with Implications for Sustainability. *World Transport Policy & Practice*, *20*(4), 7–27. Retrieved from http://worldtransportjournal.com/wp-content/uploads/2015/02/wtpp20.4.pdf

Rentjoko, A. (2018, March 12). Kota Anda termasuk sepuluh termacet di Indonesia? Retrieved from https://beritagar.id/artikel/berita/kota-anda-termasuk-sepuluh-termacet-di-indonesia

Root, A., & Schintler, L. (1999). Women, motorization and the environment. *Transportation Research Part D: Transport and Environment*, *4*(5), 353–355. http://doi.org/10.1016/S1361-9209(99)00012-7

Root, A., Schintler, L., & Button, K. (2000). Women, travel and the idea of "sustainable transport." *Transport Reviews*, *20*(3), 369–383. http://doi.org/10.1080/014416400412850

Sani, Z. (2011). *Pengaruh Gaya Hidup dan Lokasi Perumahan terhadap Nilai Waktu, Pemilihan Moda dan Permintaan Perjalanan*. Universitas Pancasila.

Sani, Z. (2013). *Ekonomi Transportasi*. Jakarta: UI Press.

Scheiner, J. (2006). Does the car make elderly people happy and mobile? Settlement structures, car availability and leisure mobility of the elderly. *EJTIR*, *6*(2), 151–172. Retrieved from https://www.tudelft.nl/tbm/over-de-faculteit/afdelingen/engineering-systems-and-services/research/ejtir/back-issues/volume6-2006/

Smart, M. (2010). US immigrants and bicycling: Two-wheeled in Autopia. *Transport Policy*, *17*(3), 153–159. http://doi.org/10.1016/j.tranpol.2010.01.002

Smart, M. J. (2015). A nationwide look at the immigrant neighborhood effect on travel mode choice. *Transportation*, *42*(1), 189–209. http://doi.org/10.1007/s11116-014-9543-4

Somenahalli, S., & Shipton, M. (2013). Examining the Distribution of the Elderly and Accessibility to Essential Services. *Procedia - Social and Behavioral Sciences*, *104*(December 2013), 942–951. http://doi.org/10.1016/j.sbspro.2013.11.189

Tal, G., & Handy, S. (2010). Travel behavior of immigrants: An analysis of the 2001 National Household Transportation Survey. *Transport Policy*, *17*(2), 85–93. http://doi.org/10.1016/j.tranpol.2009.11.003

Tukiran. (2002). *Mobilitas Penduduk Indonesia: Tinjauan Lintas Disiplin*. Yogyakarta: Pusat Studi Kependudukan dan Kebijakan, Universitas Gadjah Mada.

Valenzuela, A., Schweitzer, L., & Robles, A. (2005). Camionetas: Informal travel among immigrants. *Transportation Research Part A: Policy and Practice*, *39*(10), 895–911. http://doi.org/10.1016/j.tra.2005.02.026

van den Berg, P., Arentze, T., & Timmermans, H. (2011). Estimating social travel demand of senior citizens in the Netherlands. *Journal of Transport Geography*, *19*(2), 323–331. http://doi.org/10.1016/j.jtrangeo.2010.03.018

van Wee, B., Hagoort, M., & Annema, J. A. (2001). Accessibility measures with competition. *Journal of Transport Geography*, *9*(3), 199–208. http://doi.org/10.1016/S0966-6923(01)00010-2

Wang, Y., Monzon, A., & Ciommo, F. Di. (2015). Assessing the accessibility impact of

transport policy by a land-use and transport interaction model – The case of Madrid. *Computers, Environment and Urban Systems*, *49*, 126–135. http://doi.org/10.1016/j.compenvurbsys.2014.03.005

Warpani, S. P. (2002). *Pengelolaan Lalu Lintas dan Angkutan Jalan*. Bandung: ITB.

Westman, J., Olsson, L. E., Gärling, T., & Friman, M. (2017). Children's travel to school: satisfaction, current mood, and cognitive performance. *Transportation*, *44*(6), 1365–1382. http://doi.org/10.1007/s11116-016-9705-7

Wheatley, D. (2012). Work-life balance, travel-to-work, and the dual career household. *Personnel Review*, *41*(6), 813–831. http://doi.org/10.1108/00483481211263764

Widyawan, A. B. (2011). *Keputusan Konsumen dalam Membeli Mobil BMW*. Universitas Indonesia.

Yan, J. (2002). *Heterogeneity in Motorists' Preferences for Time Travel and Time Reliability: Empirical Findings from Multiple Survey Data Sets and Its Policy Implications* (Earlier Faculty Research). University of California Transportation Center, UC Berkeley. Retrieved from https://escholarship.org/uc/item/7nk0v3kj

Yavuz, N., & Welch, E. W. (2010). Addressing Fear of Crime in Public Space: Gender Differences in Reaction to Safety Measures in Train Transit. *Urban Studies*, *47*(12), 2491–2515. http://doi.org/10.1177/0042098009359033

Zhou, M. (2004). Assimilation, the Asian Way. In T. Jacoby (Ed.), *Reinventing the Melting Pot: The New Immigrants and What It Means to be American*. New York: Basic Books.