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ICCOEE2020

Proceedings of the 6th International
Conference on Civil, Offshore
and Environmental Engineering
(ICCOEE2020)

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Bibliographic Information

Preface

This book contains papers presented in the 6th International Conference on Civil, Offshore and Environmental Engineering (ICCOEE2020) under the banner of World Engineering, Science and Technology Congress (ESTCON2020) held on 13–15 July 2021 at Borneo Convention Centre, Kuching, Malaysia. The ICCOEE series of conferences started in Kuala Lumpur, Malaysia, in 2012.

The main objective of the ICCOEE is to provide a platform for academia and industry to showcase their latest advancements and findings in the broad disciplines of civil, offshore and environmental engineering with an emphasis on the looming Industrial Revolution 4.0. The conference also provides great opportunities for participants to exchange new ideas and experience as well as to forge research and business relations with global partners for future collaborations.

The articles in this book were accepted after a rigorous review process. All accepted papers are categorized based on the following themes and areas of research:

- Green Environment and Smart Water Resource Management Systems
- Advanced Coastal and Offshore Engineering
- Resilient Structures and Smart Materials
- Advanced Construction and Building Information Modelling
- Smart and Sustainable Infrastructure

We would like to express our gratitude to the Technical Programme Committee and Advisory Committee who undertook the biggest responsibility in the paper reviewing process. We are also grateful to the additional reviewers who helped the authors deliver better papers by providing them with constructive comments. We hope that this process contributed to a consistently good level of the papers that are included in the book.

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Contents

Investigating the ride-hailing users and their perception of the usefulness of its services: A case from Bandung, Indonesia

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Abstract. Developing countries like Indonesia experienced substantial growth of motorcycle- and car- based ride-hailing services. However, there still limited insight on how its service imply to travels behavior, given the fact that developing countries has unique socio-economic demography and infrastructure reliability. This paper describes the characteristics of ride-hailing users as well as their travel behavior, and those users' perception of the usefulness of its services. For these purposes, the study collected data using a questionnaire survey in Bandung City in 2018. The sample description shows that ride-hailing users are not only travelers who previously used private transport (motorcycles or cars) but also travelers who used public transport. The level of appreciation to ride-hailing is quite high. It could infer that users most likely have positive impression for the ride-hailing service.

Keywords: ICT, ride-hailing, travel behavior, developing countries.

1 Introduction

The mobility-on-demand platforms rise to be one of the important innovations in the last decades. Although it still debatable, the platforms are among the precursor of the sharing economy with the development of car-sharing, bike-sharing, and ride-hailing services [1]. The ride-hailing service and its implication for economy, social, and transportation has attracted various researcher from many background [2, 3, 4, 5, 6, 7]. The ride-hailing service has a strong attachment in developing countries, such as Indonesia, which have substantial urbanization and motorization as well as lack public transport services. Indonesia has experienced a very rapid growth of

ride-hailing service from the last five years. Within those five years, Go-Jek and Grab rose to be dominant ride-hailing companies for both two- and four-wheeled vehicles in Indonesia [3]. The success of the ride-hailing companies has attracted large number of funds and provided substantial number of new jobs [8]. For instance, Gojek currently have more than one million drivers that served mobility services in 50 Indonesian cities [9, 10].

The rapid growth has presented the opportunities as well as challenges for cities environment and urban mobilities [2, 3, 6]. Ride-hailing disrupt established transportation business models which have similar services consequently increase a debate on how they should be regulated [11, 12]. As its only distinguished than traditional taxicabs [13] or traditional motorcycle taxi [4] by its use of a smartphone. In the last 3 years, ride-hailing also has created several challenges for bus and paratransit services in Indonesia, mainly in big cities [14, 15].

Several studies that focus on investigate implication of ride-hailing to mode-choice indicated that ride-hailing service have various effect to the existing public transport system. Dias et al. [2] found that ride-hailing decline the public transport users in high-density area and its usage also lead to a decline in walking and bicycle journeys. However, several studies in major US cities found that the ride-hailing service increase the demand for commuter rail services, but it also threatens to decrease the demand for light rail and buses [11]. The complementary effect of ride-hailing to public transport also found in Indonesia Capital City, Jakarta as found by studies of Medeiros et al. [4] and Irawan et al. [3]. Despite the studies above, the gap in our understanding of the implications of ride-hailing on travel behavior is still substantial. It is still unknown whether ride-hailing services complement or act as an alternative to existing public transport services, or whether they substitute for modes of transport that depend on cars .

Furthermore, these studies have mostly been conducted in developed countries, and much less attention has been given to developing countries, which are different in many facets of their societal, political, and infrastructure background. The effect of ride-hailing on increasing mobility differs between developing countries and developed countries because the former usually have poor-quality public transport and/or paratransit services [1]. In Indonesia, it supported by Indonesia being one of the countries with the highest mobile and smartphone ownership rates in the world [16]. With the strong growth that has taken place in ICT infrastructure development, the digital transformation may increase in the coming decades [17]. In addition, developing countries such as Indonesia has initiated strong development of urban public transport services (i.e. Mass Rail Transport, Light Rail Train, and Bus Rapid Transit) in the next decades [18]. Therefore, it is important to manage the ride-hailing services to complement and support the public transport system.

Given the unclear implication of ride-hailing to travel behavior, understanding the users' travel behavior has important role to manage the role of ride-hailing to support and complement the public transport services. Furthermore, the investigation of perceived usefulness of ride-hailing and its interaction to the frequency of usage may provide substantial insights into to understand the role of ride-hailing and its service quality based on users' preference. Therefore, our

objectives in this study were twofold: first, to understand the perceived usefulness of ride-hailing and second, this study examine on how perceived usefulness characteristics based on their ride-hailing service preference.

The remainder of the paper is structured as follows. The following section presents the research method, where the collection of data and the respondents' characteristics are described. The model estimation is presented in the next section, and this is followed by the discussion and conclusion sections.

2   Method

This study distributed questionnaires to travelers that uses motorcycle or car ride-hailing services in Bandung City, Indonesia. The sample size of 400 was determined from Yamane's equation [19], given that the population of Bandung was 2,481,469 [20] and assuming a 5% significance level. The sample size was upgraded to 500 to overcome the possibility of errors during the survey. The questionnaire was constructed based on the literature regarding ride-sharing and ride-hailing, and travel behavior. The questionnaire was divided into two parts.

The first part contained questions about the respondents' socio-demographic characteristics. The second part was related to the characteristics of their use of ride-hailing, covering their travel behavior, such as travel time, cost, length, and frequency. In this part, the respondents were also asked to identify their travel experience and to indicate their reasons for preferring a ride-hailing service (e.g., broad service coverage, 24 hour service, the safety of the journey, etc.) using a five-point Likert scale, where 1 represented "strongly disagree" and 5 represented "strongly agree."

The questionnaire form was distributed from 24 April to 14 May 2018 after a series of reviews and revisions from a pilot survey. The questionnaire was distributed in six administrative areas in Bandung City. The method used to distribute the questionnaire was convenience simple random sampling using face-to-face interviews in various locations (offices, malls, schools, etc.). Before asking the questions, the surveyor asked, as a filtering question, whether the respondent was a ride-hailing user or not. Only respondents who were ride-hailing users proceeded to answer the remainder of the questionnaire. After the completion of the distribution of the questionnaire, the data were evaluated based on completeness, and it was found that 497 sets (99%) of the questionnaire could be used for further analysis.

3   Analysis and Result

3.1   The Ride-hailing Users

Table 1 describes the respondents' characteristics based on ride-hailing mode use which are car-based ride-hailing (CBRH) mode (n= 406) and motorcycle-based ride-hailing (MBRH) mode (n=91) and previous modes before ride-hailing established. A description of the respondents according to their responses to the question about their previous transport mode is reported in Table 1. Table 1 shows that the majority of respondents were motorcyclists before ride-hailing became established. Interestingly, there are several respondents that used public transport before ride-hailing became established, meaning that it is possible that ride-hailing is used as a substitute not only for trips made by private car but also for trips made by public transport. In addition, the former modes before ride-hailing established found significantly different between the type of ride-hailing services.

Table 1. Previous Mode Description and Ride-hailing Mode Description

Previous Mode	Ride-hailing Mode		Chi-Square
	MBRH (N=406)	CBRH (N=91)	
Motorcycle (MT)	61%	51%	15.697**
Car (PC)	20%	38%	
Public Transport (PT)	20%	11%	

*Significant at 10%, ** Significant at %

Table 2 describes the respondents' characteristics as well as the result of comparing analysis between type of ride-hailing service and previous mode. The majority of MBRH and CBRH users in this study are student (38% and 29% respectively). The income distribution is dominated by the respondent with a range of three up to six million IDR (214-428 USD) for CBRH (26%) and MBRH (32%). In terms of travel characteristics, MBRH users relatively have lower average trip fare than CBRH. Most of MBRH users have average 10,000-20,000 IDR fare (51%) while CBRH users majority have 20,000-40,000 IDR fare (52%). While most of MBRH users wait less 10 minutes for the vehicle come (77%), most CBRH users wait 5-15 minutes (78%).

Table 2. Respondents' Characteristics

Variables		Proportion (N=497)	Compare Means		
			Chi-Square MBRH vs CBRH	Levene; ANOVA [F] Previous Mode	
Education	Highschool/Lower	5.20%	7.387	40.194**; 17.708**	
	Senior Highschool	21.50%	*	MT PC PT	
	Graduates	70.80%		-	
	Post Graduates/Higher	2.40%		-	-
Occupation	Student	36.20%	17.348	3.537**; 9.372**	
	Entrepreneur	16.90%	**	MT PC PT	
	Unemployed	4.60%		-	-

Variable	Category	Percentage		MT	PC	PT
	Civil Servant	4.40%				-
	Private Employee	28.60%				
	Lecturer/Teacher	2.00%				
	Housewife	4.40%				
	Other	2.80%				
Income‡	< IDR 1,000,000	2.40%		2.379*; 24.563**		
	IDR 1,000,000 - IDR 3,000,000	16.70%		MT	PC	PT
	IDR 3,000,001 - IDR 6,000,000	30.60%		-		
	IDR 6,000,001- IDR 9,000,000	18.90%	2.392		-	-
	IDR 9,000,001 - IDR 12,000,000	16.50%				
	> IDR 12,000,000	14.90%				
Average Waiting Time	< 5 Minutes	26.80%	23.272	2.215; 2.784*		
	5-10 Minutes	46.30%	**	MT	PC	PT
	11-15 Minutes	20.30%		-	-	
	16-30 Minutes	5.20%				-
	> 30 Minutes	1.40%				
Average Travel Time	<15 Minutes	16.30%	22.454	0.641; 4.202**		
	15-30 Minutes	49.70%	**	MT	PC	PT
	30-60 Minutes	32.60%		-	-	
	60-90 Minutes	1.40%		-		-
	> 90 Minutes	0.00%				
Average Fare‡	< IDR 10,000	6.60%	94.347	1.193; 12.882**		
	IDR 10,000 - IDR 20,000	46.10%	**	MT	PC	PT
	IDR 20,001 - IDR 30,000	32.60%		-		-
	IDR 30,001 - IDR 40,000	9.90%			-	
	IDR 40,001 - IDR 50,000	3.20%				
	> IDR 50,000	1.60%				
Frequency Using Ride-hailing Per Months	<4 times	39.20%	8.494	6.105**; 10.994**		
	4-6 times	31.20%	**	MT	PC	PT
	7-14 times	20.30%		-	-	
	>14 time	9.30%				-

‡ IDR 14,000 equal to USD 1 (2018); MT= Motorcycle; PC = Passenger Car; PT = Public Transport; * Significant at 10%, ** Significant at 5%

Using chi-squared test of comparison, it was found that the variables of occupation is significantly different between the type of ride-hailing services. In terms of travel characteristics, waiting and travel time as well as trip fare also found significant different across the type of service. Moreover, ANOVA test performed to test the differences between personal characteristics as well as travel characteristics to the type mode that users use before ride-hailing became established. It is found that the variable type mode use before ride-hailing establish significantly different between the users personal and travel characteristics. Therefore, there are tendency that the market of substitution effect from public transport or private transport is differ.

3.2 Perceived Usefulness

The ride-hailing perceived usefulness and preference description is shows in Table 3. From the description it could be seen that the average preference as well as perceived usefulness is relatively high (above 3 scale point as a neutral scale). Average perceived usefulness found to have largest average number above all with 4.449. Therefore, it could infer that users most likely have positive impression for the ride-hailing service. The lowest preference of ride-hailing services is "ride-hailing is reduced travel cost" average. As its promo that reduce the fare continuously decrease nowadays due to the policy from the ride-hailing operators. The preference of ride-hailing that will reduce travel cost will decrease over time due to that reason.

Furthermore, the comparison of the preferences between type of ride-hailing services also shows in Table 2. Found that between MBRH and CBRH the preference differ for the aspects of broad service coverage and reduce travel cost. The most possible reason is related to the difference fare of MBRH and CBRH. CBRH relatively have higher fare therefore the preference of cost will differ among those modes. As broad service coverage preference most likely related to the number of drivers that available. With higher number of drivers available for MBRH than CBRH, it will influence the preference of broad service coverage. Furthermore, this study also compares the preference and perceived usefulness between the previous mode using ANOVA test. It is found there are a significant difference in the preference of "reduce travel time, multitasking, and using travel time saving for other activities". However, there is no significant differences between the group in terms of overall perceived usefulness.

Table 3. Statistics of Perceived Usefulness and Preference of Ride-hailing

Variables	Mean	Std. Dev.	Var.	Between Type of Ride-hailing		Between Previous Mode	
				Levene stat.	t-statistics	Levene stat.	ANOVA [F]
Overall perceived usefulness	4.449	0.601	0.361	0.124	-1.514	1.011	1.886
Broad service coverage	3.899	0.646	0.417	14.387**	2.047**	0.888	2.768*
24 hours services	3.883	0.689	0.474	4.615*	0.818	0.239	2.648*
Easy to get services	3.686	0.829	0.688	0.955	0.341	0.655	1.052
Reducing travel time	3.718	0.760	0.578	0.304	-0.91	7.595**	4.141**
Certainty of driver come	3.656	0.704	0.496	10.343**	0.678	2.329*	1.038
Vehicle never broke	3.668	0.733	0.537	0.571	-1.779*	4.142**	1.025
Certainty of travel time	3.728	0.639	0.408	5.730**	-0.114	0.331	0.481
Professional driver	3.759	0.624	0.389	0.442	-1.111	1.409	1.429
Vehicle very nice	3.730	0.619	0.383	1.729	-1.414	0.502	2.142
Safe to ride anytime	3.676	0.774	0.598	8.367**	1.810*	0.897	2.780*
Easy to complaint	3.765	0.706	0.499	7.093**	1.781*	0.597	1.150
Using travel time saving for other activities	3.742	0.680	0.462	8.299**	0.694	8.626**	4.564**
Productive for multitasking	3.773	0.706	0.499	0.012	-0.906	5.217**	3.491**
Reduce travel cost	3.612	0.845	0.714	0.060	2.158**	5.466**	1.423
Many promotion	3.855	0.745	0.556	0.034	-0.495	0.894	2.967*
Cashless	3.841	0.685	0.469	0.866	0.599	0.456	2.145
Good design application	3.759	0.720	0.518	0.414	0.649	0.254	1.537

* Significant at 10%, ** Significant at 5%

The preference also described based on their perceived usefulness. This study divided the overall appreciation to two groups, namely high and lower. The higher appreciation consists of respondents who have appreciation from 4.501 to 6.000 scale. In contrast. the lower appreciation consists of respondents who have appreciation below 4.501. However, it is note that as average perceived usefulness is high (4.4), the lower perceived usefulness tend to associate more to less high than low.
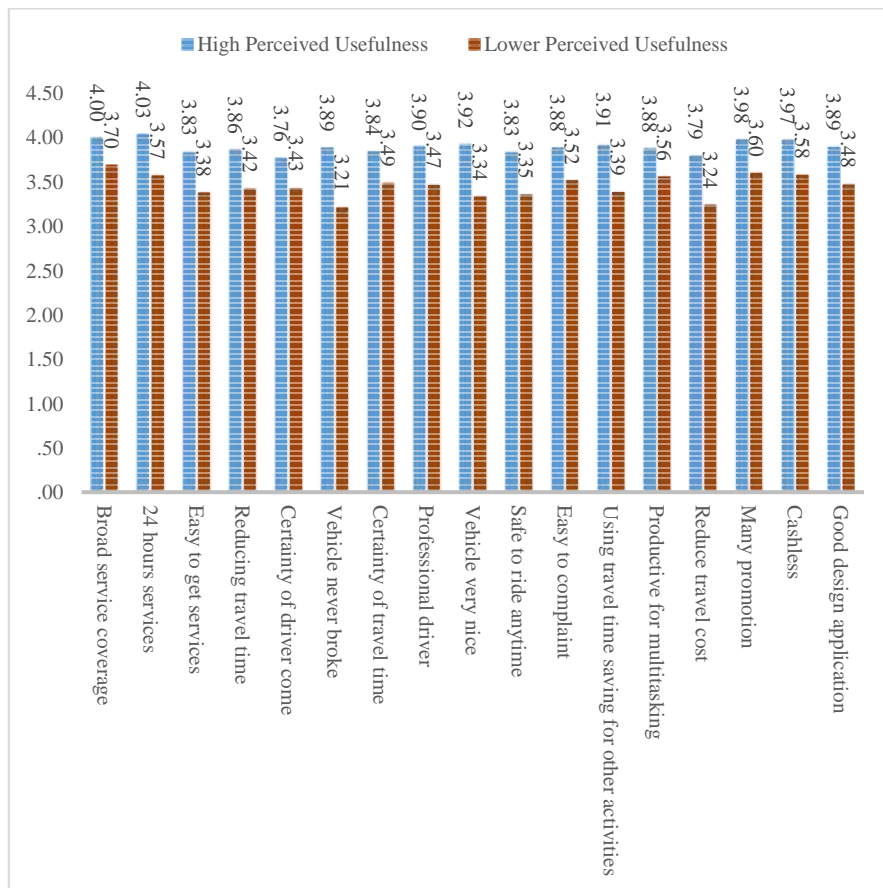
Figure 1. Preference of Ride-hailing Based on Perceived Usefulness

Figure 1 shows the comparison of ride-hailing preference between two groups of appreciation. It shows that higher preference to ride-hailing service follows by the high overall perceived usefulness. To say that, the one of the variables that influence overall appreciation of the service is the preference itself. Similar with previous description, the highest appreciation found for broad service coverage and reduce travel cost.

4   Discussion and Conclusion

Following the recent development and emerging utilization of ride-hailing services, this article try to investigate the ride-hailing users behavior and their perception related to the perceived usefulness of the services. Several previous studies, mostly in developed countries, have gathered knowledge on various effects of socio-demographic characteristics and characteristics of the built environment on ride-hailing trips. With the unique type of ride-hailing service in developing countries using motorcycles and cars, this study examines behavior using data from Bandung, Indonesia.

Based on the sample characteristics, the study reports that ride-hailing users are not only travelers who previously used private transport (motorcycles or cars) but also travelers who used public transport. It confirms the past study regarding the substitution effect of ride-sourcing that not only providing platform to move from auto-dependent modes but also taking users away from more sustainable modes of transport such as public transit [7]. This is probably related to the quality of public transport in developing countries, thus the ride-hailing offered better service in terms of safety, security and comforts therefore give new alternatives for performing trip [1].

The level of appreciation to ride-hailing is quite high. It could infer that users most likely have positive impression for the ride-hailing service. The success of the ride-hailing might be a proof that the service provided in line with the individuals' needs and filling the gap that existing transport could not offered. The fact that the level of service of the public transport systems (i.e., the bus and paratransit systems) has declined over recent decades [21]. After the establishment of ride-hailing, public transport operators in Bandung facing the decreasing public transport users especially paratransit services [15]. Furthermore, for private transport users, ride-hailing avoids the need for parking, which is more challenging in urban areas where parking costs more and there are fewer parking spaces available [22].

The lowest preference of ride-hailing services is "ride-hailing is reduced travel cost" average. As its promo that reduce the fare continuously decrease nowadays due to the policy from the ride-hailing operators. It is in line with the review of ride-hailing studies from Tirachini [1] that lower cost is one of the reason why people using ride-hailing. Increasing the cost of ride-hailing will decreasing the competitiveness of its services consequently the appreciation to ride-hailing service will decrease over time due to that reason. The level of perceived usefulness of ride-hailing not found varied between their type of service (i.e. MBRH or CBRH) and previous modes. It could be concluded that both of services provide high-quality of services. Furthermore, the bivariate analysis of ride-sourcing appreciation and preference found that there is tendency of relationship between them. Higher preference to the service found have similar pattern to higher appreciation. This is related to the link between the users' attitude to the intention to use certain type of modes which stated by Van et al. [23] studies.

The study indicates that substitution from private as well as public transport is happens. Furthermore, this study also indicates that increasing the tariff of ride-

hailing will decrease its competitiveness. In fact, in next five years, it is predicted that ride-hailing tariff will increase do to limitation of promo/discount. Therefore, preparing the high quality of existing public transport should be a main point on the agenda for city governments at least, to decrease the use of ride-hailing as people's main means of transport. Study by Irawan et al. [24] indicates that in medium to low income cities, subsidize could be tools for making public transport more competitive. On the other hand, with the higher income capacity, substantial congestion, and higher economic growth, the development of a high quality public transport have to be a priority development for middle to high income cities.

Despite the findings, this study has some limitations that could be a basis for the next research agenda. The measure of aggregate trips used in this study could not perfectly capture how travelers link their daily trips together and its related to investigate the role of ride-hailing in individuals' daily trips. An extension of this kind would extend our knowledge of the substitution effect of ride-hailing, managing the ride-hailing in cities mobility, and could be used to investigate the potential complementary effect so as to increase public transport usage.

5   Acknowledge

6   References

[1] Tirachini, A. (2019). Ride-hailing, travel behaviour and sustainable mobility: an international review. Transportation, 1-37.

[2] Dias, F. F., Lavieri, P. S., Garikapati, V. M., Astroza, S., Pendyala, R. M., & Bhat, C. R. (2017). A behavioral choice model of the use of car-sharing and ride-hailing services. Transportation, 44(6), 1307-1323.

[3] Irawan, M. Z., Belgiawan, P. F., Tarigan, A. K. M., & Wijanarko, F. (2019a). To compete or not compete: exploring the relationships between motorcycle-based ride-hailing, motorcycle taxis, and public transport in the Jakarta metropolitan area. Transportation, 1-23.

[4] Medeiros, R. M., Duarte, F., Achmad, F., & Jalali, A. (2018). Merging ICT and informal transport in Jakarta's ojek system. Transportation Planning and Technology, 41(3), 336-352.

[5] Metcalfe, G. & Warburg,J., (2012). A Policy Agenda for the Sharing Economy. The Urbanist.

[6] Suatmadi, A. Y., Creutzig, F., & Otto, I. M. (2019). On-demand motorcycle taxis improve mobility, not sustainability. Case Studies on Transport Policy, 7(2), 218-229.

[7] Young, M., & Farber, S. (2019). The who, why, and when of Uber and other ride-hailing trips: An examination of a large sample household travel survey. Transportation Research Part A: Policy and Practice, 119, 383-392.

[8] Azzuhri, A. A., Syarafina, A., Yoga, F. T., & Amalia, R. (2018). A Creative, Innovative, and Solutive Transportation for Indonesia with Its Setbacks and How to Tackle Them: A Case Study of the Phenomenal GOJEK. Review of Integrative Business and Economics Research, 7, 59-67.

[9] Go-Jek. (2018). One App For All Your Needs. https://www.go-jek.com/about, Accessed October 30, 2018

[10] Go-Jek. (2019). Rilis laporan kejog. https://selular.id/2019/01/rilis-laporan-kejog-gojek-umumkan-pencapaiannya-selama-2018/kejog-2018/. Accessed December 23, 2019

[11] Clewlow, R. R., & Mishra, G. S. (2017). Disruptive transportation: The adoption, utilization, and impacts of ride-hailing in the United States. University of California, Davis, Institute of Transportation Studies, Davis, CA, Research Report UCD-ITS-RR-17-07.

[12] Thomopoulos, N., & Givoni, M. (2015). ICT for transport: Opportunities and threats. Edward Elgar Publishing.

[13] Rayle, L., Dai, D., Chan, N., Cervero, R., & Shaheen, S. (2016). Just a better taxi? A survey-based comparison of taxis, transit, and ride-hailing services in San Francisco. Transport Policy, 45, 168-178.

[14] Damaini, A. A., Nugroho, G. S., & Suyoto, S. (2018). Fraud Crime Mitigation of Mobile Application Users for Online Transportation. International Journal of Interactive Mobile Technologies (iJIM), 12(3), 153-167.

[15] Mutiah, D. (2017). Makin Ditinggalkan, Perlukah Angkot di Bandung Dipertahankan? From https://www.liputan6.com/regional/read/2909825/makin-ditinggalkan-perlukah-angkot-di-bandung-dipertahankan. Accessed January 8, 2020

[16] Alfarizi, M.K. (2019) Survei Kepemilikan Smartphone, Indonesia Peringkat ke-24. https://tekno.tempo.co/read/1181645/survei-kepemilikan-smartphone-indonesia-peringkat-ke-24. Accessed 5 October 2019

[17] Das, K., Gryseels, M., Sudhir, P., & Tan, K. T. (2016). Unlocking Indonesia's digital opportunity. McKinsey & Company Indonesia Office. Download from https://www.mckinsey.com/~/media/McKinsey/Locations/Asia/Indonesia/Our%20Insights/Unlocking%20Indonesias%20digital%20opportunity/Unlocking_Indonesias_digital_opportunity.ashx. Accessed January 8, 2020

[18] Ministry of National Development Planning, (2019). National Mid-Term Development Plan 2019-2024.

https://www.bappenas.go.id/files/rpjmn/Narasi%20RPJMN%20IV%2020 20-2024_Revisi%2028%20Juni%202019.pdf. Accessed 8 January 2020

[19] Yamane, T. (1967). Statistics, An Introductory Analysis, 2nd Ed., New York: Harper and Row.

[20] Bandung Statistics Bureau (BPS). (2017). Bandung In Figure 2017.

[21] Prayudyanto, M.N., Rizki, M., Ningtyas, D.U. 2016. Report of Public Transport Service Analysis of Greater Bandung Area. Part of Sustainable Urban Transport Improvement Project. Ministry of National Development Planning. Jakarta, Indonesia

[22] Rizki M., Joewono T.B., Belgiawan, P.F., Irawan, M.Z. (2019). The travel behavior of ride-sourcing users, and their perception of the usefulness of ride-sourcing, based on the users' previous modes of transport: A case study in Bandung City, Indonesia. Submitted to IATSS Research

[23] Van, H. T., Choocharukul, K., & Fujii, S. (2014). The effect of attitudes toward cars and public transportation on behavioral intention in commuting mode choice—A comparison across six Asian countries. Transportation research part A: policy and practice, 69, 36-44.

[24] Irawan, M. Z., Belgiawan, P. F., Joewono, T. B., & Simanjuntak, N. I. (2019b). Do motorcycle-based ride-hailing apps threaten bus ridership? A hybrid choice modeling approach with latent variables. Public Transport, 1-25.