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 a substantial growth of motorcycle- and car-based ride-hailing services. However, there is still a limited insight into how its service implies travel behaviors. This study aims to investigate the characteristics of ride-hailing users as well as their travel behavior and users' perception regarding the service usefulness. The analyses employed data from questionnaire distribution in Bandung City in 2018. The sample describes 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 for ride-hailing is quite high, which implies that users most likely to have a positive impression of ride-hailing service.

Keywords: ICT · Ride-hailing · Travel behavior · Users · Developing countries

1 Introduction

The platforms of the mobility-on-demand rise to be one of the important innovations in the last decades. Although it is 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 backgrounds [2–7]. The ride-hailing service has a strong attachment in developing countries, such as Indonesia. Indonesia has experienced rapid growth of ride-hailing service within the last five years. Go-Jek and Grab rose to be dominant ride-hailing companies for both two- and four-wheeled vehicles in Indonesia in recent years [3]. The success of the ride-hailing companies has attracted an enormous amount of funds and provided a substantial

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number of new jobs [8]. For instance, Gojek currently has 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 the city environment and urban mobilities [2, 3, 6]. Ride-hailing disrupts established transportation business models with similar services that consequently increase debate on how they should be regulated [11, 12]. The new service is distinguished from traditional taxicabs [13] or traditional motorcycle taxis [4] by its use of a smartphone. Ride-hailing has created several challenges for bus and paratransit services in Indonesia as well, mainly in big cities [14, 15].

Studies indicated that ride-hailing service has various effects on the existing public transport system. Ride-hailing declines the public transport users in the high-density area, as well as declines walking and bicycle journeys [2]. However, several studies in major US cities found that the ride-hailing service increases 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 can also be found in Jakarta, Indonesia [3, 4]. Despite those studies, it is still unknown in what circumstances the ride-hailing services complement or act as an alternative to existing public transport services, or whether they simply substitute existing mode. Furthermore, most studies regarding ride-hailing employed empirical data from developed countries. The effect of ride-hailing on the mobility is believed to be different between these two regions because the developing countries usually have poor-quality public transport and/or paratransit services [1]. It is amplified with a fact that Indonesia is being one of the countries with the highest mobile and smartphone ownership rates in the world [16], where digital transformation may increase in the coming decades [17]. The effect will be challenging as many developing countries have initiated strong development of urban public transport services (i.e. MRT among others) [18]. Therefore, it is important to anticipate the impact of the ride-hailing services to the public transport system.

Furthermore, the investigation of perceived usefulness of ride-hailing and its interaction to the frequency of usage may provide substantial insights to understand the role of ride-hailing and its service quality. Therefore, our objectives in this study were twofold: first, to investigate the perceived usefulness of ride-hailing and second, to examine 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 use motorcycle or car ride-hailing services in six administrative areas in Bandung City, Indonesia from 24 April to 14 May 2018. The sample size of 400 was determined based on Yamane's equation [19], given that the population of Bandung was 2,481,469 [20] and the assumption of a 5% significance level. The sample size was upgraded to 500 to overcome the possibility of errors during the survey. The distribution method was convenience simple random

sampling using face-to-face interviews. Respondents were provided a filtering question of whether she/he was a ride-hailing user or not. Only respondents who were ride-hailing users proceeded to answer further.

The questionnaire consisted of two parts. The first part contained questions about the respondents' socio-demographic characteristics. The second part was related to users' travel behavior in using ride-hailing, 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 choosing the service (e.g., broad service coverage, 24-h service, or safety of the journey) using a five-point Likert scale, where 1 represented "strongly disagree" and 5 for "strongly agree." After the responses were evaluated based on completeness, it was found that 497 sets (99%) of the questionnaire could be used for further analysis. The collected data were analyzed using standard inferential statistics, namely chi-squared and ANOVA.

3 Analysis and Result

Table 1 describes the characteristics of the respondents who are user of car-based ride-hailing (CBRH) mode and motorcycle-based ride-hailing (MBRH) mode. Table 1 also describes previous modes before ride-hailing established, where the distribution is significantly different. Table 1 shows that most respondents were motorcyclists before using ride-hailing. Around 10 to 20% are users of public transport before shifts to CBRH or MBRH, respectively. It implies that ride-hailing is used as a substitute not only for trips made by private car but also for trips made by public transport.

The dominant users of student for MBRH (38%) and CBRH (29%). The respondent is dominated by them with a range of three up to six million IDR (214-428 USD) for CBRH (26%) and MBRH (32%). MBRH users relatively have lower average trip fare than CBRH. Most of MBRH users spend 10,000 to 20,000 IDR for the fare (51%), while CBRH users' majority spend 20,000 to 40,000 IDR (52%). While most of MBRH users wait less 10 min for the vehicle to come (77%), most CBRH users wait 5 to 15 min (78%).

Analyses show that the variables of occupation, waiting time, travel time, and trip fare are significantly different between MBRH and CBRH. ANOVA results show that the users personal and travel characteristics are significantly different between previous modes. It implies that the substitution effect of the service to public transport or private transport is differ.

The ride-hailing perceived usefulness and preference description is shown in Table 2. Data shows that the average preference as well as perceived usefulness is relatively high. Average perceived usefulness is found quite large with 4.449. It implies that users most likely have positive impression for the ride-hailing service. The lowest preference is "ride-hailing reduces travel cost". The possible reason is the effect of operators' policy to decrease the amount of the promotional fare.

Table 1. Respondents' characteristics

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%			
Variables		Proportion (N = 497)	Compare Means			
			Chi-Square	Levene; ANOVA [F]		
			MBRH vs CBRH	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%		–		–
	Civil Servant	4.40%			–	
	Private Employee	28.60%				
	Lecturer/Teacher	2.00%				
	Housewife	4.40%				
	Other	2.80%				
Income‡	Less than 1 million	2.40%	2.392	2.379*; 24.563**		
	1–3 million IDR	16.70%		MT	PC	PT
	3–6 million IDR	30.60%		–		
	6–9 million IDR	18.90%			–	–
	9–12 million IDR	16.50%				
	12 million IDR or more	14.90%				
Average Waiting Time	< 5 min	26.80%	23.272	2.215; 2.784*		
	5–10 min	46.30%	**	MT	PC	PT
	11–15 min	20.30%		–	–	
	16–30 min	5.20%				–
	> 30 min	1.40%				

(*continued*)

Table 1. (*continued*)

Previous mode		Ride-hailing mode		Chi-Square		
		MBRH (N = 406)	CBRH (N = 91)			
Average Travel Time	<15 min	16.30%	22.454	0.641; 4.202**		
	15–30 min	49.70%	**	MT	PC	PT
	30–60 min	32.60%		–	–	
	60–90 min	1.40%		–		–
	> 90 min	0.00%				
Average Fare‡	Less than 10 thousand IDR	6.60%	94.347	1.193; 12.882**		
	10–20 thousand IDR	46.10%	**	MT	PC	PT
	20–30 thousand IDR	32.60%		–		–
	30–40 thousand IDR	9.90%			–	
	40–50 thousand IDR	3.20%				
	50 thousand IDR or more	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%

Furthermore, analyses revealed that the preferences regarding the MBRH and CBRH are different for the aspects of broad service coverage and reduce travel costs. The reason is the difference fare between both services, where CBRH relatively has higher. The aspect of broad service coverage preference is most likely related to the number of drivers available. A higher number of drivers available for the service will influence users' preference. Results of ANOVA shows that there is a significant difference in the preference of reduce travel time, multitasking, and using travel time saving for other activities. However, there is no significant difference between the group in terms of overall perceived usefulness.

Table 2. Statistics of perceived usefulness and preference of ride-hailing

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

* Significant at 10%, ** Significant at 5%; L.stat: Levene statistics

The preference was also described based on their perceived usefulness. This study divided the overall appreciation into two groups, namely high and lower. The higher appreciation consists of respondents who have appreciation from 4.501 to 6.000 scale, while lower appreciation has an appreciation below 4.501. Figure 1 shows the comparison of user preferences. It shows that a higher preference for ride-hailing service was followed by the high overall perceived usefulness.

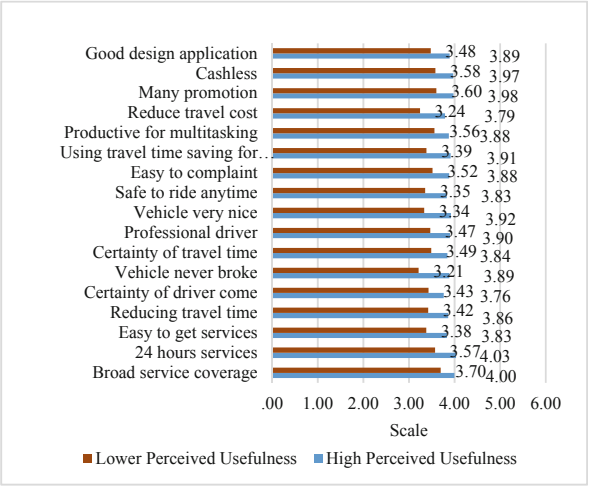

Fig. 1. Preference of ride-hailing based on perceived usefulness

4 Discussion and Conclusion

This article reports that ride-hailing users are not only travelers who previously used private motorcycles or cars but also public transport users. It confirms the existence of the substitution effect of ride-hailing that not only shifting auto-dependent mode users but also taking away users from public transit [7].

The level of appreciation for ride-hailing is quite high that implies a positive impression by the users. It provides an evidence that the ride-hailing service can fulfil individuals' needs and fills the gap that existing transport could not offer. It is a fact that the level of service of the existing public transport systems has declined over last decades [21], especially after the establishment of ride-hailing likes as happened in Bandung with the paratransit services [15]. For private transport users, ride-hailing eliminates the need for parking especially in urban areas [22].

Increasing the cost of ride-hailing will decrease the competitiveness of its services and consequently, decrease users' appreciation to the service. It is easy to understand that lower cost is one of the reasons why people using ride-hailing [1]. The level of perceived usefulness of ride-hailing was not found varied between MBRH and CBRH as well as between previous modes. It explained that both services provide high-quality services. Furthermore, analysis also found the relationship between appreciation and preference. A higher preference for the service was found to have a similar pattern to higher appreciation. This is related to the relationship between the users' attitude to the intention to use a certain type of mode which stated by Van et al. [23].

The study indicates the existence of substitution from private and public transport to ride-hailing service. It requests an anticipation. Preparing the high quality of existing public transport should be the main point on the agenda for the government. For example, the provision of subsidy as a tool to make public transport more competitive [24].

Despite the findings, this study has some limitations that could be a basis for future study. An extension with individual data would extend our knowledge of the substitution effect of ride-hailing, managing the ride-hailing in city mobility, and could be used to investigate the potential complementary effect to public transport.

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