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FACTORS AFFECTING INTENTION TO USE FULLY ELECTRIC BIKE TRANSPORT OF RIDE-HAILING APPLICATIONS: THE UTAUT APPROACH

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Abstract Since electrify is booming around the world as one of the global warmings, many lives aspect in trying to be nice to environment by trying to go electric. Indonesia is also seeing changes in public transport behaviour due to the switch from traditional to electronic transport. The purpose of this study is to identify the key factors influencing consumer adoption of ride-hailing applications among all selected electric vehicle providers using the Unified Theory of Technology Acceptance and Use (UTAUT) approach. This study uses a convenience sampling method. Data were then compiled from self-administered questionnaires, with a total of 146 samples available. Respondents are consumers of Beam Rover all-electric bikes. This study uses the PLS-SEM technique to analyse relationships between variables. The results show that effort expectancy, performance expectancy, social influence, and facilitating conditions positively influence behavioural intentions to use Beam Rover, an all-electric ride hailing service. The results enrich the empirical evidence of consumer behaviour in term of ride hailing in fully electric bike transport modes. At the end of this study, theoretical and practical contributions are provided.

Keywords *UTAUT;* ride *hailing*; *electric vehicle*; *global warming*

INTRODUCTION

The increasing climate change as a result of global warming, raises awareness about the importance of public concern for environmental sustainability, and also raises awareness of saving energy in various fields, including in the realm of transportation, recreation, tourism, to the hospitality business (Haskell, Bonnedahl, & Stål, 2021; Kungl & Hess, 2021; YahiaMarzouk & Jin, 2022). Especially in urban areas, increasing CO2 emissions, excessive energy consumption, worsening air pollution, and noise pollution caused by traffic congestion are becoming serious problems (MacKenzie & Gannon, 2019). Based on European and American data, it is estimated that air pollution kills 40,000 people each year in Switzerland, France, Austria and other countries (Künzli et al., 2000). The increasingly serious air pollution that occurs has encouraged the development of electric vehicles which have started to get serious recently (Jones, Begley, Berkeley, Jarvis, & Bos, 2020).

In order to reduce the amount of vehicle exhaust emissions which result in poor air quality, as well as traffic jams, a way out is needed to overcome this problem without imposing restrictions on the use of private vehicles, one that can be utilized is ride hailing transportation (Lanamäki & Tuvikene, 2022). Ride hailing transportation is a business model that uses the Sharing Economy business concept. The Sharing Economy itself is a kind of business which allows it's customers to obtain certain services or goods anytime by sharing resources owned by other parties (Almunawar, Anshari, & Ariff Lim, 2020; Lanamäki & Tuvikene, 2022; Ornicha Anuchitchanchai, 2021).

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Major ride hailing companies in Indonesia include Gojek and Grab, where the two ride hailing service providers have also started providing electric-based operational vehicles (Business.com, 2021). Although ride-hailing transportation can reduce the number of vehicles moving on the road, it is basically not able to completely solve all problems related to congestion and air pollution (Aw et al., 2019). In Indonesia, the electrification of operational vehicles has begun to be carried out by various ride-sharing transportation business players, such as Gojek, Grab, and even logistics service providers such as Paxel are participating in the electrification of operational vehicles to show concern for the environment (Katadata, 2021; Selular.id, 2022; Tempo.co, 2022). The Indonesian government through the Minister of BUMN also continues to encourage the implementation of electric vehicles to be immediately encouraged to be used by large ride hailing providers, namely Gojek and Grab. In fact, as a form of the government's seriousness in its commitment to reducing carbon dioxide emissions, the Indonesian government is also encouraging the use of electric vehicles by issuing regulations that the future government's official vehicles will use electric-based vehicles (Detik.com, 2022).

In Indonesia, Gojek holds a 59% market share for ride hailing, followed by Grab and Maxim (Dataindonesia, 2021). Although dominated by Gojek and Grab as the main players, Maxim as a newcomer in the ride hailing industry has brought a change in the competition for ride hailing modes of transportation in Indonesia. Maxim offers relatively cheaper rates than Grab and Gojek. Maxim provides a reservation service to be able to list complex routes in one trip, which can contain several addresses at once in one reservation. There are also preference services such as services for the need to transport luggage or pets, and are unique in the form of a nominal transaction fee that can be negotiated. Users can also share vehicles with other users (ride sharing) in which the final fee can be shared equally, thus minimizing costs, as well as reducing the amount of carbon emissions by reducing the number of vehicles in circulation as a result of sharing vehicles with other users (Ruangojol.com, 2020). This ride-sharing model is an advantage of Maxim that competitors such as Gojek and Grab don't have. These advantages have made Maxim in a relatively short time, since its introduction in early 2018 now it has been able to serve up to 77 cities in Indonesia as of March 2021 (Ruangojol.com, 2021).

The Technology Acceptance Model (TAM) is a good and tested model which can be used to explain why users adopt technology or predict the use of a certain type of technology for certain purposes (Davis, P, & Warshaw, 1989). TAM is one of the strongest and rational models that can be used to predict individual intention and acceptance in the last 20 years. Traced using Google Scholar citation its shown there the original study TAM, introduced by (Davis et al., 1989), ving more than 7700 times citation (Alalwan, Dwivedi, Rana, & Williams, 2016). It should also be understood that TAM is the theory most often adopted to explain customer's intention and usage of various types of digital technology-based applications, ranging from e-banking, internet banking, online shopping, online travel agents, super apps for transportation and also apps for hospitality and e learning too (Pillai & Sivathanu, 2020; Sivathanu & Pillai, 2019). In TAM there are two core things, namely effort expectancy and performance expectancy. Effort expectancy and performance expectancy in TAM known as the determinant which influence the behavioural intention (Alalwan et al., 2016)

Studies in TAM continue to conduct research to gaining better understanding factors related to the acceptance of technologies. Refine TAM, later developed a theory called the Unified Theory of Acceptance and Use of Technology (UTAUT) originally introduced by (Venkatesh, Morris, Davis, & Davis, 2003). UTAUT integrates various literatures regarding

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the acceptance of technologies. The four main factors influencing the acceptance of technologies are performance expectancy, effort expectancy, social influence, and facilitating conditions. Also, a number of moderating factors also give better explanation such as gender, the age of respondents, experiences, and voluntariness of use are also known as behavioural intention moderating factors. UTAUT is known as the result of a combination of Theory of Reasoned Action (TRA), Innovation Diffusion Theory (IDT), Technology Acceptance Model (TAM), Theory of Planned Behaviour (TPB), Motivational Model, and Social Cognitive Theory (SCT).

Previous research in various fields such as social psychology, information systems, management, and marketing, has widely adopted the UTAUT model. UTAUT is known to provide good research results compared to the 8 research models carried out separately, with adjusted R2 values of up to 69% (Venkatesh et al., 2003). Since the ability to explain the various external factors and the TAM variables, UTAUT is called as the better version of TAM (Agarwal, Ramadani, Dana, Agrawal, & Dixit, 2021). UTAUT generally known for its ability to explain the technological related things, and reasoning how the technology can be accepted. This is why UTAUT is proper tools to be used to identify technology acceptance.

As the versatility of UTAUT, this study is grounded on Venkatesh et al. (2003) to better understand how UTAUT influences behavioural intention in ride-hailing applications, such performance expectancy, effort expectancy, social influence, and facilitating condition. Effort Expectancy means that users believe that using technology will relatively help their work approach the minimum effort (Pillai & Sivathanu, 2020). Effort expectancy basically depends on an individual's level of understanding of technology. Effort expectancy is an important part of measuring behavioural intention to use a technology (Akturan & Tezcan, 2012). Meanwhile, the perceived usefulness of Performance Expectancy is defined as a certain degree that users believe by involving technology will be able to make their work easier and faster to complete. Based on previous research, perceived usefulness is known as one of the important factors that influence behavioural intention (Kang & Namkung, 2019).

The findings of previous studies in various fields have found that TAM is useful as a predictor of acceptance of technology, such as in the banking sector (Jun & Palacios, 2016), hospitality (Tom Dieck, Jung, Kim, & Moon, 2017), e -wallet technology (Kumar, Adlakaha, & Mukherjee, 2018), retail mobile apps (Newman, Wachter, & White, 2018), smart retail technologies(Roy, Balaji, Quazi, & Quaddus, 2018). Consumers are increasingly able to guess what value in the future if they can get it if a technology service is simple and easy to use, so that when consumers try the technology and it is found to be easy, consumers will imagine being able to do anything with the technology (Foroughi, Iranmanesh, & Hyun, 2019), which will eventually lead to behavioural intention due to imagination about what conveniences will be obtained when using technology that facilitates various needs in everyday life (S. Singh & Srivastava, 2018).

Based on the explanation, hypothesis is developed:
H1: Effort expectancy has a positive effect on behavioural intention
H2: Perceived usefulness performance expectancy has a positive effect on behavioral intention

Facilitating condition definition refers to an individual belief that technical infrastructure flooring the system utilization (Venkatesh et al., 2003). The meaning consist concepts by 3 totally different constructs, they are: perceived behavioural management,

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facilitating conditions, and compatibility. Each variable is functionalized to include the technological aspects that are intended to get rid of operational constraint difficulties. Taylor and Todd (1995) find theoretical aspect as facilitating conditions which is the core part of perceived behavioural control in TPB. The suitableness variable from IDT relate with items that faucet the work among the individual's work habit and explaining the technological related system in the company (Venkatesh et al., 2003).

Previous scholar found facilitating condition positively affecting the behavioural intention (Reyes & Redoña, 2021). Here, (Zhou, Yu, & Choguill, 2021) states that facilitating conditions are positive determinants for adopting self-service parcel deliver. Further, as found in prior literature, higher facilitating conditions would cause higher effect of behavioural to use ride hailing applications' feature for purchasing food and intrinsically this ends up in the subsequent hypothesis:

H3: Facilitating condition positively influence behavioural intention of ride-hailing applications

Brand Image (BI) is an imagination that is formed in the minds of consumers as a result of frequent exposure to information about something on an ongoing basis (M. Moslehpour, 2022). Consistent with the argument stating that social influence has a strong influence on behavioral intention (J. Singh, 2020), researchers found that social influence also has a strong influence on brand image as well as behavioral intention (Fondevila-Gascón, 2020). Previous research found that social influence influences behavioral intention (M.S. Siddiqui, 2021). Various studies were conducted to examine the effect of social influence on behavioral intention in the vehicle sector (Evgeniy, 2019), ride hailing transportation culinary (Alam Hamdani & Abdul Fatah Maulani, 2018), as well as electronic products (Yunus, 2016). In these various fields the researchers found that social influence had a positive effect on behavioral intention.

Many other studies have also found that social influence influences brand image (Ansary & Nik Hashim, 2017). Social influence allows people to create imaginations in their minds about certain products that will affect the product's brand image (Amaro, Barroco, & Antunes, 2020). Previous research found the influence of social influence on brand image in various fields, such as ride hailing transportation (Massoud Moslehpour, Ismail, Purba, & Lin, 2020), food products (Fachrurazi, Silalahi, Hariyadi, & Fahham, 2022), and clothing products (Cham, Ng, Lim, & Cheng, 2018). Research in various other fields has also found similar results that social influence has a positive effect on brand image (Moise, Gil-Saura, Šerić, & Ruiz Molina, 2019).

Previous research has found brand image giving such positive effect on behavioural intention in various fields, such as ride-sharing transportation (M. Moslehpour, 2022), the tourism industry (Dedeoğlu, 2020), telecommunication devices (Fondevila-Gascón, 2020). The brand image is also formed through various electronic media, both YouTube (Corrêa, 2020), and other media such as Instagram (Iglesias-Sánchez, 2020). Various studies that have been conducted also have findings stating that brand image has a significant positive effect on behavioural intention (Cheung, 2020).

Based on the explanation, the following hypothesis is formed:
H4 : social influence giving positive effect to the behavioural intention
H5 : social influence giving positive influence to the Brand Image

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H6 : Brand Image giving a positive effect to the behavioural intention.

From the explanation of the development of the hypothesis, it can be summarized in the form of a research model in Figure 1. In this study there are 5 research variables, namely effort expectancy, performance expectancy, facilitation conditions, social influence, brand image, and behavioural intention.

In this study, it will be investigated whether effort expectancy has a positive effect on behavioural intention. Then it will also be investigated whether performance expectancy giving a positive effect on behavioural intention. Then, research is also conducted that will test whether facilitating conditions have a positive effect on behavioural intention. It will also examine the effect of social influence on behavioural intention, as well as social influence on brand image, and brand image on behavioural intention.

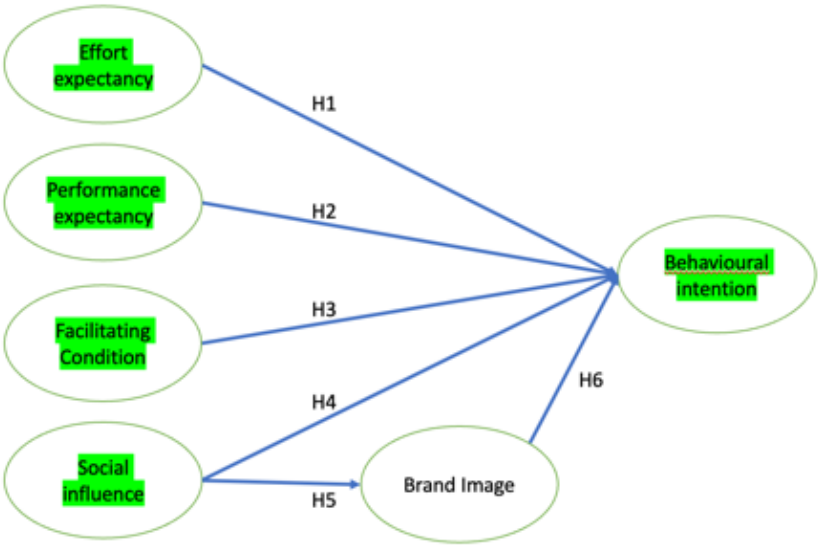

Figure 1. Research Model

METHOD

This study observed Beam Mobility customer's in Semarang City, which experienced using the Beam Rover mode of transportation. Thus, convenience sampling was used to obtain data from the target consumers who use Beam Mobility ride hailing. Then, they share their viewpoints about the services (Sundararaj & Rejeesh, 2021).

The advantage of convenience sampling is that it allows researchers to get available early user who experienced using the service, and estimate user ratings by identifying different characteristics and provides effective analysis results about their experience on using certain product or services (Prentice & Nguyen, 2020). In this study, respondents will be involved, namely people in the city of Semarang who have used Beam Rover fully electric.

We use five-point Likert scale for estimation levels of agreement. The Likert scale ranged from 1 as "strongly disagree" to 5 as "strongly agree". Data was collected from self-administered questionnaire related to UTAUT factors, adapted as follow:

Effort Expectancy (Surya, Sukresna, & Mardiyono, 2021)

- EE1. interaction in the app is clear and understandable.

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- EE2. easy to become skilful for using the app.
- EE3. app are easy to use.
- EE4. learning the app is easy.

Performance Expectancy (Surya et al., 2021)
- PE1. application is useful for me.
- PE2. enables to get destination quicker.
- PE3. increase travel efficiency.
- PE4. allows to travel easier.

Social Influence (Surya et al., 2021)
- SI1. People think I should use the app.
- SI2. People who are important think that I should use the app.
- SI3. using the app because closest people use.
- SI4. if I don't, people think I'm out of date.

Facilitating Condition (Surya et al., 2021)
- FC1. I have device to use the app.
- FC2. I have knowledge to use the app.
- FC3. the app compatible with device I use.
- FC4. I can get help if I have difficulty use the app.

Brand Image (Mohd Shuaib Siddiqui et al., 2021)
- BI1. brands introduced by my friends creates a brand image of products.
- BI2. brands introduced by my friends in social networks, creates a brand image of products.
- BI3. Credibility source creates a brand image in my mind.
- BI4. Consumer's online review creates a brand image in my mind.

Behavioural Intention (Surya et al., 2021)
- BI1. I intend to use the app next few months.
- BI2. I predict I would use the app next few months.
- BI3. I am planning to use the app.
- BI4. I intend to use the app more often.

This study uses Structural Equational Modelling (SEM) to analyse, and then performing test and followed by review the data which already collected. Initially, the analysis of consumer demographic information will continue to analyse the important attributes that influence behavioural intention. The initial respondent is 187 sample, then sorted to 146 usable for further analysis.

RESULTS AND DISCUSSION

Respondent demographics consist of 87 male and 49 female who participated in this study. Most of the respondent age between 21-30 years old and come from Semarang.

Table 1: *Demographic Data*

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	Description	Frequency	Percentage
Gender	Male	87	60%
	Female	59	40%
Occupation	Student	12	8%
	College Student	93	64%
	Workers	32	22%
	Entrepreneur	9	6%
Spending	<1mio	87	60%
	1-2 mio	32	22%
	2-3 mio	21	14%
	>3 mio	6	4%
Age	17-21	41	28%
	21-30	83	57%
	>30	22	15%
Using the service	1-2x	57	39%
	3-5x	51	35%
	>5x	38	26%
City of Origin	Semarang	93	64%
	Kendal	11	8%
	Batang	4	3%
	Pekalongan	8	5%
	Pati	12	8%
	Pemalang	4	3%
	Purwodadi	8	5%
	Tegal	6	4%

We evaluated the item reliability by reviewing the score of loading factor (should > 0.5). The result shows all item have loading factor greater then 0,7. The internal consistency and construct reliability examined by reading the Cronbach's Alpha (CA) and Composite Reliability (CR). Value of CA & CR should >0.7 to be acceptable and a value of >0.8 will considered very satisfying. All item shows value greater then 0,8, except CA for Effort expectancy, which have value 0,786, which still acceptable. The detailed data can be seen on Table 2.

Table 2. *Convergent Validity & Reliability*

	Items	Loadings	AVE	CR	CA
Effort Expectancy	EE1	0,774	0,601	0,857	0,786
	EE2	0,831			
	EE3	0,771			
	EE4	0,721			
Performance Expectancy	PE1	0,707	0,652	0,882	0,822
	PE2	0,851			
	PE3	0,845			
	PE4	0,819			
Facilitating Condition	FC1	0,842	0,723	0,913	0,874
	FC2	0,883			
	FC3	0,882			

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	FC4	0,791			
Social Influence	SI1	0,860	0,738	0,918	0,884
	SI2	0,886			
	SI3	0,864			
	SI4	0,825			
Brand Image	BR1	0,865	0,680	0,937	0,921
	BR2	0,786			
	BR3	0,869			
	BR4	0,850			
	BR5	0,840			
	BR6	0,788			
	BR7	0,766			
Behavioural Intention	BI1	0,935	0,888	0,970	0,958
	BI2	0,971			
	BI3	0,975			
	BI4	0,887			

The discriminant validity evaluates the value of pass loading and the values of Average Variance Extracted/AVE. Table 3 shows us that every indicator in its respective assemble have higher value of pass loading to its assemble. In addition, the value of Square Root of AVE acquired through every assemble is more than the correlation value among constructs with different constructs withinside the identical column. These effects fulfil discriminant validity requirements.

Table 3. *Discriminant Validity*

	BI	BR	EE	FC	PE	SI
BI	0.943					
BR	0.279	0.824				
EE	0.472	0.292	0.775			
FC	0.308	0.154	0.549	0.850		
PE	0.485	0.287	0.441	0.119	0.808	
SI	0.503	0.234	0.360	0.113	0.567	0.859

The evaluation of structural model ruled by those criterions: path coefficient is used to decide the path of correlation coefficients. Positive correlation coefficient indicates positive relationship between constructs. The model be examined by referring the value of the coefficient of determination (R2) that explain the variation of dependent variable. The value of R2 is among 0 and one. Zero value means independent variables can't provide an explanation for the variations of dependent variable. Value of 1 suggests the independent variables completely provide an explanation for the variations of dependent variable. Figure 2 display the complete result of structural model.

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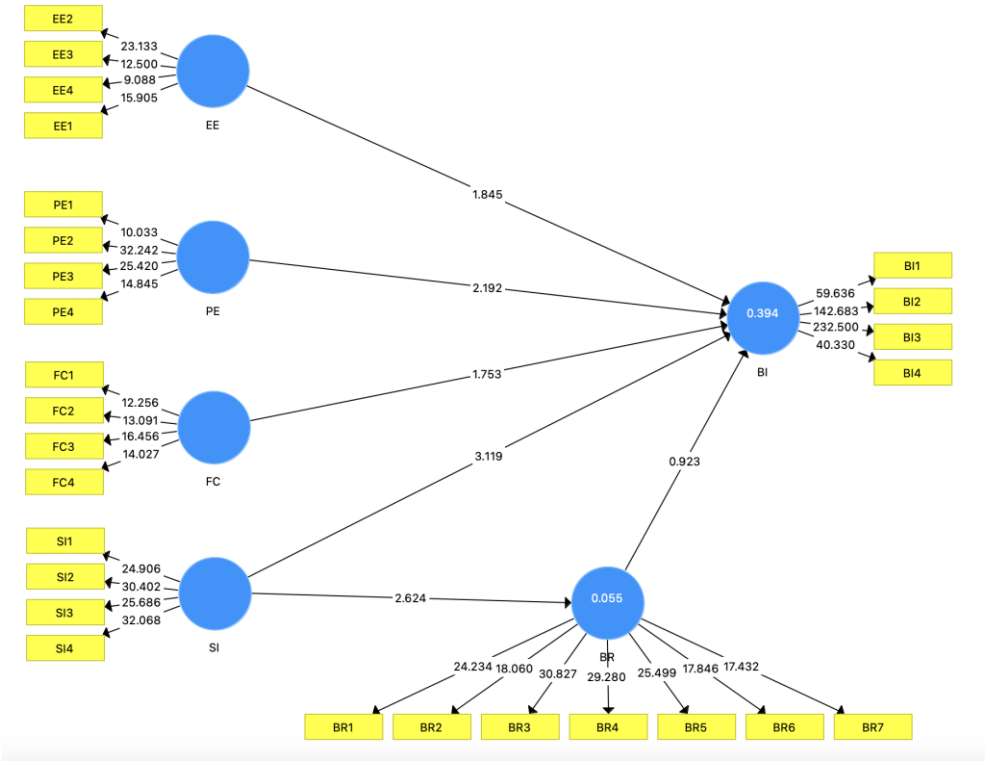

Figure 2. Structural Model

From the analysis we can see from the P value, H1, H3, and H6 is not supported as it has P value greater then 0.05. Otherwise H2, H4, and H5 is fully supported as it has value smaller than 0.05.

Table 4. Summary of Structural Model

Hypothesis	Description	B	T Statistic	P Values	Result
H1	EE -> BI	1,845	0,778	0,066	not supported
H2	PE -> BI	2,192	1,012	0,029	supported
H3	FC -> BI	1,753	0,722	0,080	not supported
H4	SI -> BI	3,119	1,253	0,002	supported
H5	SI -> BR	2,624	1,063	0,009	supported
H6	BR -> BI	0,923	0,355	0,357	not supported
	SI -> BR -> BI			0.019	supported

This studies empirically testing the effects of UTAUT factors on behavioural intention to use fully electric bike of ride hailing apps. Results of the studies purpose to answer the influences and determine whether or not the effects relate to changes in purchaser conduct throughout Indonesia from offline to on line purchasing. In line with prior studies, performance expectancy and social influence, positively influence the behavioural intention. Among these variables, social influence delivers the highest impact. Facilitating condition here found to be not supported. This tend to be interesting. Nowadays of course people have cellular phone, because it's also prerequisite to be the user of Beam Rover need to scan the

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barcode and operate the service using cell phone. This show that everyone really don't have problem with the cellular phone as facilitating condition. But, Statistically it show that facilitating condition is not supported. This mean facilitating condition does not have positive significant in affecting the behavioural intention. This might because of the service area of Beam Rover is too limited as this early stage they operates in Semarang. This is possibly causing the inflexibility of the potential user when they are going somewhere where the area is not served already. Compared to Gojek or Grab for instance, the service area are so broad, and the flexibility of the available driver make the user of the service happily use the service of Gojek and Grab. We just need to pay and sit, and the driver bring us to our destination. While using Beam Rover, even its fully electric which is good for the environment, its operate driverless. Yeah from pricing perspective its absolutely cheaper with only 700 IDR per minute use. But from the limited service area, it will causing people to deny to use the service because its limited area of service, compare to its competitor (at least at this time). And, the driverless also interesting, for user who don't want to deal with traffic jam, it might bothering if they should drive alone in the crowd. Especially for tourist, the don't get know well to reach somewhere, its possibly better convenience for tourist to use the ride hailing service with driver available, so they don't need to worry on the road to reach their destination.

This study enriched the UTAUT research concept in connection with technological adoption behaviour, especially in the context of fully electric ride hailing apps. The findings shows the variable of performance expectancy and social influence, positively influence behavioural intention to use fully electric bike modes of transport in term of ride hailing apps in Semarang city, Indonesia. The results are in line with previous studies, such as (Zhou et al., 2021), (Abdul-Ghani, Hyde, & Marshall, 2019), and (Okumus, 2020). (Chauhan, Yadav, & Choudhary, 2019) found performance expectancy positively and significantly influence user intention to adopt internet banking, (Surya et al., 2021) found performance expectancy, social influence, affecting customers intention to use smartphone's diet apps when buying food online. This relate to prior findings, (Upadhyay & Jahanyan, 2016) found that performance expectancy and social influence are each of influence the intention to use the mobile payment technology. Similarly, (S. Singh & Srivastava, 2018) shows if social influence is a big cause in determine user intention in using services in the Indian commercial banks.

The results of this study may explain changes in consumer behaviour. The significant impact of performance expectations and social impact may indicate consumers' preference for using bike-sharing apps on full electric bikes, rather than riding on their own. In this sense, fully electric bikes and ride-sharing applications are becoming more reliable every time, so this is attracting more people to participate in efforts to raise environmental awareness. Fuelled by advances in mobile phone technology and the ever-increasing cost of mobile phones, the use of all types of electric vehicles can become overwhelming. The combination of these factors can stimulate a change in consumer behaviour in Indonesia, which supports the transition process from using carbon footprint technology to carbon neutral technology in Indonesia.

The results of this study are also important for those working in the online travel sector or car sharing companies. The online taxi or transportation industry in Indonesia continues to grow. Many big transportation companies are planning to enter the Indonesian market and expand the list of ride sharing companies in Indonesia. In addition, existing competitor which is bigger and settler such as Gojek and Grab are still trying to expand their market in Indonesia and around its region, continue to expand to broader cities to gain larger volume

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of new customers. Recently, Gojek and Grab decided to use e-bike as their main means of transportation in the future to demonstrate their commitment to be a carbon neutral company. Massage application companies will also do well to develop various resources to help consumers use the application. We also recommend environmental-respect companies such as Beam Rover to serve broader service area so they can provide a wider service area to accommodate the changing workforce of their potential customer, and give them more flexibility to user the service.

CONCLUSION

Ride-hailing apps are apparently still growing in term of area of services in Indonesia, including the new fully electric bike modes, as well as the existing ride hailing provider such Gojek and Grab is now entering electric modes of transport too. This study tries to empirically testing factors affecting consumer's adoption to use ride hailing apps in term of fully electric bike under the lenses of Unified Theory of Acceptance and Use of Technology (UTAUT). We found this empirical testing model is able to explain 39% of the variance in behavioural intention. Moreover, results show performance expectancy, social influence, positively influence behavioural intention to use ride-hailing applications for specific fully electric bike modes of transport. Notwithstanding, effort expectancy had no significant influence. We encourage researchers to continue to explore and document how various theories or models affect online consumer behaviour.

Like other studies, this current study has limitations that can be a basis for future research. First, this study uses convenience sampling as the Beam Rover are very early coming in town, so the respondent as we can reach are involved. But it is recommended that future research use a probability sampling method, especially a sample that covers all areas of the city. Second, the current study only examines the UTAUT factors directly to link to the behavioural intention of fully electric bike. Future research can improve the study by inputting the variable related to green transportation, or green technology, or green marketing to better support such kind of this research. Or, UTAUT 2 could be implemented as its contains more variables to count such price. Future research should be able to conduct research on the broader area in different setting, to better generalize the result of the study.

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