

NAVIGATIONAL CHOICES IN URBAN CONGESTION: A COMPREHENSIVE ANALYSIS OF PASSENGER RIDE INTENTION TOWARDS MOTOR TAXI SERVICES IN MALAYSIA

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ABSTRACT: Motorcycles have become a standard mode of transportation in many countries, including Malaysia, due to their affordability, lower fuel consumption, low maintenance costs and convenience, given the worsening traffic situation. Hence, the idea of motorcycle taxis. This concept is common throughout much of Southeast Asia, but the awareness is a novelty in Malaysia, which has depended on cars to act as taxis for some time. Therefore, Malaysia's 'motorcycle taxi service' push has gathered countrywide interest. This study aims to determine factors influencing passenger ride intention towards motor taxis. Data were collected through self-administered questionnaires and online surveys on 206 respondents. SmartPLS analysis generated findings on perceived price, safety, convenience, accessibility, social influence and ease of use as significant factors in predicting passenger ride intention. The results revealed that there is a substantial relationship between the perceived price, safety, and perceived accessibility towards the intention to use the motor taxi services. This implies that there is a need for the authorities to come up with a policy that protects passenger safety when using this new type of e-hailing service. This research study offers valuable and essential information for stakeholders to understand the psychological determinants further and address the needs of a special interest group of end-users.

Keywords: E-hailing, Malaysia, Motor taxi, Traffic, Transport

1. Introduction

Malaysian transportation is moving fast to meet the economy's and the population's growing needs. However, it simply failed to cope with the growing demand of people. The incompetence of public transport has increased traffic congestion and parking problems, especially in Kuala Lumpur. Traffic volume typically refers to the number of vehicles, traffic density, and the capacity of roadways at a specific time and location. It is influenced by socio-economic factors, such as traffic growth, often leading to peak-hour congestion [1]. It is also accustomed to the rapid traffic problems, making it one of the busiest cities in Southeast Asia. Like any other country, the people of Kuala Lumpur have travelled easily in their cars due to traffic overcrowding. This has led to a massive increase in private car ownership. One of the interchanges in quality of life among the urban population is traffic congestion [2]. To solve the traffic problem, ride-sharing emerged to encourage people to share car journeys. It was introduced in 2009 in the United States of America [3] and in 2013 in Malaysia. The drive for motorcycle taxi services (motor taxis) in Malaysia has gathered countrywide attention. There

have been demands for motorcycle e-hailing to be provided in Malaysia. Unlike neighbouring countries such as Indonesia, Thailand and Vietnam, Malaysia has yet to allow two-wheeled drivers to carry passengers. According to [4], these three countries have the most motorcycles in the ASEAN region, with Indonesia having the highest number at 109 million. Indonesia's ride-hailing sector, valued at Rp 382.62 trillion (US\$2.35 billion) in 2022, accounts for 2% of its GDP. Motorcycles contribute to 81% of traffic fatalities, higher than Malaysia's 59%, with both countries having comparable motorcycle ownership rates of 466 per 1,000 people [5]. Malaysia experienced its first bike hailing in late 2016 through local startup Dego Ride. Diego Ride implemented an SMS system to verify requests and appointments. However, it was hastily declared illegal by the previous government due to safety concerns. Based on a study by the Ministry of Transport, fatal accidents involving motorcycles were 42.5 times higher than that of buses and 16 times higher than that of cars [4].

Nevertheless, the plan to introduce bike ride-hailing in Malaysia is advancing. Malaysian Transport Minister Anthony Loke mentioned that the government had permitted a six-month trial

period for bike ride-hailing services through a pilot project or 'Proof of Concept' ("POC") that started in January 2020. The trial period is open to other ride-hailing companies, including GoJek. All ride-hailing companies must fulfil specific requirements: passengers and riders must be 18 years old and above, and the rider must possess a full motorbike license. Riders must provide helmets for passengers and only one passenger at a time. In addition to that, motorbikes need to be free of unapproved modifications and not be on JPJ's blacklist [4].

Beforehand, motorcycle taxi services in some countries, such as Thailand and Vietnam, have been working under unregulated settings that have caused many complications for drivers and passengers. However, Thailand became the first country in the world to regulate motorcycle taxi services in 2005 [6]. The advent of motorcycle-based ride-hailing services offered more transportation alternatives to users in developing countries like Indonesia and Vietnam. Nonetheless, numerous people presently consider that the convenience of these new alternatives intimidated the demand for public transportation. Given the importance of the sharing economy platform as a new business model and with e-hailing as one of the cutting-edge disruptive technological developments in this economy, it is commendable to investigate and study this sector.

Certain studies have resided in the e-hailing services sector, emphasising the key challenges and effects affecting its extensive acceptance [7,8]. Most studies focused on e-hailing ride-sharing but lacked bike sharing, especially motor taxi services, due to its status in Malaysia. All motorcycle rides hailing in Malaysia were given a six-month trial run, transporting passengers and packages in the Klang Valley starting from January 1, 2020. The dearth of studies on consumer behaviour acceptance of bike sharing permitted a necessity to look at key influences that affect passenger behaviour and its impact when using such a service.

Several cases of e-hailing complaints were noted, including driver misconduct and misbehaviour, sexual harassment and abuse, price overcharging, and mishaps due to accidents throughout the journey [3]. Despite these cases, demand for e-hailing continues to rise. Major concerns such as passenger safety, perceived price, convenience, perceived accessibility and social influence are determinants of passenger behaviour towards their ride intention. Studies on the sharing economy, particularly ride-hailing and its impact on commuter mobility in Malaysia's metropolitan areas, remain limited. Since there were only a few studies on customer adoption of ridesharing, it is necessary to investigate key factors that affect passenger behaviour and their implications when using such a service.

This study hopes to strategize the conventional taxi system so that it can compete with car service e-hailing systems by transforming its business model with application-based taxis. Besides, understanding customer attitudes toward ridesharing could help policymakers ensure passenger safety, security, and fair pricing policies, which have become significant issues for e-hailing businesses.

2. Review of literature review and hypothesis development

The 'sharing economy' emerges from technological advancements that facilitate sharing activities, including the exchange of goods and services, both physical and digital, via internet-based information systems [9]. Due to Internet technology's rapid advancement, taxi services have now constructed an online platform to interact and engage with their consumers. According to [10], the availability of mobile application technology allowed taxi service operators to expand their market and improve their client interaction programmes. The introduction of motorcycle taxis urged individuals to utilise online motorcycles as a quicker and more cost-effective form of transportation. Motorcycle-based ride-sourcing is a type of public transportation that uses motorbikes and is often operated without established routes and for short distances. It can access challenging sites such as alleyways and minor roadways and avoid traffic jams [11].

The behavioural intention toward ride-hailing services was critical in analysing the viability of ride-hailing services for passengers [12]. Research has focused on travellers' intentions to use ride-hailing services based on criteria such as price, safety, convenience, and accessibility, all of which substantially impact passengers' decision-making behaviour [13]. Behavioural intention is defined as a person's intention to decide or plan to carry out a plan. It is often used interchangeably to refer to a plan, choice and decision [14]. Passengers' intention to ride is strongly influenced by their service satisfaction, ride convenience, and service efficiency. In the study of transportation services, behavioural intention has been used to analyse methodologies to reflect future ride-hailing service behaviour and adoption rates [15]. In a study by [16], 65% of consumers chose e-hailing transport since they saw it as better, more pleasant and safer than other choices.

Perceived safety attributes were personal safety, journey time and reliability of connection [3] to determine passengers' intention to use motor taxis. Implementing some initiatives to protect passengers' safety was important with the intention of customers' safety and security being prioritised. Perceived safety is an important aspect for passengers when riding a motor taxi. Motor taxis

always point to higher risks than cars and buses. The Ministry of Transport (MoT), Malaysia, reported that fatal accidents involving motorcycles were 42.5 times and 16 times higher than those involving buses and cars [4]. Motor taxi drivers tend to ignore the safety actions implemented by the transport authorities [17]. For instance, [18] showed motor taxi drivers ride under the influence of alcohol or without wearing a helmet, [19] showed motor taxi drivers work without insurance coverage or don't possess a driving licence. These caused high-risk exposure to a traffic crash. Thus, safety inspection is a critical aspect that attracts passengers' intent to use motor taxis. Motor taxi riders also need to comply with all driving laws, rules and regulations. It is proposed that:

H1: A significant positive relationship exists between perceived safety and passenger ride intention.

Perceived price is defined as a person's perception of the amount they paid for the quality of the product or service they received [20]. Perceived price in a motor taxi is referred to the fares of the service charged to the passenger. [21] stated that in the transportation sector, price was a critical indicator influencing affordability concerning the rates paid and the service offered. Many individuals chose e-hailing services since they were less expensive than traditional taxis [22], and payment choices via credit or debit card only encouraged passengers to use e-hailing more [23]. There have been calls for future research to focus on the influence of pricing on its adoption [24], as little was known about how passenger perceived pricing on their riding intention. Therefore, price or cost has been one of the most often reported criteria in several studies. Thus, it is proposed that:

H2: A significant positive relationship exists between perceived price and passenger ride intention.

A product or service is convenient when it does not bring any emotional or physical burden to its user [25]. Passengers would want a convenient application when booking a motor taxi and experiencing less traffic. According to [26], convenience includes ease of use and usefulness. If motor taxis can provide convenience applications such as e-hail apps, this may spur passenger intention to use motor taxi services [3]. [27] suggested that perceived ease of use had the highest influence on the support adoption of Near Field Communication (NFC)-enabled mobile credit card applications. It is proposed that:

H3: A significant positive relationship exists between convenience and passenger ride intention.

Perceived accessibility refers to the ease with which commodities, facilities, destinations, and events can be accessed for most transportation activities [28]. Transportation accessibility significantly impacted passenger-rider intention because passengers often chose to use facilities that were easily accessible to their desired destination. [29] observed that the key to encouraging more individuals to make their choice of e-hailing was accessibility. Individual attributes such as needs, talents, and opportunities may impact a person's access to transportation. Consequently, using applications to help the booking process of motor taxis provided additional convenience to consumers and assisted them in developing the shortest route plan. Thus, it is proposed that:

H4: A significant positive relationship exists between perceived accessibility and passenger ride intention.

Social influence is the degree to which an individual perceives the importance of using innovation through the belief of others [27]. [30] suggested that social influence played a significant role in M-commerce adoption. [31] claimed that online word-of-mouth had a considerable impact on buying behaviour. According to [32], the social environment is typically a key component in influencing and defining perceived needs and seeing others may inspire consumers to use similar items and services. In using e-hailing services, [33] claimed that social influence to use e-hailing services among users with high frequency was the advertisement or news from mass, followed by current trends and friends and family. Thus. It is proposed that:

H5: Social influence and passenger ride intention have a significant positive relationship.

3. Methodology

This empirical study used a quantitative approach via an online Google survey form. A 5-point Likert scale was used to allow the respondents to indicate their level of agreement for each of the exogenous and endogenous variables. Online questionnaires were collected from respondents around Klang Valley. Klang Valley was the area which extended from the most significant population to the lowest municipality, comprised of Wilayah Persekutuan Kuala Lumpur, Klang, Cheras, Subang Jaya, Petaling Jaya, Selayang, Shah Alam, Ampang, Putrajaya and Sepang. The study used non-probability sampling, namely purposive sampling, to recruit public transport users efficiently. Consequently, many completed surveys may be acquired from participants [34].

A total of 216 questionnaires were distributed online using social media such as WhatsApp links, Facebook, and Instagram. However, due to incomplete answers, only 206 (95.37%) questionnaires were available for further analysis. The pre-test was conducted to ensure the face validity of the questionnaire items. Minor modifications were made to the questionnaires for the next phase of data collection [35].

4. Data Analysis

To analyse the demographic profile, SPSS Version 25 was hired. This study used Smart PLS 3 to validate the model's prediction.

Table 1 Respondent profiles

	Category	Frequency (N=206)	Percentage (%)
Gender	Female	99	48.1
	Male	107	51.9
Age	15-20 years old	17	8.3
	21-25 years old	142	68.9
	26-30 years old	14	6.8
	31 – 40 years old	24	11.7
	41 – 50 years old	6	2.9
	51 years old and above	3	1.5
Marital Status	Married	32	15.5
	Single	174	84.5
Race	Chinese	157	76.2
	Indian	11	5.3
	Malay	35	17.0
	Others	3	1.5
Education Level	Bachelor Degree	181	87.9
	Master Degree	16	7.8
	Others	7	3.4

	PhD	2	1.0
Occupation	Government	5	2.4
	Private sector	26	12.6
	Self-employed	12	5.8
	Student	158	76.7
	Unemployed	5	2.4
Income Level	<RM2000	158	76.7
	RM2001 - RM3000	12	5.8
	RM3001 - RM4000	4	1.9
	RM4001 - RM5000	11	5.3
	RM5001 and above	21	10.2

Of those involved in the survey, 48.10% were female and 51.90% were male. Most respondents were between 21-25 years old (68.9%). 174 (84.5%) respondents were single, and 32 (15.5%) were married. There are 157 Chinese respondents (76.2%), 35 Malay respondents (17%), 11 Indian respondents (5.3%) and three respondents from others (1.5%). The majority of the respondents were undergraduates, with a total of 181 (87.9%), followed by Master with a total of 16 (7.8%), others of professional qualification with a total of 7 respondents (3.4%) and 2 for Philosophy of Doctorate (1%). For the occupation category, 158 (76.7%) were students, 26 respondents (12.6%) were from the private sector, 12 (5.8%) were self-employed, five respondents were from the government (2.4%) and five were unemployed (2.4%). For the income level category, 158 respondents (76.7%) were earning an income of below RM2000, 12 respondents (5.8%) were from an income level of within RM2001-RM3000, 4 (1.9%) were from an income level of within RM3001-RM4000, 11 (5.3%) were from income level of within RM4001-RM5000 and finally income level above RM5000 were 21 (10.2%).

Table 2 Result of Measurement Model

Construct	Items	Mean	SD	Outer Loading	CR	AVE
Social Influence	SI1	2.54	0.483	0.878	0.897	0.686
	SI2	2.36	0.488	0.876		
	SI3	2.78	0.575	0.814		
	SI4	2.56	0.674	0.733		
Perceived Safety	PS1	3.35	0.492	0.870	0.939	0.754
	PS2	3.27	0.524	0.851		
	PS3	3.34	0.443	0.896		
	PS4	3.10	0.529	0.849		
	PS5	3.32	0.488	0.873		
Perceived Price	PP1	3.84	0.550	0.799	0.932	0.732
	PP2	4.31	0.516	0.799		
	PP3	4.34	0.429	0.799		

		PP4	4.27	0.476	0.799		
		PP5	4.12	0.601	0.799		
Perceived		PC1	2.81	0.626	0.780	0.914	0.728
Convenience		PC3	3.34	0.563	0.827		
		PC4	3.07	0.420	0.907		
		PC5	3.07	0.452	0.892		
Perceived		PA1	3.89	0.483	0.876	0.950	0.827
Accessibility		PA2	3.82	0.417	0.909		
		PA3	3.84	0.384	0.923		
		PA4	3.90	0.374	0.927		
Passenger	Ride	PRI1	2.86	0.411	0.876	0.943	0.847
Intention		PRI2	3.04	0.357	0.873		
		PRI3	3.16	0.404	0.818		

Several procedures were used to assess the data set reliability. Construct reliability assessed the degree to which items are free from random error and yield consistent results. This study calculated the reliability of measures using the composite reliability (CR) index and the average variance extracted (AVE) index. Table 2 shows that the AVE values for every construct exceeded 0.5, indicating convergent validity. The table also revealed that all the factor loadings are above 0.7 (except PC2) and that composite reliability exceeds 0.7 [36]. Thus, the constructs' reliability is all considered good and acceptable.

Table 3 Discriminant validity (Fornell-larcker Criterion)

Const ruct	Pass eng er Ride Intention	Perce ived Acces sibilit y	Perce ived Conv enience	Perc eive d Price	Perc eive d Safety	Soc ial Infl uence
Passe nger Ride Intention	0.920					
Perce ived Acces sibilit y	0.585	0.909				
Perce ived Conv enience	0.421	0.650	0.853			
Perce ived Price	0.367	0.471	0.528	0.855		
Perce ived Safet y	0.379	0.455	0.497	0.750	0.868	
Socia l Influe nce	0.593	0.615	0.626	0.490	0.502	0.828

Table 3 shown that the Discriminant validity (Fornell-larcker Criterion) is achieved since the values in bold which represent the squared root of AVE is higher than all the values in its rows and columns. The rest of the values show the correlation between the constructs with other constructs within the conceptual model.

Table 4 Discriminant validity (Heterotrait-Monotrait Ratio (HTMT))

Const ruct	Pass eng er Ride Intention	Perce ived Acces sibilit y	Perce ived Conv enience	Perc eive d Price	Perc eive d Safety	Soc ial Infl uence
Passe nger Ride Intention						
Perce ived Acces sibilit y	0.634					
Perce ived Conv enience	0.471	0.716				
Perce ived Price	0.399	0.508	0.590			
Perce ived Safet y	0.406	0.483	0.542	0.820		
Socia l Influe nce	0.674	0.693	0.725	0.558	0.562	

A HTMT value that exceeded 0.85 represented an issue of discriminant validity. As shown in Table 4, all HTMT values of the construct were below 0.85. These tests suggested that discriminant validity

was not a serious problem in our study. The Discriminant validity (Fornell-larcker Criterion and Heterotrait Monotrait Ratio) was analyzed using the Smart_PLS 3.2.8 software [37]. The results showed that the conceptual model is fit based on the reported

Chi-Square= 691.414, d_G=0.572, d_ULS=1.209, SRMR=0.061, and NFI=0.847.

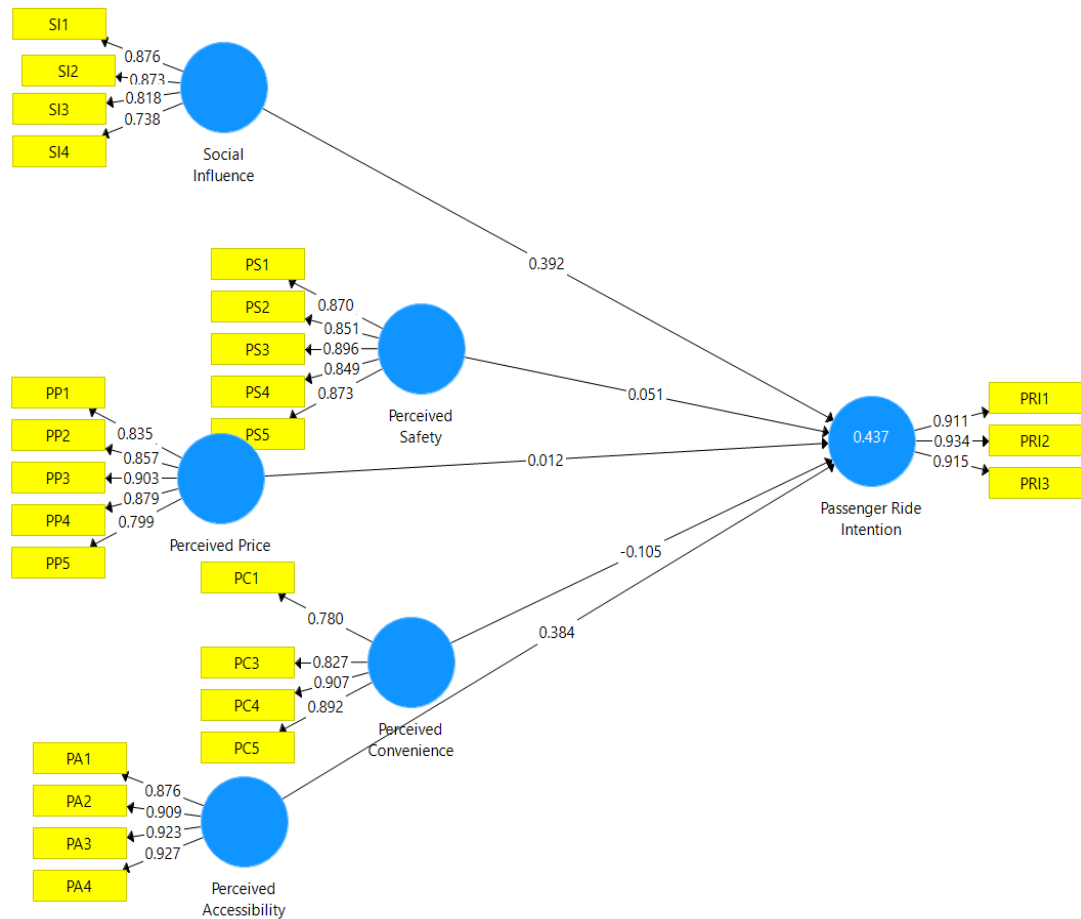


Figure 1 Structural Model

The model above was presented with a direct path of social influence, perceived safety, perceived price, perceived convenience, and perceived accessibility. Perceived accessibility and social influence were significant at the p-value of 0.000 and the path coefficient of 0.384 and 0.392, respectively. No indirect effect was hypothesised. Social influence contributed the highest, with 0.436, to the relationship with the passenger ride intention.

Table 5 Path coefficient for hypothesis testing

Paths	Coefficient	t-value
H1: PS → PRI	0.051	0.552
H2: PC → PRI	0.105	1.114
H3: PP → PRI	0.012	0.125
H4: PA → PRI	0.384	4.108**
H5: SI → PRI	0.392	4.905**

Note: PS – Perceived safety, PC – Perceived convenience, PP – Perceived price, PA – Perceived accessibility, SI – Social influence, PRI – Passenger ride intention

Table 5 indicated that perceived accessibility (p=0.000) and social influence (p=0.00) affect passenger ride intention; the rest of the proposed hypothesis was not supported. The Variance Inflation Factor (VIF) was examined to identify multicollinearity. Table 5 showed that multicollinearity is not an issue among the exogenous latent constructs since all VIF values were below 5. Thus, multicollinearity is not a threat in this study.

5. Discussion and Conclusion

Perceived accessibility was the strongest predictor of passenger ride intention. This was supported by the findings by [16], where perceived accessibility was significantly related to the behavioural intention of Generation Z to use the Grab e-hailing service. Passengers could be influenced by perceived accessibility regarding ease of booking, coverage and supply of motorbikes in KL city, operating hours, number of contract drivers, and delivery speed. This was also supported by studies on Grab

cars in Thailand, where passengers' concerns were mainly about perception and accessibility [38].

In car ride-sharing services, social influence affects passengers' intentions, as it affects their emotions, opinions or behaviours towards specific products and services [39]. Social influence was another influence on passenger ride intention. [39] supported this in his study, where social influence significantly influences passenger intention. [39] concluded in their study that social influence had a positive relationship with intention. This study found that when deciding their intention to ride a motor taxi, passengers appear to be influenced by reference groups, friends, family members, and reference groups due to their direct relationship. Accessibility is also crucial because passengers who intend to use motor taxi services seek something convenient and fast to avoid traffic.

This study produced some significant contributions. To begin, this research looked at existing literature in the field of transportation to establish a theoretical framework and identify both an absolute and relative view of the gap. Second, it analyses the current state of variables driving it, which builds on existing research and expands the field of knowledge, therefore unifying and advancing it. Finally, because this study is the first to examine the factors influencing the passengers' intention towards motor taxi services, it is unique in the field.

Because of the age and income level, future studies should focus on a greater cross-section of respondents, including other demographic profiles and marketing factors such as price, promotion, brands and strategies. More diverse random samples of roughly 400 respondents could help to confirm the findings. Other models could also be investigated and analysed to understand the variables' antecedents further. Future research using a structural equation modelling methodology might examine the critical roles of mediators or moderators influencing the factors and effects on the passengers' intention towards motor taxi services.

This research will also aid motor taxi services, and the findings will show how ridesharing can be enhanced to gain a competitive advantage over competitors. Traffic congestion in the Klang Valley has worsened post-COVID-19 restrictions, with motorcycle ride-hailing proposed as a solution. Malaysia's high motorcycle ownership, limited public transport, and thriving p-hailing sector make it well-suited for this option. Given the thriving p-hailing sector, motorcycle ride-hailing presents significant untapped potential. Flexible arrangements, such as riders providing ride-hailing services during peak hours and focusing on delivery services during off-peak periods, could maximise efficiency and address transportation and logistical needs.

Many limitations should be noted, and future research directions may be able to overcome the limitations of this study.

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