Customers' Willingness To Use Mobile Taxi Booking Applications: A Study Based On The Theory Of Planned Behavior

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Abstract

The rapid digital transformation has reshaped the public transportation sector by implementing taxi services through mobile applications. In Sri Lanka, Mobile Taxi Booking (MTB) Apps have gained significant traction, largely driven by widespread smartphone use. This study aimed to explore customer intention toward using online Taxi-Booking Apps, framed within the Theory of Planned Behavior. A descriptive survey methodology was employed, with structured questionnaires gathering the necessary data. For statistical evaluation, confirmatory factor analysis alongside structural equation modeling was conducted. Results revealed that attitude, perceived behavioral control, and subjective norms significantly influence Sri Lankan consumers' behavioral intention to adopt mobile taxi booking applications. These insights provide valuable guidance for e-hailing service providers and mobile app developers to design effective marketing strategies and enhance user-friendly apps with additional valuable features, thereby supporting profitable market development.

Keywords: E-hailing, Taxi service industry, Customer intention, Mobile apps

Introduction

The taxi sector plays a vital role in providing public transportation services within urban areas, offering point-to-point passenger transit and generating numerous employment opportunities for the national workforce. The overall productivity of a country's labor force is often closely linked to the effectiveness of its transportation system. However, in recent years, the taxi service industry has encountered significant challenges due to a mismatch between the supply of taxis and passenger demand [1, 2]. This imbalance frequently resulted in inefficiencies, with passengers struggling to secure timely pickups while drivers experienced prolonged waiting periods for customers. Such issues contributed to increased road congestion during peak periods and worsened air pollution caused by slower vehicle speeds. Consequently, these problems have led to dissatisfaction among users, with many passengers lodging complaints about the taxi service quality.

Rapid technological advancements have substantially transformed service industry operations [3–6]. The taxi industry has similarly benefited from progress in telecommunications, mobile, and wireless networking technologies. The surge in smartphone adoption and enhanced internet accessibility have been key drivers of this change. Smartphones have become the primary tool for accessing internet information, and their widespread use has integrated them into everyday life. According to global statistics, smartphone users reached 3.2 billion worldwide, with a penetration rate of 41.5% in 2019. Additionally, mobile applications—software programs for smartphones—have seen massive uptake; in 2018, 174 billion app downloads were recorded. The proliferation of free mobile apps has further encouraged global adoption, serving purposes ranging from

communication and gaming to social networking and browsing. Within this context, Mobile Taxi Booking (MTB) apps have emerged as a significant innovation within the taxi service sector.

MTB apps, also known as e-hailing apps, have been developed primarily in urban centers to address the challenges faced by both passengers and taxi operators. These applications serve as a platform bridging riders and drivers, driving rapid growth in the taxi industry. Passengers can conveniently arrange rides using mobile apps, making travel decisions easier. The integration of technology, particularly graphical user interfaces and GPS, has enhanced user experience by allowing passengers to locate nearby taxi drivers. Upon receiving a ride request, drivers may accept or reject the trip. Users can view driver profiles, including licensing information, before confirming service, which helps ensure legitimacy. These technological advancements have fundamentally transformed the global taxi ecosystem. In 2019, e-hailing services reached a user penetration of 13.5%, projected to rise to 20% by 2023 (World Statista). Moreover, the global ride-hailing industry generated revenues amounting to US$183,677 million in 2019 (World Statista).

Competition among taxi app providers to attract consumers has intensified, often driven by promotional marketing campaigns. Various promotional offers have accelerated consumer willingness to utilize MTB services to meet their transportation needs. Compared to traditional taxi services, mobile app-based systems offer consumers several advantages, including lower fares, diverse payment options, discounts, and reliable service, which contribute to increased customer satisfaction and loyalty [7, 8]. This ride-hailing model also benefits drivers by minimizing idle time and offering performance-based incentives. Peng *et al*. [9] supported this view, highlighting that mobile taxi apps help reduce imbalance between passenger demand and driver availability.

In Sri Lanka, over fifty MTB app-based taxi companies currently operate in the capital and other urban areas. This emerging trend has led to a substantial shift in consumer behavior, with higher adoption rates of mobile taxi services compared to traditional taxis. As a result, the conventional taxi system is experiencing a decline, sparking considerable discussion among Sri Lankan consumers. Given this significant rise in MTB app usage, identifying the factors influencing consumer adoption is both theoretically important and valuable for industry stakeholders. Therefore, this study aims to investigate the determinants affecting Sri Lankan consumers' behavioral intention to adopt mobile taxi booking applications, using the framework of the theory of planned behavior.

Theoretical background

The Theory of Planned Behavior (TPB), introduced by Ajzen [10] and further developed by Conner and Armitage [11], serves as a fundamental cognitive framework explaining how individuals direct their actions. TPB builds upon the Theory of Reasoned Action (TRA) by addressing limitations in predicting behaviors that are less under voluntary control. To overcome these shortcomings, TPB incorporates additional factors to better anticipate user behaviors where control is diminished [12]. Over time, TPB has emerged as a leading model for explaining how users accept and adopt innovations. It highlights the role of informational and motivational determinants in shaping human conduct [11]. Central to TPB are three main constructs: attitude, Subjective Norms (SN), and Perceived Behavioral Control (PBC), which collectively predict an individual's readiness and intention to perform certain behaviors [13, 14]. This framework is commonly utilized to explore intentions behind information system usage and technology adoption [15, 16], and has applications in sectors including healthcare, marketing, sustainability, and public relations.

Within TPB, attitude represents a person's overall favorable or unfavorable evaluation toward engaging in a specific behavior [17]. Fishbein and Ajzen [10] describe attitude as an individual's positive or negative assessment of the behavior.

The concept of Subjective Norms (SN) reflects the social pressure individuals perceive to either carry out or refrain from a behavior [10]. Weng *et al*. [18] link SN to the influence of normative beliefs held by important others, showing its significant role in sustaining continued use of mobile taxi booking (MTB) services.

Perceived Behavioral Control (PBC) reflects how easy or difficult individuals believe it is to perform the behavior [10]. It denotes the perceived level of control and the amount of effort required to enact the behavior. Prior studies have identified PBC as a vital factor shaping online shopping intentions and behaviors [16, 19, 20].

At the heart of the TPB model is behavioral intention, defined as an individual's subjective likelihood or probability of performing the behavior [13]. It is considered the most reliable predictor of actual behavior [10], functioning as a motivational trigger prompting action, distinct from aspirations or expectations.

Hypothesis development

The TPB posits that attitude influences behavioral intention, which subsequently shapes actual behavior. Studies confirm that attitude significantly affects acceptance and use of information systems [21, 22]. Attitudes evolve as individuals process new information and experiences [23], with attitude often exerting the strongest influence on behavioral intention [16]. Paul *et al*. [24] further confirmed that consumer attitudes are significant predictors of purchase intention. In the transportation industry,

mobile taxi booking apps use promotional strategies aimed at changing user attitudes to encourage sustained usage and loyalty. Therefore, the first hypothesis is proposed:

H1: Attitude significantly affects behavioral intention toward mobile taxi booking apps among taxi service users.

Subjective norms have been found to positively influence attitudes toward mobile taxi booking apps [18] and act as significant predictors of both attitude and perceived behavioral control [25]. Lim *et al.* [26] observed similar patterns in their study on Malaysian e-hailing app adoption. Hence, the second hypothesis is formulated:

H2: Subjective norm significantly influences behavioral intention to use mobile taxi booking apps among taxi service users.

Perceived behavioral control also plays a critical role in consumers' recognition and use of e-commerce platforms. Research shows that PBC impacts consumer intentions to purchase and engage with online services [27, 28]. Hansen *et al.* [29] reinforced the importance of PBC in predicting behavioral intentions. Accordingly, the third hypothesis is:

H3: Perceived behavioral control significantly impacts behavioral intention to use mobile taxi booking apps among taxi service users.

Finally, the link between behavioral intention and actual behavior is well-established, especially in e-commerce contexts [19]. Sheppard *et al.* [30] emphasized the predictive power of intentions in determining behavior, supported by Gieure *et al.* [31]. Thus, the fourth hypothesis is:

H4: Behavioral intention to use mobile taxi booking apps significantly predicts actual behavior among taxi service users.

Materials and Methods

Data collection

This research adopted a descriptive survey approach to explore the factors influencing the behavioral intention of taxi users in Sri Lanka to adopt mobile taxi booking applications. The target group included both domestic and international users of taxi services. A convenience sampling strategy, classified under non-probability sampling methods, was used to select participants from the broader taxi service user population within Sri Lanka. Data were gathered via a structured questionnaire distributed with the assistance of local taxi drivers. Out of the total 214 responses collected, 181 were deemed valid for analysis.

To ensure precision in responses, the survey was designed in structured format, using English as the medium of communication, considering its widespread usage as a second language among the Sinhala-speaking population and its accessibility for both foreign and local respondents. The questionnaire was divided into three main sections: the first gathered demographic information to profile the sample; the second contained questions related to the exogenous variable; and the third addressed items associated with the endogenous variables.

Variables and measurement scales

A total of 15 measurement items were derived based on an extensive literature review related to the Theory of Planned Behavior (TPB). These items represented four principal variables of the model. A five-point Likert scale was applied, where participants indicated their level of agreement from "strongly disagree" to "strongly agree." Multiple items were used for each construct to enhance measurement accuracy. The items assessing the dependent variable, behavioral intention, were primarily adapted from Limayem *et al.* [19], who examined the adoption of e-commerce platforms. Measurement items for subjective norm were drawn from the work of Tommasetti *et al.* [32], while those assessing attitude and perceived behavioral control were sourced from Rouibah *et al.* [33]. All items were carefully revised to suit the context of the present investigation.

Results and Discussion

Sample profile

Descriptive statistics were used to profile the sample. Male participants represented 44.7% of the respondents, while females comprised 45.3%. The age bracket with the highest representation was 31–40 years, accounting for 35.9% of the participants. Other age groups included those under 18 (5%), 18–25 (28.2%), 26–30 (15.5%), 41–50 (8.8%), and above 50 years (6.6%). Monthly income distribution showed that 24.9% of the respondents earned below Rs. 20,000, 50.8% earned between Rs. 20,000 and Rs. 40,000, 17.1% earned Rs. 40,000 to Rs. 60,000, and 7.2% earned more than Rs. 60,000. In terms of education, 54.7% held a bachelor's degree, 29.3% had completed some high school, and 16% possessed a master's degree or higher. Regarding internet usage, 59.7% had been using the internet for over seven years, 13.8% for five to seven years, and 20.4% for three to five years. Additionally, 5.5% of participants reported spending money on taxi services daily, whereas 23% were identified as low-frequency users.

Measurement model

To assess the adequacy of the dataset for factor analysis, an Exploratory Factor Analysis (EFA) was conducted using SPSS. Maximum likelihood extraction along with Promax rotation was employed. The Kaiser-Meyer-Olkin (KMO) test yielded a value of 0.920, indicating outstanding sampling adequacy. Furthermore, Bartlett's Test of Sphericity was significant, confirming that the correlation matrix was suitable for structure detection. The extracted factors accounted for 72.37% of the total variance, with the majority of factor loadings exceeding 0.7 on the pattern matrix. One item under the attitude construct exhibited a measurement issue and was excluded to enhance the model's consistency.

Next, internal consistency for each construct was evaluated using Cronbach's alpha. According to Nunnally [34], a reliability threshold of 0.7 or higher is deemed acceptable. All constructs met or exceeded this criterion: Attitude (0.848), Subjective Norms (0.862), Perceived Behavioral Control (0.972), and Behavioral Intention (0.893).

To confirm construct validity, Confirmatory Factor Analysis (CFA) was performed. This analysis assessed whether the measurement items accurately reflected the theoretical constructs under investigation. The results showed satisfactory model fit indices: Goodness of Fit Index (GFI) = 0.919, Adjusted Goodness of Fit Index (AGFI) = 0.874, Root Mean Square Residual (RMR) = 0.032, Normed Fit Index (NFI) = 0.933, and Comparative Fit Index (CFI) = 0.975. These values indicate that the measurement model met standard validity criteria **(Table 1)**.

Table 1. Model Fit Results of the Measurement Model

Index of Fit	Chi-Square	(df)	P	CMIN/DF	GFI	AGFI	NFI	CFI	RMSEA
Value	133.54	87	0.001	1.535	0.919	0.874	0.933	0.975	0.055

In addition, the study evaluated convergent validity to confirm that the items effectively represent their associated constructs. As outlined by Hair *et al.* [35], convergent validity is assessed by correlating multiple indicators of the same concept to ensure the scale consistently measures the intended construct. Two main techniques were employed to examine this form of validity. The first involved assessing the factor loadings obtained during the factor analysis. Since all factor loadings exceeded the threshold of 0.7, the results substantiated the model's convergent validity. The second technique applied was the calculation of the Average Variance Extracted (AVE), which reflects the extent to which variance in the observed variables can be attributed to the underlying latent construct, as opposed to measurement error.

To further validate the model, discriminant validity was assessed. This involved comparing the AVE values with the shared variance metrics, specifically the squared inter-construct correlations (MSV). Discriminant validity was deemed satisfactory when the AVE values for each construct exceeded the corresponding MSV values, confirming that each construct is distinct and not overly correlated with others in the model. A detailed summary of these findings is provided in **Table 2**.

Table 2. Discriminant Validity Measures

	AVE	MSV	Intention	Attitude	Subjective Norms	PBC	Actual
Intention	0.682	0.402	**0.826**				
Attitude	0.557	0.536	0.634	**0.746**			
Subjective Norms	0.616	0.403	0.589	0.635	**0.785**		
PBC	0.748	0.536	0.540	0.732	0.553	**0.865**	
Actual	4.511	0.027	0.164	0.085	0.027	0.092	**2.124**

Structural model

Following confirmation of model fit through confirmatory factor analysis, the structural model was constructed using AMOS Software to examine the statistical associations among the constructs. The results of the empirical causal model are presented in **Figure 1**.
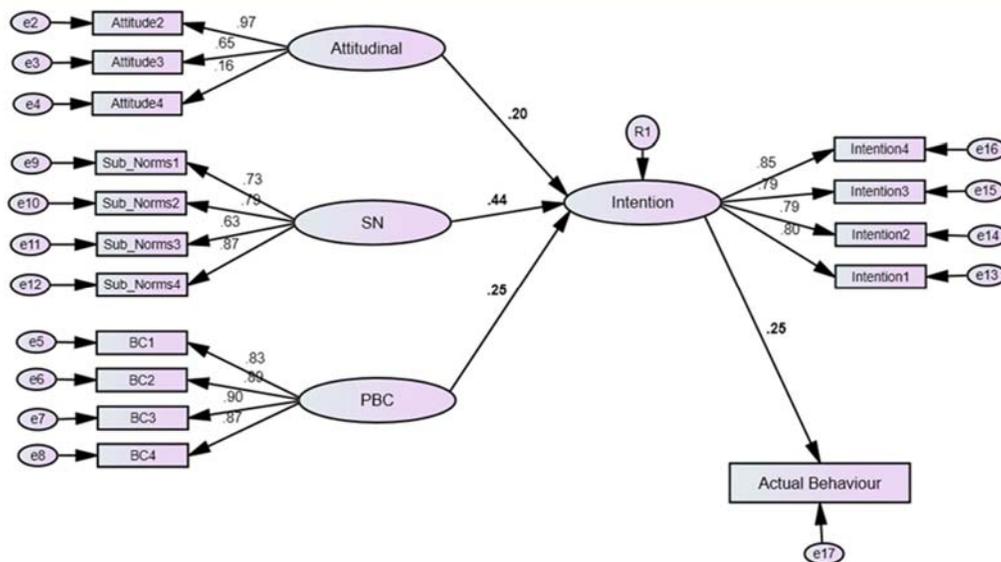
Figure 1. Structural Model Output Chi-square = 291.542 / Degrees of freedom = 177 / Probability level = .000

The structural model's fit was assessed, and the results demonstrated that it met the commonly accepted thresholds for validity. Detailed model fit indices are displayed in **Table 3** below.

Table 3. Model Fit Results of the Empirical Causal Model

Index of fit	Chi-Square	(df)	P	CMIN/DF	GFI	AGFI	NFI	CFI	RMSEA
Value	604.03	92	0.000	3. 305	0.829	0.747	0.848	0.887	0.113

Hypothesis testing

H1: Attitude has a significant effect on the behavioral intention of mobile taxi booking apps among taxi service users.

To examine H1, a path modeling strategy via AMOS was employed to determine whether attitude influences users' behavioral intention toward mobile taxi booking apps. The analysis yielded statistically meaningful results at the 95% confidence level ($p < 0.05$), thereby invalidating the null hypothesis. The influence of attitude was quantified with a Squared Multiple Correlation (SMC) of 0.196, indicating that a single unit increase in attitude results in a 0.20 standard deviation rise in behavioral intention.

H2: Subjective Norm has a significant effect on behavioral intention of mobile taxi booking apps among taxi service users.

Hypothesis H2 was tested to explore the association between subjective norm and behavioral intention. This linkage was assessed using AMOS-based path analysis, which revealed a significant positive connection ($p < 0.05$). The statistical outcome warranted the rejection of the null hypothesis, and the model showed that subjective norm exerts a predictive weight of 0.365 on behavioral intention among users in the Sri Lankan context.

H3: Perceived behavioral control has a significant effect on the behavioral intention of mobile taxi booking apps among taxi service users.

To assess H3, the influence of perceived behavioral control on behavioral intention was modeled through structural path analysis. The resulting data demonstrated statistical significance ($p < 0.05$), allowing the null hypothesis to be dismissed. A positive correlation was confirmed, supported by an SMC of 0.229, showing that stronger perceptions of control correlate with higher behavioral intention to adopt mobile taxi services.

H4: Behavioral intention has a significant effect on the actual behavior of using mobile taxi booking apps among taxi service users in Sri Lanka.

The final hypothesis, H4, aimed to establish whether behavioral intention translates into actual user behavior. Utilizing AMOS for path evaluation, the findings indicated a significant effect ($p = 0.001$), thereby leading to the rejection of the null. With a corresponding SMC of 0.251, the analysis revealed a clear and positive linkage between a user's intention and their actual engagement with mobile taxi booking apps.

Conclusion

The transport service sector has rapidly expanded with an increase in mobile taxi booking applications, enabling passengers to reach their destinations quickly and with minimal hassle. This research concentrated on examining consumers' behavioral intention to utilize these electronic platforms. Building upon previous studies and theoretical foundations, a conceptual framework was developed based on the theory of planned behavior. Subsequently, statistical methods were employed to evaluate the hypotheses formulated in this study.

Findings reveal that components of the theory of planned behavior—namely attitude, perceived behavioral control, and subjective norms—play a significant role in influencing the adoption of mobile taxi booking apps within the Sri Lankan service landscape. The study also confirmed that the introduction of innovative technology positively impacts consumer behavioral intention. Therefore, by implementing targeted strategies, companies providing these services have the potential to expand their market share through increased use of MTB applications.

Among the variables analyzed, subjective norms emerged as the most influential factor affecting customers' behavioral intention, indicating a societal shift toward embracing mobile commerce applications as a convenient and modern service channel. This societal acceptance creates a conducive environment for service providers to attract users with relative ease, driven by social pressure to adopt such technologies. Additionally, the positive influence of perceived behavioral control reflects users' perceptions of the apps being user-friendly and straightforward. The research also documented favorable customer attitudes toward adopting these applications. Given the significant impact of all examined variables on customer intention, service providers can leverage this insight to promote app usage. By increasing promotional efforts and educating users about electronic services, companies can further boost MTB application adoption rates, supported by a socially favorable climate. Moreover, improving users' understanding is likely to diminish resistance toward app usage.

In summary, consumer attitude, perceived behavioral control, and subjective norms positively influence the behavioral intention of Sri Lankan consumers to use MTB applications. Consequently, by offering more intuitive mobile apps and implementing attractive promotional activities, taxi service providers can effectively capture a larger share of the market.

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