An Assessment of the Behavioural Intention for Using Ride-Sharing Services: Empirical Evidence from a Developing Country

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Abstract

In today's age, it is essential for ride-sharing service providers and policymakers to explore and understand the components affecting both the actual and potential user willingness to use such services in developing countries. Therefore, the purpose of this paper was to explore the critical components of an individual's intention to use ride-sharing services, wherein an extended Technology Acceptance Model (TAM) was employed as the conceptual framework. Here, the extension was made by considering three constructs, namely environmental awareness, perceived risk, and personal innovativeness. Overall, 683 respondents participated in the study in which a quantitative approach was adopted and the responses were collected through a structured questionnaire using a five-point Likert-scale. Structural Equation Modelling (SEM) was performed to assess whether the data fit the conceptual framework and test the hypotheses accordingly. The results showed that environmental awareness, perceived ease of use, personal innovativeness, and perceived usefulness positively impacted consumer behavioural intention of using ride-sharing services. The study also found that perceived risk was negatively associated with perceived usefulness and the intention of using ride-sharing services, whereas personal innovativeness was negatively associated with perceived risk while positively influenced the perceived ease of use and perceived usefulness. Based on the study findings, practical implications and future research recommendations were discussed. Hence, this paper on the sharing economy, specifically of the transportation sector could assist policymakers and business operators in promoting sustainable transportation through ride-sharing services.

Keywords: Ride-sharing services, Sharing economy, Technology Acceptance Model

1.0   Introduction

Sharing economy is considered as a socio-economic model wherein firms use various online platforms to not only share but also to reuse excessive products or services (Grybaitė and Stankevičienė, 2016; Valente, Patrus, & Guimarães, 2019). Individuals can utilise their excess production capability to generate additional earnings, from which many academicians have labelled this as the "sharing market" (Benoit et *al.*, 2017; Valente & Patrus, 2019). Recently, many firms are showing up under the umbrella of sharing and collaboration (Valente, Patrus, & Guimarães, 2019). Due to the sharing economy, the conventional manufacturing industry is undergoing a metamorphosis to the novel form of the service sector that is popularly known as the ride-sharing industry (Yun et *al.*, 2020). Bangladesh as a developing country (Hossain, Naser, Zaman, & Nuseibeh, 2020) revealed the rising popularity of ride-sharing since 2016 when some popular companies entered the Bangladeshi market to meet the escalating public demands. According to Rahman et *al.* (2019), adapting digital technologies allow people from developing countries to upgrade their quality of living. A report published by Industrial Development Leasing Company of Bangladesh Limited (IDLC) in 2019 showed that the number of estimated commuters who wanted to avail ride-sharing services through mobile apps was 10,000 in January 2017. Meanwhile, the report published by The Business Standard has shown that 7.5 million rides have made by commuters every month on average through such ride-sharing services (Tarek & Amit, 2020). Therefore, it can be deduced that the ample number of advantages resulting from the sharing economy model implementation has made it widely acceptable across many entities and firms (Schor, 2016). According to Napalang and Regidor (2017), people from urban areas have started to consider ride-sharing services as a feasible medium of transportation after enduring toilsome transportation difficulties. Similarly, Liu and Wayne (2019) have noted the transformation of conventional cab services as a result of the online ride-sharing applications that typically link passengers and drivers directly. These smartphone-based applications allow both riders and customers to have increased levels of flexibility and efficiency (Cheng, Fu, & de Vreede, 2018; Creutzig et *al.*, 2019). Additionally, it has become an integral part of the urban transportation system (Jin, Kong, Wu & Sui, 2018), thus rendering ride-sharing a topic that has caught the interest of many researchers (Christina, Suhud, & Rizan, 2018; Wang, Wang,

Wang, Wei, & Wang, 2018). In line with other scholars (Clewlow et *al*., 2017; Christina et *al*., 2018; Y. Wang et *al*., 2018), this technology has started to gain prevalence due to its explicitness and feasibility.

According to Eisenmeier (2018), a consumer surplus of US$ 2.9 billion was generated in four cities of the United States in 2015. Currently, the global user penetration rate of ride-sharing services is 19.3 per cent and this value is anticipated to rise to 20.6 per cent by 2024. Meanwhile, the global revenue was found to be US$192,276 million; due to the large-scale embracement of ride-sharing services, it is presumed that in the year 2024, the annual growth rate will surge to 17.5 per cent and contributing to a market volume of US$365,912 million (Statista, 2020). This indicates that the people are heading towards greater use of sharing economy in recent years.

Ride-sharing is a phenomenon in which multiple individuals travel to their respective destinations in the same vehicle due to having similar schedules and plans, thus sharing the costs (Furuhata et *al*., 2013; Long, Tan, Szeto, & Li, 2018). There are several benefits of using ride-sharing services: first, it decreases the expenses and upsurges the ease of travel for the drivers and passengers alike (Liu, Kockelman, Boesch, & Ciari, 2017; Dills & Mulholland, 2018). For instance, the people in urban cities of Bangladesh has reported comfort issues in using public transportation due to not getting seats during rush times. Moreover, such transportation stops at different locations to fetch passengers, which are time-consuming for other passengers. People have also expressed their dissatisfaction with other transportation vehicles due to the operators charging a disproportionate fare and ignoring commute requests (IDLC, 2019). Therefore, ride-sharing plays a significant role in reducing traffic congestion and cutting down the levels of energy usage and greenhouse gas emissions by making use of the spare seats and decreasing the number of vehicles used (Teubner and Flath, 2015; Namazu, MacKenzie, Zerriffi, & Dowlatabadi, 2018). According to IDLC (2019), 36% per cent of the people are living in the capital city of Dhaka, which makes it one of the most densely populated cities of South Asia. According to the estimation by the World Bank, the average traffic speed has declined from 21 kilometres per hour to 7 kilometres per hour (IDLC, 2019). Lastly, ride-sharing benefits the society by providing people with the opportunity to develop their socialisation skills, thus fostering the bond of mutual trust (Furuhata et *al*., 2013; Hofmann, Hartl, & Penz, 2017).

The tenable transportation mode of ride-sharing has been acknowledged as an eminent means by which levels of carbon release and traffic jams can be reduced (Wang et al., 2018). To cut down the increasing traffic congestion and foster environmentally safe travel practices, countries such as Germany, Britain, United States, and Canada have devised various sets of policies with the assistance of their respective local and regional governments. The policies such as availability of ride-share lanes and a decreased fuel tax are all aimed at motivating for increased usage of ride-sharing (Collura 1994; Caulfield, 2009).

Putting the perspective of Bangladesh into consideration, there are several reasons that justify the rising necessity of investigating consumer behaviour regarding ride-sharing services. Firstly, the number of consumers utilising ride-sharing services accounts for a whopping 4.7 million in the country. Secondly, this sector generated a revenue of US$ 55,558 million and US$ 26,153 million in China and India, respectively, in the year 2020 (Statista, 2020). Contrarily, this figure has accounted for only US$141 million in Bangladesh. Thirdly, in the light of Statistics (2020), the figures of average revenue per user accounted for only US$29.98 in Bangladesh, while China and India yielded US$106.55 and US$88.39, respectively, in the same year. This underlines the need to examine the consumer behaviour of using ride-sharing services within the context of Bangladesh.

According to Agatz, Erera, Savelsbergh, and Wang (2012), many ride-sharing applications in smart devices and the evolution of online-based peer-to-peer ride-sharing mediums collectively have aided in bringing out the advancement of the practice. Accordingly, a transportation network company can facilitate the process of ride-sharing in many ways. For example, they ensure an active exchange of information, provide effortless connectivity to shared vehicles, and allocate instant availability of ride-sharing services through geo-location technology available in intelligent devices (Teubner and Flath, 2015; Dills & Mulholland, 2018).

To spread the concept of ride-sharing and ensure public awareness of its benefits, many initiatives have to be taken. This may include aid from the government and technical cooperation regarding the usage of such mobile ride-sharing applications. More importantly, it is crucial to find the factors that influence and determine the ability and eagerness of Bangladeshi consumers in using and publicising the ride-sharing service. To comprehend the factors that have an impact

on consumer motive to use such services, the Technology Acceptance Model (TAM) by Davis (1989) has been adopted as the basic theoretical concept. In undertaking issues relating to consumer acknowledgement of innovative technology, the model has often served as a potent means (Cheung and Vogel, 2013; Hubert et al., 2017). Prior studies have also made use of it to analyse the extent to which consumers want to use shared-ride services and have a real sense of their value and benefits. For instance, a study by Chen and Lu in 2016 applied green TAM to analyse and examine the motive of consumers in using public bike-sharing services. The study found that green TAM was properly applicable in explicating the determinants and factors associated with the consumer acceptance of ride-sharing services. Meanwhile, investigating the factors affecting the motivation of Swedish generation Y customers to use Uber resulted in Fleischer, and Wahlin (2016) formulating a research model with the Theory of Planned Behaviour (TPB) and TAM. The latter theory was initially introduced by Ajzen (1991).

Similar to every other theories that have assisted in explicating innovative technology acceptance, TAM is also subject to many criticisms. For instance, scholars and critiques have argued that it is incomprehensive and does not consider negative factors, thereby evaluating only the positive driving factors of consumer motives towards the acceptance of new technology (Cheng and Huang, 2013; Girod, Mayer, & Nägele,2017). Besides, consumers often worry about the potential risks associated with the use of using ride-sharing services (Kim, Baek, & Lee, 2018), which is thus considered as an important factor as the service is a novelty in the field of technology (Lee, 2009; Gao, & Chen, 2019).

Furthermore, the personality trait of a consumer such as individual innovativeness may serve as a determinant of their ability to acknowledge ride-sharing services (Wang et al., 2018). This is attributable to the features of mobile-based ride-sharing services that are characterised by innovativeness (Girod et al. 2017). Similarly, the degree to which a consumer is conscious of the environmental well-being is also a determinant relating their acceptance of ride-sharing services (Tussyadiah, 2015). This can be described by ride-sharing services having many pros to the environment; for instance, it eases traffic jams and reduces carbon release (Caulfield, 2009; Yu et al., 2017).

The intention of the customers to utilise different technologies has been explicated through TAM in many studies, such as mobile service (Wang, Lin, & Luarn, 2006), teacher technology usage (Teo, 2011), internet banking (Lee, 2009; Yousafzai, Foxall, & Pallister, 2010; George & Kumar, 2013), and online tax service (Wu & Chen, 2005). However, empirical studies related to ride-sharing services in the context of developing countries are scarce and have received less attention from scholars (Wilhelms et *al.*, 2017). As a result, some research questions are still unanswered. Consequently, this research is intended to explore the factors influencing the intention to use ride-sharing services from the perspective of TAM and in the context of Bangladesh. This gives rise to the following question: what factors affect the behavioural intention of customers to use ride-sharing services? Accordingly, this study aims to fill the gap by delineating the consumer intention to use ride-sharing services, thus addressing the research question, as well as contributing to the existing theoretical and academic literature on ride-sharing services from the perspective of Bangladesh. To understand the consumer intention of using ride-sharing services more profoundly based on the above discussion, this research attempts to add individual innovativeness, perceived risk, and environmental innovativeness into the model. In comparison to the previous studies based on the same context, this research is more purposeful as it puts the additional determinants into consideration as well.

2.0 Theoretical background, research model and hypothesis

2.1 Technology acceptance model

Initially proposed by Davis in 1989, the technology acceptance model (TAM) is a widely implemented groundwork typically used to comprehend an individual's acknowledgement of specific innovative technology (Legris et al., 2003; Hubert et al., 2017). According to the model, perceived usefulness and perceived ease of use are two significant components that determine the consumer's usage attitude and intention towards a novel technology (Davis, 1989). In particular, the perceived ease of use is the degree to which an individual can use the technology both simply and conveniently (Venkatesh and Davis, 2000). In contrast, the degree to which the implementation of technology is assumed to be beneficial and effective can be referred to as perceived usefulness (Legris et al., 2003).

Perceived ease of use, in general, has a positive impact on perceived usefulness as specified by TAM. Moreover, the consumer's attitude towards using a novel form of technology is positively impacted by both perceived usefulness and perceived ease of use in accordance with TAM. In addition to this, their intention to use technology is collectively affected by both attitude and usefulness. Lastly, the actual use behaviour is ascertained by the consumer's usage intention. Prior to this, TAM has been used in some studies by eliminating the attitude towards using a novel technology (Wu et al., 2011; Park et al., 2014). Two reasons justify this move: first, it is difficult to quantify and measure attitude (Chen, 2008), and second, the intervention effect of attitude that acts as an intervener between the consumer's fundamental beliefs (perceived ease of use and perceived usefulness) and behavioural intention is weak (Lee and Lehto, 2013). Similarly, the study conducted by Venkatesh (2000) on consumer behaviour has implied that the simplified TAM is more prognostic than its original. Additionally, more recent studies (Nikou, & Economides, 2019; Chang, Hajiyev, & Su, 2017) have also shown that perceived usefulness and perceived ease of use are thus identified to create a positive impact on behavioural intention. Therefore, the simplified TAM is henceforth adopted for the current research.
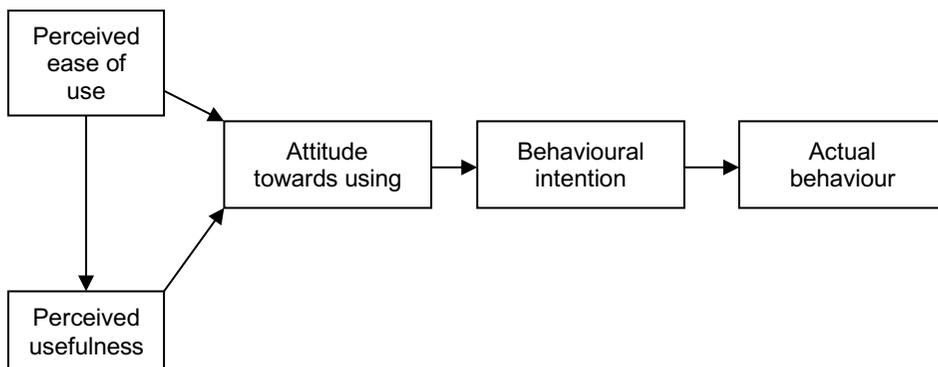

Figure 1 : Technology Acceptance Model by Davis (1989)

In reference to ride-sharing, the degree to which users believe that the use of such service is not difficult can be thus known as the perceived ease of use. Conversely, the element of perceived usefulness determines the degree to which the consumers assume that the ride-sharing service helps them to attain specific objectives, such as pleasant ride experience and trip convenience, decreased travel

costs, decreased levels of fuel usage, lower greenhouse gas release, and mitigated traffic jams (Namazu, MacKenzie, Zerriffi, & Dowlatabadi, 2018; Machado, De Salles Hue, Berssaneti, & Quintanilha, 2018; Wang et al., 2018).

Furthermore, Park et *al*. (2014) have stated that perceived usefulness and ease of use are two factors that consumers consider when it comes to using new technology. Perceived ease of use, in particular, has revealed in earlier studies that a positive association with behavioural intention and perceived usefulness can be seen, while and perceived usefulness shows a positive association with behavioural intention (Cheng and Huang, 2013; Tan, Ooi, Leong, & Lin, 2014; Lee, Lee, & Jeon, 2017; Chen, & Tsai, 2019; Nikou, & Economides, 2019). Therefore, by adhering to the same analogy regarding ride-sharing services, the following hypotheses are proposed:

H1. Perceived ease of use has a positive association with perceived usefulness.

H2. Perceived ease of use has a positive association with consumer intention to use ride-sharing services.

H3. Perceived usefulness has a positive association with consumer intention to use ride-sharing services.

2.2   Perceived risk

According to Park et al. (2014), negative factors are typically ignored by TAM, whereby it only puts the positive factors of innovative technology utilisation into consideration. Unfortunately, perceived risk is a major barrier that has been found to make consumers feel reluctant towards adapting a new technology or service (Kim et al., 2008; Cheng and Huang, 2013; Chauhan, Yadav, & Choudhary, 2019; Wang, Wang and Wang, 2019). Consequently, it is crucial to evaluate the impact of such element by integrating it into TAM. Henceforth, it can be positioned that the fundamentals of TAM, namely perceived usefulness and perceived ease of use are the positive factors that lead to the consumer utilising innovative technology. On the contrary, perceived risk is considered as a negative component and justifies the consumer's reluctance in using said novel technology.

In general, perceived risk comprises of various risks such as physical, financial, psychological, product performance, social, or time

elements in the context of product or service usage and its consequence (Featherman & Pavlou, 2003). Following this, many issues are in consumers' minds when making use of a novel technological innovation (Hong, 2017; Tussyadiah and Pesonen, 2016). For example, some studies have found that the issues bothering the consumers of developing countries are the risks associated with security, privacy, and additional payment charged at the time of using ride-sharing services (Lee, Rahafrooz, & Lee, 2017; Valente, Patrus, & Guimarães, 2019). Furthermore, Cheng (2016) has argued that the ride-sharing service typically operated via a mobile phone is a form of emerging O2O (online to offline) business model, which has many physical, legal, and financial risks associated. Moreover, the studies conducted by Yang and Ahn (2016) and So et al. (2018) have found that passengers are typically concerned about their security issues when they engage in communication with unknown people.

Therefore, perceived risks can diminish the optimistic perceptions with regard to products and services that consumers form. When they focus more on the perceived risk, they are more likely to ignore the products and services, thus assuming that the products are not worthy (Martins, Oliveira, & Popovič, 2014; Boateng, Kosiba, & Okoe, 2019).

Similarly, studies conducted in the e-commerce field have shown that perceived risk negatively impacts perceived usefulness in the case of online shopping payment and internet banking (Jarvenpaa, Tractinsky, & Vitale, 2000; Featherman and Pavlou, 2003). Laforet and Li (2005), among others, have found that it is essential for the acceptance of innovative technology by a consumer. In contrast, consumer adoption intention is also negatively impacted by the level of perceived risk (Chauhan, Yadav, & Choudhary, 2019). Moreover, the study conducted by Yang et *al*. (2015) has revealed that perceived risk is negatively associated with consumer behavioural intention. On the other hand, ride-sharing services in many developing nations are observed to be unmanaged; reasons such as rash driving, theft activities of drivers, and unrecoverable loss of customer possessions have increased the perceived risks associated with such services (Boateng, Kosiba, & Okoe, 2019). In the context of the arguments mentioned above, the hypotheses proposed are:

H4.   Perceived risk has a negative association with perceived usefulness.

H5.   Perceived risk has a negative association with consumers intention to use ride-sharing services

2.3   Personal characteristics

Cheng and Huang (2013), for example, have argued that the knowledge of personal characteristics is vital to raise the predictability of TAM. A typical TAM only takes into account the consumer's abstract beliefs about the technology characteristics while leaving out on the consumers' personal characteristics. Furthermore, one of the insufficiencies of research on the new green technology acceptance is that it only considers the technological perspective. Regardless, the inclusion of personal characteristics into TAM can help to overcome the weaknesses of the research effort itself (Girod et al., 2017). Two prime personal characteristics that affect consumer acceptance of innovative technology are environmental awareness and personal innovativeness (Girod et al., 2017). Therefore, to create a more extensive outline that aids in studying the consumer intention to use ride-sharing services, these two prime factors are integrated into the TAM.

According to Rogers (1995), personal innovativeness is considered as the extent to which an individual is capable of adapting to novel entities such as new services, technologies, or products at a faster rate than others. Following this, Nikou (2019) has argued that it is a crucial determinant of consumer intention to adopt novel technologies, while Lewis, Agarwal, and Sambamurthy (2003) are of the opinion that a higher degree of personal innovativeness embedded in an individual leads to a higher likelihood of confidence with regard to using new technologies. Moreover, Lu et al. (2005) have found that individuals with high personal innovativeness tend to perceive innovative technology more optimistically and intend to embrace it more compared to those with low personal innovativeness. In line with this, Serenko (2008) has also inferred that perceived ease of use and perceived usefulness are impacted by personal innovativeness, whereas previous studies by Bhatti (2007) and Tan et al. (2014) further prove such impact. Moreover, it is found that consumer adoption intention is affected by this phenomenon as well (Tan et al., 2014). In addition to these determinants, individuals having high personal innovativeness tend to focus more on the benefits of innovative technology than the associated risks (Cheng and Huang, 2013). In line with the innovation diffusion theory, it is found that individuals with

higher levels of personal innovativeness are more prone to embrace new technologies, possess a higher capability to cope with the uncertainty, and understate the consequences of associated risks (Agag and El-Masry, 2016). Additionally, the study by Aldás-Manzano et *al*. (2009) has indicated that risk-bearing ability and behavioural intention are considerably impacted by the level of personal innovativeness possessed by an individual. Thus, the hypotheses that can be drawn from the above-discussed notions are:

H6.   Personal innovativeness has a positive association with the perceived ease of use.

H7.   Personal innovativeness has a positive association with perceived usefulness.

H8.   Personal innovativeness has a negative association with the perceived risk.

H9.   Personal innovativeness has a positive association with consumer intention to use ride-sharing services.

Environmental awareness is an individual's knowledge and interest in the manner in which human behaviour creates an impact on the environment (Schuitema, Anable, Skippon, & Kinnear, 2013). According to Hopwood, Mellor, and O'Brien (2005), this particular notion is comprehensive in nature, whereby it includes various dimensions such as sensibilities, perceptions, cognitions, and concerns regarding environmental issues. It also involves an individual's attitudes and thoughts regarding problem-solving, while concurrently incorporates how human-environmental relationships should be managed to improve environmental quality. Therefore, environmental awareness can act as a prime driving factor in transforming the current individual behaviour towards a more environmentally responsible behaviour (Wang et *al*., 2016).

It has been emphasised in many past studies that individuals are more likely to take up initiatives that are more environmentally friendly when they possess higher levels of environmental awareness (Kahn, 2007; Bansal, 2011; Khaola, Potiane, & Mokhethi, 2014; Chen and Hung, 2016). Meanwhile, those conducted by Fishman et *al*. (2013) and Jamšek and Culiberg (2020) have noted that consumers are more prone to use bike-sharing systems when they have higher levels of environmental awareness. Besides, Wang, Li, and Zhao (2017) have found that such people are more likely to be inspired for

the use of vehicles utilising sustainable energy so that the level of harmful gas release can be reduced, thus acting environmentally responsible by adopting such means. In consideration of the environmental gains behind the use of a sustainable mode of ride-sharing, it can be reasoned that consumers with increased levels of environmental awareness are more probable to use ride-sharing services. Therefore, the following hypothesis is proposed:

H10. Environmental awareness has a positive association with consumers intention to use ride-sharing services.

3.0 **Methodology**

3.1 Data Collection

To test the hypotheses drawn in this study, the research instrument used to collect data consisted of the questionnaire survey method. Divided into three parts, the first segment comprised the respondent demographic, followed by introductory questions on ride-sharing, and finally, a set of measurement items designed to capture the research model constructs. A pilot test was initially conducted prior to the formal survey, following which the questionnaire was further discussed and modified after receiving feedback from 35 piloting respondents. Based on the pilot test, the time required to complete the questionnaire was approximately 7 minutes in duration. Subsequently, data collection period spanned from June to mid-September 2019 and Google Form was used to conduct the formal survey online. A total number of 580 respondents took part in the study and were split into two groups, whereby the first group amounted to 320 individuals who were students belonging to eight different private universities in Bangladesh. Meanwhile, the respondents of the second group were selected randomly and then completed the questionnaires at their own discretion.
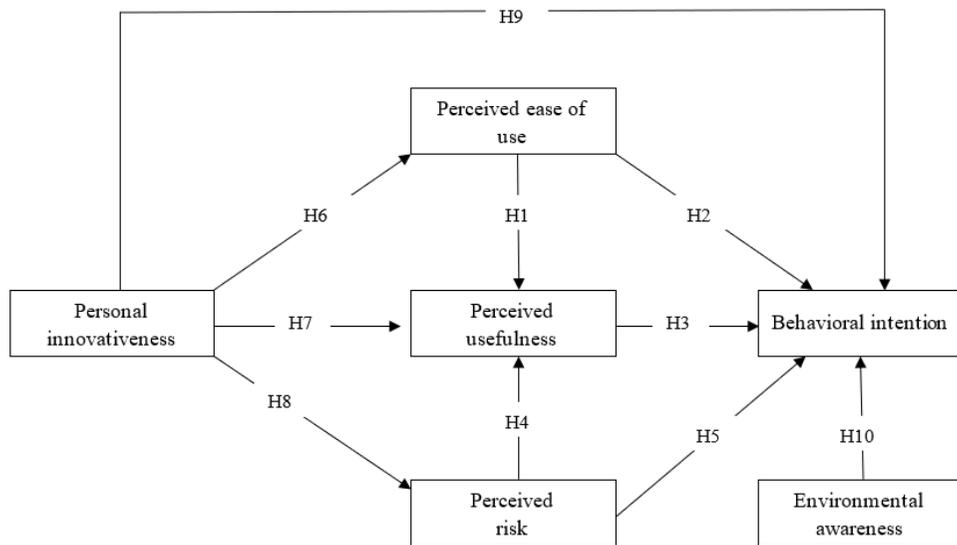
Figure 2 : The research framework

As the prime users of app-based ride-sharing services consisted of youths owning smart devices (Zhu et *al*., 2017a, b), engaging with the students was appropriate and relevant in the context of this survey. Out of the total of 683 responses, 103 were discarded as some had missing values while the others had an inconsistent pattern of responses. Conclusively, after dismissing 103 responses, the remaining 580 responses were considered as valid and subjected to data analysis.

Table 1 depicts the demographic information of the participants. It showed that more than 50% of the respondents were male, while a majority of the total respondent (47%) aged between 15 and 25 years. The participants were revealed to be well-educated, whereby the percentage of bachelor and master degree holders was 37 and 14 per cent, respectively. Regarding the monthly income, 47% of the total respondents earned an income below 20000 BDT, while only 4.5% had an income above 50000 BDT. Moreover, in terms of user experience, 513 participants had previously used ride-sharing facilities, whereas the remaining 67 had never used any services related to ride-sharing.

3.2   Measures:

Based on a comprehensive review of the literature on TAM, personal innovativeness, environmental concern, and perceived risk,

the measurement items were formulated accordingly. However, to make the questionnaire more suitable for the context of ride-sharing, slight alterations were made to the wording. Therefore, a 5-point Likert scale with options ranging from "strongly agree" to "strongly disagree" was used to measure the items.

Table 1 : Demographic profile of respondents (n=580)

Variable		Frequency	Percentage (%)
Gender	Male	326	56
	Female	254	44
	Total	580	100
Age	15-25	274	47
	26-35	239	41
	36-45	40	7
	Above 45	27	5
	Total	580	100
Education level	High school or College	282	48.62
	Bachelor's degree	214	37.00
	Master's degree	81	14.00
	PhD	3	0.50
	Total	580	100
Monthly income	Less than 20000 BDT	274	47.24
	20000-35000 BDT	213	36.72
	35000-50000 BDT	78	13.44
	Above 50000 BDT	15	2.60
The ride-sharing experience	Yes	513	88.44
	No	67	11.56
	Total	580	100.00

The items of perceived ease of use were derived from the study of Gefen, Karahanna, and Straub (2003), while those of perceived usefulness were adapted from the study of Gefen and Straub (2004). Next, the measurement items of the intention to embrace ride-sharing were derived the studies of Yu, Ha, Choi, and Rho (2005) and Kim, Choi, Kim, and Park (2017) accordingly. Meanwhile, the items of personal innovativeness were derived from the study of Venkatesh and Davis (2000), Kuo and Yen (2009), and Cheng and Huang (2013), whereas those used in the studies by Fransson and Gärling (1999) and Ahn, Kang, and Hustvedt (2016) were employed to measure the

environmental awareness construct. Last but not least, measuring perceived risk incorporated items that were mostly derived from the studies of Kim et *al*. (2017) and Zhu et *al*. (2017a, b).

4.0 **Results**

In essence, SEM was performed to assess whether the data fit the conceptual framework and test the proposed hypotheses, following which SPSS 20 and AMOS 20 were employed to carry out the data analysis. In particular, AMOS 20 was used to perform confirmatory factor analysis (CFS) and followed by path analysis.

4.1 Confirmatory factor analysis

For data analysis purposes, the goodness of fit, reliability, and validity of the model were analysed in detail. Previously, Hair et al. (1998) have suggested that the standardised factor loadings of every item should be above 0.70. Accordingly, Table 2 demonstrates that the model achieves the underpinning criteria as the standardised factor loading of the items are above the benchmark value.

Table 2 : Convergent validity and Reliability Assessment

Construct	Item	Reliability		Convergent validity	
		Cronbach's alpha	Composite reliability	Standardised factor loading	AVE
Personal innovativeness	PI1	0.77	0.82	0.75	0.67
	PI2			0.79	
	PI3			0.83	
Perceived ease of use	PEU1	0.87	0.90	0.88	0.86
	PEU2			0.92	
	PEU3			0.86	
Perceived usefulness	PU1	0.88	0.92	0.83	0.71
	PU2			0.79	
	PU3			0.75	
	PU4			0.84	
	PU5			0.82	
Perceived risk	PR1	0.80	0.86	0.87	0.63
	PR2			0.82	
	PR3		0.84		
	PR4		0.79		

Table 2 : Convergent validity and Reliability Assessment - continue

Construct	Item	Reliability		Convergent validity	
		Cronbach's alpha	Composite reliability	Standardised factor loading	AVE
Environmental awareness	EA1	0.83	0.91	0.73	0.65
	EA2			0.78	
	EA3			0.85	
	EA4			0.87	
Behavioural intention	BI1	0.84	0.89	0.87	0.80
	BI2			0.91	
	BI3			0.85	

In this study, the construct reliability was measured using the values of composite reliability and Cronbach's alpha (Fornell and Larcker, 1981). First, Cronbach's alpha values for perceived ease of use, personal innovativeness, environmental awareness, perceived usefulness, perceived risk, and behavioural intention were 0.87, 0.77, 0.83, 0.88, 0.80, and 0.84, respectively; all of the values were above the required benchmark. Similarly, the composite reliability values of the tested constructs were above the recommended level of 0.70 and ranged from 0.82 to 0.92, thus suggesting that the results were reliable. Furthermore, convergent and discriminant validity both were adopted based on Fornell and Larcker's criterion (1981) to evaluate the validity of the constructs, whereas convergent validity was also assessed using the average variance extracted (AVE) (Chiu and Wang, 2008). According to Hair et al. (2006), the recommended value of AVE is 0.50; consequently, the results obtained showing values ranging from 0.65 to 0.71 thus indicated that the required and recommended level was successfully attained. In particular, the assessment of discriminant validity was carried out by comparing the construct correlations and the square root values of AVE (Chiu and Wang, 2008). Next, Table 3 shows that the square root of AVE values replaced the diagonal components present in the correlation matrix, whereby these values were larger than the construct correlations. Therefore, the current research successfully verified and confirmed the discriminant and convergent validity of its model (Fornell and Larcker, 1981).

Table 3 : Discriminant validity of the research model

Construct	PI	PEU	PU	PR	EA	BI
PI	**0.79**					
PEU	0.64	**0.87**				
PU	0.73	0.68	**0.78**			
PR	-0.38	-0.31	-0.43	**0.81**		
EA	0.55	0.51	0.61	-0.37	**0.86**	
BI	0.73	0.64	0.76	-0.58	0.51	**0.83**

The diagonal (bold) elements are the square roots of AVE values and the off-diagonal elements are the correlations among the constructs

In general, a statistical test can be influenced by the number of observable variables; therefore, measuring the fit indexes of a model is considered to be more appropriate (Lu et *al*., 2007). Prior research works by Hair et al. (2006) and Kim, Mirusmonov, and Lee (2010), respectively, have shown that the evaluation of absolute fitness can be assessed by a ratio of χ2 to the degree of freedom, RMR, RMSEA, GFI, and AGFI. Table 4 demonstrates that such goodness-of-fit indices fulfil the recommended requirement level. Here, the research model's parsimony fit indices (i.e. PNFI and PGFI) and incremental fit indices (i.e. CFI and NFI) met the requirement as their values were more than 0.9 and 0.5, respectively. Hence, the model was satisfactorily regarded as having a good model fit.

Table 4 : Goodness-of-fit indices of confirmatory factor analysis

Fitness index	Ideal value	Index value
Absolute fit measure		
χ2/df	< 3.00	2.73
RMSEA	< 0.08	0.06
GFI	> 0.90	0.95
AGFI	> 0.90	0.93
RMR	< 0.05	0.02
Parsimony fit measure		
PGFI	> 0.50	0.65
PNFI	> 0.50	0.72
Incremental fit measure		
NFI	> 0.90	0.91
CFI	> 0.90	0.93

4.2   Path Analysis

Following the confirmation of model fitness, path analysis was performed to assess the hypotheses of this study. Figure 3 and Table 4 below represent the results of path analysis carried out, whereby the results obtained indicate that all of the proposed hypotheses re in line with the anticipated direction. In particular, personal innovativeness revealed a positive association with the intention to use ride-sharing services (β = 0.29, t value = 3.48, p < 0.05), as well as perceived usefulness (β = 0.35, t value = 3.44, p < 0.001) and perceived ease of use (β = 0.38, t value = 7.17, p < 0.001), thus indicating the support for H7, H9, and H6. Besides, the findings showed that consumers with high personal innovativeness found it easy to use ride-sharing services and were in favour of such usage.
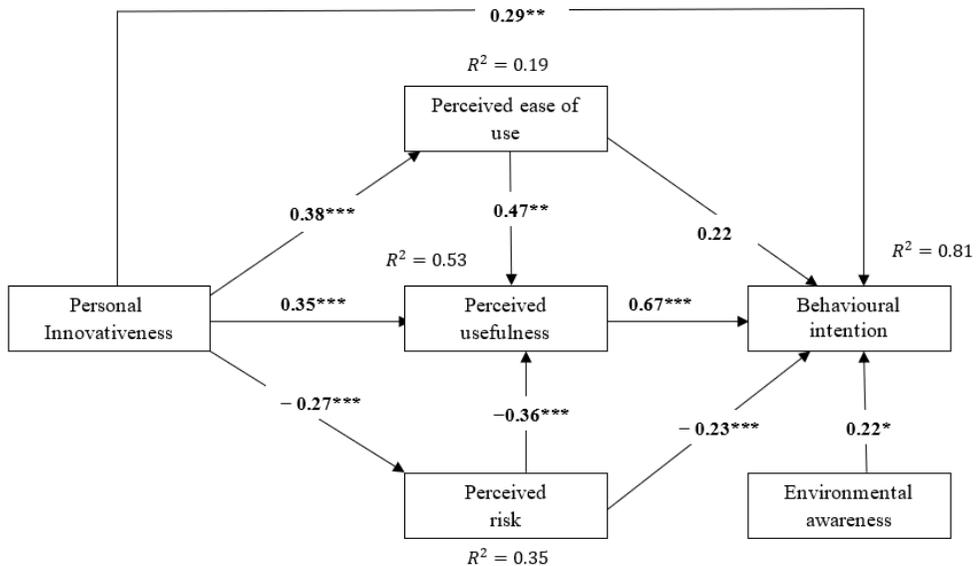

Figure 3 : Path analysis results. *Notes*: *p < 0.05, **p < 0.01, ***p < 0.001

Moreover, highly innovative people are more prone to consider the benefits of ride-sharing facilities, which are in line with previous studies (Kuo and Yen, 2009; Kim et al., 2010; Cheng and Huang, 2013). The result of the current study suggested that personal innovativeness negatively impacted perceived risk (β = − 0.27, t value = − 7.78, p < 0.001). Therefore, H8 was supported; in accordance with the expected outcome, perceived ease of use yielded a positive

association with perceived usefulness, showing support for establishing H1.

Table 5 : Results of path analysis

Path from	Path to	Estimate	t value	Result
H1: Perceived ease of use	Perceived usefulness	0.47***	3.25	Supported
H2: Perceived ease of use	Behavioural intention	0.22**	3.47	Supported
H3: Perceived usefulness	Behavioural intention	0.67***	4.74	Supported
H4: Perceived risk	Perceived usefulness	−0.36***	-2.73	Supported
H5: Perceived risk	Behavioural intention	−0.23***	− 5.27	Supported
H6: Personal innovativeness	Perceived ease of use	0.38***	7.17	Supported
H7: Personal innovativeness	Perceived usefulness	0.35***	3.44	Supported
H8: Personal innovativeness	Perceived risk	−0.27***	− 7.78	Supported
H9: Personal innovativeness	Behavioural intention	0.29**	3.48	Supported
H10: Environmental awareness	Behavioural intention	0.22*	3.73	Supported

The results are significant at *$p < 0.05$, **$p < 0.01$, ***$p < 0.001$

Similarly, the results demonstrated the significant impact of perceived ease of use on the behavioural intention of using ride-sharing services (β = 0.22, *t* value = 3.47, *p* > 0.0*1*), thus in support of H2. Moreover, perceived usefulness posed a significant impact on the behavioural intention of using ride-sharing services (β = 0.67, *t* value = 4.74, *p* < 0.001), thereby indicating support for H3. As perceived risk negatively impacted behavioural intention of using ride-sharing services and perceived usefulness, it indicated support for both H4 and H5, suggesting that it directly impacted the behavioural intention for using ride-sharing services. Additionally, the construct had an indirect impact on behavioural intention through perceived usefulness. Meanwhile, environmental awareness was revealed to have a positive and direct impact on the behavioural intention to use ride-sharing services (β = 0.22, *t* value = 3.73, *p* <0.05), indicating that H10 was hence supported. Next, the results also demonstrated that individuals with high environmental awareness were seemingly more interested in using the sustainable transportation mode, namely ride-sharing. However, they also suggested that the impacts of environmental awareness and personal innovativeness both on the behavioural intention of using ride-sharing services were comparatively less.

5.0 Implications

The current research on the sharing economy, specifically pertaining to the transportation sector could assist the policymakers and business operators in promoting sustainable transportation through ride-sharing facilities. From the findings, it is evident that perceived usefulness and perceived risk are the key factors aiding the process of determining the behavioural intention of customers to use ride-sharing services. To increase the level of consumer perceived usefulness, benefits other than decreased travel costs can be offered to consumers through various ride-sharing platforms. For instance, initiatives such as availing discount vouchers for the first month of ride-sharing and free first-time ride can also be sponsored, which may help to increase consumer's sense of familiarity with ride-sharing services. This will, in turn, add on to the increasing level of perceived usefulness. Similarly, to help the public nurture a positive mentality towards the concept of ride-sharing, the government and different service providers can publicly emphasise on its associated benefits.

In contrast, relevant initiatives should also be devised and implemented towards cutting down the levels of perceived risks. Firstly, the more experience the consumers encounter with technology, they are more likely to experience decreased levels of perceived risks (Cheng and Huang, 2013). Hence, this explicates the effectualness of promotional policies in increasing the trial rate of ride-sharing. Secondly, the financial and personal security of a consumer should be ensured at all levels by platform operators with the aid of advanced security mechanisms. Moreover, driver authenticity and vehicle information should be strictly checked as this would upgrade the real-name authentication system in use and assure top-level security. Accordingly, the consumer's perceived level of risk and issues relating to insecurity can be reduced by providing them with insurance facilities. Lastly, issues relating to the use of the user's information and the limits of accessing data should be explicated and conveyed to the consumers with clarity and assurance.

6.0 Conclusion

The usage of ride-sharing services can act as a precursor to decreased amounts of carbon release in the air and can have an impact on the mitigation of traffic congestion. The study examined the existing association between environmental awareness, personal

innovativeness, personal usefulness, perceived risk, perceived ease of use, the behavioural intention of using ride-sharing services. The study has also examined the motives and reasoning of users to either use or not to use these services. The study incorporates both the positive perceptions concerning ride-sharing services, by the consumers such as perceived usefulness and also the negative perceptions by the consumers such as perceived risk. Concomitantly, the impact of personal characteristics on using ride-sharing services has been examined in the conceptual framework of the study. The results bring to light that the consumer's trait of personal innovativeness positively impacts the behavioural intention of using ride-sharing services. Consumers with increased levels of personal innovativeness are more likely to find the newly emerging service of ride-sharing to be quite appealing. Nevertheless, this positive effect is found to be moderately small ($\beta = 0.17$) in view of the fact that consumers make a choice of using ride-sharing services based on its convenience and usefulness, not on their need for inquisitiveness and recentness. Environmental awareness is noted to be positively connected to consumers' willingness to using ride-sharing services. This positive effect is found to be moderately small ($\beta = 0.22$). Moreover, this owes to the fact that the majority of the consumers in Bangladesh may not consider the context of environmental safety and how the usage of a ride-sharing service would contribute to it. In consideration of the foregoing, most of the consumers avail of a ride-sharing service to benefit in terms of economy, convenience, and comfort, rather than intending to act in an environmentally responsible manner.

The strongest influential factor, perceived usefulness is found to be positively related to the consumer's intention of using ride-sharing services. Therefore, it can be inferred that the main engines that determine the usage of ride-sharing services are the components that comprise perceived usefulness, such as the benefit and ease that are experienced. Nevertheless, the behavioural intention of using ride-sharing services was significantly affected by perceived ease of use, which is inconsistent and contradicts the results of prior researches carried out by Cheng and Huang (2013) and Wu and Wang (2005). A noteworthy amount of impact is created on a consumer's intention to use ride-sharing services by the perceived ease of use by means of an intermediary of perceived usefulness. Although most customers and future are likely to use this ride-sharing service due to the convenience and simplicity they experience, this aspect, however, alone cannot

account for the choice made by consumers. As a matter of fact, ride-sharing behaviour is only influenced by the perceived ease of use when consumers perceive it to be of great benefit to them. It is also worth noting that perceived risk has a negative impact on the consumer's intention to avail of ride-sharing services. The requirement of the use of a smart device that acts as the medium by which consumers can avail the ride-sharing services has accounted for the negative impact discussed above as it puts personal data at risk (Hong 2017).The anxiety that consumers encounter when they avail for ride-sharing services mainly stems from security concerns relating to information safety. On the other hand, consumers also have concerns regarding their physical security, for instance, experiencing an accident on the trip (Zhu et al. 2017a, b).

7.0   Limitations and scope for future research

There are some limitations of this research that need to be addressed and resolved in future research. Firstly, the data has been collected from respondents, most of which are Chinese college students. Hence, a more diverse group of people should be included. Next, the completion is relatively quite low as the competed and retuned numbers of questionnaires are less in number. Steps have to be taken to ensure a good completion rate. Thirdly, factors related to specific individual attributes like preference and experience have not been taken into account while exploring the issues of environmental awareness and personal innovativeness on the behavioural intention of using ride-sharing. Attempts have to be taken to put all these factors into consideration. Finally, the prime emphasis of this research is on the intention of using ride-sharing services rather than the true action or behaviour exhibited by the consumer. Future research studies on this topic should further examine the user's actual behaviour so that the gap among the intention and the actual behaviour of using ride-sharing services can be reduced.

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