

# Customer behavioral intentions in accepting technology-based ride-hailing service: Empirical study from Vietnam

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**Abstract.** *Technology provides opportunities for customers to access better service quality, which imposes the higher customer behavioral intentions. Ride-hailing service is the newly-emerged transportation medium in Vietnam market, surpassing the popularity of conventional vehicles (taxi, buses, for-rent bikes, etc.). While prior research has focused on the elements that influence customer behavioral intention in ride-hailing, this study sought to explain the process of establishing service quality through several variables before enhancing the customer intention. As a result, the research suggested and validated an integrated framework that included three components (perceived service quality, functional quality, and information quality) in addition to the classic service quality– customer behavioral intention model. The findings significantly confirm the fundamental conventional link between (1) Functional quality and Perceived service quality; (2) Information quality and Perceived service quality; and (3) Perceived service quality and Customer intention.*

**Keywords:** Consumer behaviour, Customer's technology acceptance, Service quality, Technology ride-hailing service.

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## Introduction

Economic transformation is identified as the major determinant of the global stage of prosperity. Ever since the beginning of the 21<sup>st</sup> century, service has become the rightful impetus for international development (Ozbekler and Ozturkoglu, 2020) with the radically increasing level of competitions among enterprises and nations. Quality, under the circumstances, is considered to be the recipe for success for better market dominance (Greenfield, 2014; Buell et al., 2016; Shah et al., 2020). Scholars have focused on the connection between competition and the provision of high-quality services within enterprises, concluding that increasing competition typically results in higher service quality levels (Greenfield, 2014). A fundamental tenet of the economic models that underpin most of

this study is that a firm's market share and success are impacted by the degree of service quality provided by it and its rivals. More precisely, service quality is critical for attaining critical objectives such as building trust, increasing customer happiness, and nurturing loyalty (Shah et al., 2020), all of which are acknowledged as critical aspects in a business's competitiveness and success. As a result, service quality has been widely investigated in conventional telecommunications service environments, and certain metrics have been developed to quantify it (Buell et al., 2016).

The ride-sourcing or ride-hailing services offered by Transportation Network Companies (TNCs) have exploded in popularity among the world's metropolitan population, both developed and developing. These on-demand mobility services use modern information and communication technology-enabled smart-phone apps to link drivers and customers dynamically and effectively in real time (Nguyen et al., 2020). Unlike typical taxi services, drivers often operate their own cars and are solely liable for the vehicles' capital and operating expenditures. These services often operate under laxer regulatory conditions than taxis and shift a considerable portion of the risk to drivers, enabling them to be much less expensive in most regions than taxis. The use of mobile phone apps that provide real-time and visual monitoring of the vehicle, as well as the lack of cash transactions (although cash is allowed in certain developing countries), make TNC services easy for passengers (Truong et al., 2020). The eventual introduction of fully autonomous cars is predicted to substantially cut the prices of these on-demand mobility services in the future, allowing for a significant shift away from vehicle ownership. Ridesharing has a number of benefits. To be specific, it can reduce travel costs and improve trip convenience for drivers and passengers (Nguyen et al., 2020; Brown and LaValle, 2020; Tonder and Petzer, 2020); this type of transportation can benefit the environment by increasing the utilization of available seat capacity and reducing the number of vehicles used for personal trips, thereby alleviating traffic congestion and reducing energy consumption and greenhouse gas emissions (Bismo, 2018). Indeed, ridesharing is a sustainable means of transportation that has often been cited as an effective way to cut carbon emissions and urban congestion (Nguyen et al., 2020). Many developed countries, including the United States, the United Kingdom, Canada, and Germany, have actively promoted a wide range of policies through local and regional governments to encourage ridesharing with the goal of alleviating traffic congestion and encouraging people to develop environmentally friendly travel habits (Wenming et al., 2019; Shah, 2020; Nguyen et al., 2020).

The service quality component of ride-sourcing services is unique and hybrid, since it encompasses not just typical taxi service quality, but also the ability to access these services through the mobile app (Shah, 2020). Again, the emergence of ride-sourcing services has resulted in the establishment of an organized market for taxi service, as opposed to the disorganized market that existed before. While some researches have addressed the relevance of service quality in ride-sourcing services, defining their service quality standards remains a work in progress. Prior research on taxi and ridesharing services has primarily focused on traditional taxi services (Alonso et al., 2018; Bilali et al., 2019; Moreno et al., 2019); exploring and analyzing their regulations and governance (Diep et al., 2019) and understanding user behavior (Wenming et al., 2019). There is a growing body of literature on the quality of mobile app. services (Bismo, 2018; Nguyen et al., 2020; Tonder and Petzer, 2020). However, none of the study studies addressed ride-sourcing services. According to Nguyen et al. (2018); ride-sourcing services exposed service quality concerns. The empirical

results are insufficient in light of the ride-sourcing service's service quality. By acquiring insight into service quality elements and designing a service quality scale for ride-sourcing services, this research will close a gap in the literature.

This study aims to provide the impacts of service quality toward customer technology acceptance intention in Vietnam ride-hailing professions. In comparison to prior relevant literature on ridesharing services, this study is significant because it takes a more in-depth look at other characteristics that encourage the usage of ridesharing services. This integrated theoretical model may aid in the research of the sharing economy from the consumer technology adoption perspective.

## **Literature review**

### ***Service quality***

The quality value of a product is the utility associated with its perceived quality and predicted performance (Bismo, 2018). Different ways to ensure quality standards have been taken by sharing economy goods and services, which may leave customers unclear about the repercussions of service delivery. Ride-hailing services enable vehicle owners to earn money driving cabs. There is a great deal of variation in terms of driving abilities, auto insurance, and vehicle quality. Arguably, the inability of a provider to do a job effectively may have an effect on perceived quality. Additionally, ride-hailing service quality standards are largely influenced by rating systems and traveler comments. The heavy dependence on feedback scores increases the possibility that scores may be manipulated by anyone (Nguyen et al., 2020).

To conceptualize service quality in the information era, researchers created the online service quality (e-SQ) (Lee et al., 2021), electronic service quality (E-S-QUAL) (Parasuraman et al., 2002), and other service quality evaluation tools. However, earlier research has concentrated on established businesses (Parasuraman et al., 1988), with few studies evaluating service quality in developing industries, including the sharing economy. The only research that examined service quality in the sharing economy focused on Airbnb in particular (Tonder and Petzer, 2020). Research on the quality of service provided by online car-hailing services is still in its infancy. Additionally, prior research on the sharing economy has primarily focused on defining and explaining the phenomenon (Belk, 2010; Bardhi and Eckhardt, 2010) and its business models (Rogers, 2015), without drawing conclusions about service quality. Although past studies examined the growth of online car-hailing using economic theory (Zha et al., 2016), academics welcome chances to incorporate other theories and multi-level analyses to enable interdisciplinary and context-rich investigations (Jiang and Rosenbloom, 2005). According to service-dominant logic (Vargo and Lusch, 2004), service is central to all economic activity. As a result, the sharing economy is a subset of the service economy, and it is vital to apply service science theory to research on the sharing economy. Quality can be investigated in several dimensions. The findings of several research should be provided as follows:

Table 1. Research about service quality and service quality dimensions

| Authors and years        | Service quality definition                                                                                                                                                                                                                                                                                 | Service quality dimensions                                                                             |
|--------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------|
| Ekinci (2001)            | Generally, service quality is seen as the output of the service delivery system, particularly in pure service systems. Additionally, service quality is correlated with customer satisfaction. Customer perceptions of service quality are subjective.                                                     | (1) Physical quality;<br>(2) Output quality;<br>(3) Time quality;<br>(4) Reliability.                  |
| Kang and James (2004)    | Service quality is a broad term that refers to a customer's assessment of service expectations in relation to a business's performance. A firm with a high standard of service quality is more than likely capable of addressing consumer expectations while being economically competitive in its sector. | (1) Functional quality;<br>(2) Technical quality.                                                      |
| Saghier (2015)           | Service quality is a worldwide judgment or attitude on the service's overall excellence or superiority", and they envisaged a customer's assessment of the service's overall quality.                                                                                                                      | SERVQUAL 5 dimensions                                                                                  |
| Kasiri et al. (2017)     | Service quality is a metric that indicates how well a service meets consumer expectations. Businesses that consistently meet or exceed customer expectations are deemed to provide superior service.                                                                                                       | (1) Functional quality;<br>(2) Technical quality.                                                      |
| Nguyen and Tran (2018)   | Service quality is defined as the attitude of consumers formed over time as a result of a service performance.                                                                                                                                                                                             | (1) System quality;<br>(2) Technical quality;<br>(3) Information quality.                              |
| Pakurar et al. (2019)    | Quality of service can be understood as a comprehensive customer evaluation of a particular service and the extent to which it meets their expectations and provides satisfaction                                                                                                                          | SERVQUAL 5 dimensions;<br>(6) Access to Service;<br>(7) Financial aspect;<br>(8) Employee Competences. |
| Widiastuti et al. (2019) | The quality of service is a result of the effort that each employee of the business makes to please clients. In the common sense, service quality is described as the customer's perception of superiority or perfection.                                                                                  | (1) System Quality;<br>(2) Information Quality;<br>(3) Service Quality.                                |

Source: Author's own elaboration.

### **Customer behavioral intention and service quality**

The service provider that a customer selects is determined by the link between the willingness to pay for service quality improvements and the rise in variable costs, and, hence, pricing, associated with providing such improvements (Bobinac et al., 2010). Intuitively, theory suggests that, as customers gain knowledge about the service quality and price of competing providers in their market via numerous sources. From the information gathered, they can determine which provider best matches their own service quality and price preferences. In reality, however, this sorting is likely to be imprecise, both because customers have

difficulty evaluating service quality precisely (Aizuddin et al., 2012; Chatterjee et al., 2017) and because human information processing in complex situations is limited (Song et al., 2018). Additionally, prospective buyers are unlikely to analyze the absolute quality of each local market competition. Rather than that, customer judgments of quality are often made in a comparative perspective (Bobinac et al., 2010). Specifically, the quality of an item is determined by its relative superiority over alternatives seen as replacements by the consumer (Deutschmann et al., 2021).

Given that geographic proximity is a significant consideration for consumers when picking a service provider such as a bank (Tonder and Petzer, 2020), it is probable that the customer's evoked set would include relative levels of service performance shown by companies operating in their market. Service-sensitive clients, who are more prepared to pay for superior service, may gravitate toward organizations that have a favorable service quality/price ratio in their market over time. Similarly, price-sensitive clients with a reduced willingness to pay for service quality may drift toward organizations with a poor relative service quality/price position in their market over time. To the degree that each market has a unique mix of businesses, each with persistent, firm-level disparities in service quality (Deutschmann et al., 2021), a firm's relative service/price position may change significantly across markets. Thus, a multimarket firm's competitive environment may dictate that it maintains a relatively high service quality/price position in one market while maintaining a relatively poor service quality/price position in another. As a result of these well-understood customer sorting tendencies, a multimarket business may gain and keep customers that place a varying premium on pricing and service quality in various markets.

Customer behavioral intention should include motivating variables that impact an individual's conduct and reflect an individual's desire or attempt to commit the activity (Ajzen, 1991). The execution intent is dependent on the goal intent and specifies the time, location, and manner by which the objective will be accomplished. The purpose of the implementation is to facilitate the attainment of future objectives. The intention to engage in an action is a predictor of subsequent conduct (Jiang and Rosenbloom, 2005). Behavioral control awareness and behavioral intent may be utilized to predict actual conduct, according to the theory of planned behavior (TPB). Intent to use or purchase intent refers to the chance that a consumer intends to acquire or utilize a certain product. Younus et al. (2015) discovered that a customer's decision to use or purchase a product (intent) is highly determined by the product's value and the recommendations offered by other customers.

### ***Customer behavioral intention and ride-hailing service quality***

In the ride-hailing service, vehicle usage is a critical area of study in the development of transportation systems and the supply of related services. Along with the advancement of information technology, administrators must have efficient and timely techniques for increasing customer trust and satisfaction in order to compete and attract consumers in online marketing (Jiang and Rosenbloom, 2005; Purwanto et al., 2020).

Since the introduction of taxis from the early decades of the 20<sup>th</sup> century, this type of transportation has been the primary means of hiring vehicle with little competition from other modes (Brown and LaValle, 2020). Nevertheless, in 2012, ride-hailing services such as Uber have disrupted the taxi industry by linking passengers and drivers through smartphone apps. Both the popular press and governmental initiatives have contrasted taxis against ride-hailing services, often emphasizing the taxi driver's hardship and the impending elimination of these venerable services (Wenming et al., 2019). Fewer researches have examined how the two ways of delivery compare in terms of service quality. The continuing conflict between taxis and ride-hailing businesses has mostly centered on ride-cheap hailing's trip pricing as the key reason for declining taxi trips (Brown and LaValle, 2020). However, the cost of the journey is just one component of the service and research indicates that passengers put a premium on other components of the service, such as wait time and dependability. Therefore,

the customer behavioral intention to use taxi has been radically changed under the impact of ride-hailing service.

This may be due to the advancements in technology acceptance from customers. According to Nguyen et al. (2020), perceived utility and perceived simplicity of use associated with mobile taxi booking applications resulted in a favorable user attitude and raised the desire to use mobile taxi booking apps. As a consequence, perceived benefits were defined in this research as the advantages that mobile taxi booking applications provide customers using two well-defined variables: perceived utility and perceived simplicity of use. Along with apparent technology advantages, the economic benefits that passengers may obtain from ride-hailing service providers through the applications should be considered when determining customer happiness and loyalty. For instance, Grab, Vietnam's leading transportation service app, has been aggressively discounting and promoting its services recently, including a free ride trial, discount promo code, referral program, and discounts in select areas, in order to keep its existing customers away from emerging services offers from transportation service providers might be conceptualized as perceived sales promotion, which was one of the characteristics of marketing tools that used short-term, non-periodic approaches to increase sales in a variety of ways (Ofori et al., 2021). Furthermore, it was a critical component of the four Ps of the marketing mix, which were used to attract consumers and encourage them to purchase or try their goods and services (Younus et al., 2015). Customers are often aware of supposed price promotions which directly reduce the price for service, which makes customers more satisfied.

Theoretically, customer behavioral intention is described as a consumer's likelihood of purchasing a certain product, brand, or service in the near future (Tonder and Petzer, 2020). Scholars have indicated that behaviors such as consumer intention and repurchase intention are motivated by a conation or action orientation characterized by a willingness to behave favorably toward one entity (Lee et al., 2021). In the context of ride-hailing, buying intention refers to a consumer's desire to book a trip using the ride-hailing mobile app. Moreover, a positive attitude toward a certain product, brand, or service provider results in a buy intention (Ofori et al., 2021). Once established, such intentions are difficult to reverse, since customers would want to utilize the chosen product, brand, or service provider if they have access to them. The fast growth of the mobile internet has resulted in the creation of ride-hailing applications that meet the needs of intelligent transportation. Through the usage of ride-hailing applications, passengers may conveniently discharge taxi data through their mobile phone, which will be sent to all service provider drivers that use the apps' driver terminal (Lim et al., 2018; Fauzi and Sheng, 2020). The usage of ride-hailing applications has reduced the imbalance between passengers and drivers, hence increasing the competence with which a taxi may be summoned. Ride-hailing applications have developed a platform through which consumers may request a taxi service using mobile devices, and the request will be routed to taxi drivers who are in the area or nearby. Consumers may always view the driver profile before purchasing the service; this ensures that all drivers have an appropriate license or authorization to perform the service (Nguyen et al., 2020).

## ***Factors impact on customer technology acceptance towards ride-hailing service***

### ***Functional quality***

Functional quality refers to the quality-of-service processes that offer direct service to clients or that include contact between the service provider and the customer (Rengkung et al., 2017; Alwan and Rajab, 2021). This functional characteristic focuses on the service provided by the service provider. This quality measures an individual's attitude, adaptability, dependability, and indication of trust (Rengkung et al., 2017). Researchers have drawn attention to the service provider's quality in organizations and provided with the necessary care to help them achieve their highest goals, as all organizations strive to operate efficiently and effectively in order to accomplish previously planned goals at the lowest possible cost (Kang, 2006). The difference between a good and a poor company is how the service provider in the business interacts with the client; service provision is a mix of human resources and technology that aims to offer high-quality services in a more efficient manner. Generally, functional quality refers to the manner to which the service providers deliver the service and this would closely relate to the process of achieving better results in service quality. Functional quality can be described in SERVQUAL model, famous framework by Parasuraman (1988).

*H1: Functional quality has a strong impact on the perceived service quality of ride-hailing service.*

### ***Technical quality***

Technical quality is defined as the conformance of a product's qualities to its specification. Technical quality as defined by specification conformance indicates an operational, or internally focused, element of quality (Rengkung et al., 2017). Conformance to specifications is a result of internal processes that are very consistent and low in variance. When things are done correctly, for instance, when efficiency is high, a higher level of technical quality is produced. Technical quality may be readily quantified using statistical tools such as process capability (Kurniati and Rahayu, 2021).

Particularly, developing a technological advantage is challenging, since rivals in a wide variety of sectors might swiftly propose identical solutions (Kang, 2006). The critical management consequence is to recognize that, although it may be challenging for an organization to be first in delivering a great technical service output, customers will tolerate this as long as the resulting service is not substandard. Conclusively, technical quality should be extremely important in business and in ride-hailing service. In this type of sharing service, technical quality may be related to technology issues or algorithms for better mobile applications.

*H2: Technical quality has a strong impact on the perceived service quality of ride-hailing service.*

### ***Information quality***

Information quality is the customer's assessment of the information shown on a mobile commerce application. The two elements of information quality are content adequacy (the dependability, sufficient, and completeness of the information delivered) and content usefulness (informativeness and valuableness of the information displayed) (Nguyen and Tran, 2018). More precisely, information quality is critical to information management because it affects the quality of information created and developed within an organization.

High-quality information may both enhance the decision-making process and serve as a competitive advantage for the firm (Azemi et al., 2017). Via enhancing the quality of its information, an information audit should be adopted and developed. Information auditing is a procedure that identifies existing information inside an organization, its location, the user, the cost, and the impact of the information. Overall, information quality is often regarded as a critical factor in determining the quality of an organization's choices and actions (Alshikhi and Abdullah, 2018). As a result, information has become a more vital resource for enterprises, especially in ride-hailing services.

*H3: Information quality has a strong impact on the perceived service quality of the ride-hailing service.*

#### *Perceived service quality*

There is literature on the relationship between perceived service quality and customer behavioral intention or customer satisfaction. Prior research has demonstrated that perceived service quality is a predictor of customer behavioral intention (Makanyeza and Chikazhe, 2017; Saleem et al., 2017; Iqbal et al., 2018). On the other hand, other academics assert that customer behavioral intention predates perceptions of service excellence (Farooq et al., 2018; Islam et al., 2019).

However, there was an ambiguity around the causal link between perceived quality and customer behavioral intention that stemmed from a lack of agreement on the definition and analysis of the two notions. According to Kurniati and Rahayu (2021), service quality is a multifaceted and transient construct that relates to some aspect of the supplied product, while satisfaction refers to the customer's reaction to the offer. Customer intention, according to Parasuraman et al. (1985), is transaction-specific, while quality is more generic and built over time. This demonstrates unequivocally that the disparate opinions of researchers contribute to uncertainty about the causal link.

To provide high-quality service to consumers, business managers must first understand their expectations (Saghier, 2015) and then implement programs that address customer concerns (Narangajavana and Hu, 2008) and result in an increase in service quality (Slack et al., 2020). Customers' demands and expectations are always changing, which is why hotel managers must be aware of these changes and adjust their service quality appropriately (Teeroovengadum, 2020). Additionally, since various consumers have varying perceptions of service quality, it is necessary to address this issue. When service quality is enhanced, customer behavioral intention moves towards buying decision, which leads to positive business consequences (Widiastuti et al., 2019). It is vital to examine hotel managers' opinions of hotel rating and to associate them with increased service quality and performance (Narangajavana and Hu, 2008).

Perceived service quality, on the other hand, may be addressed from both a global and transactional standpoint (Lee et al., 2021). On a transactional level, customer behavioral intention with the service impacts perceptions of service quality; on a global level, consumer intention is determined by perceived service quality.

*H4: Perceived service quality has a strong impact on the customer's behavioral intention of using a ride-hailing service.*

Based on the abovementioned theories, a theoretical research framework is proposed as in Figure 1 below:

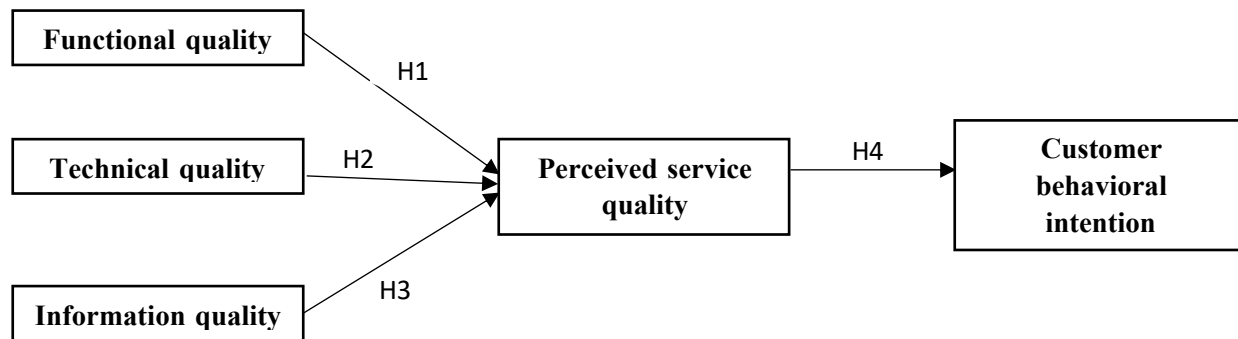


Figure 1. Proposed research framework

Source: Author's own elaboration.

## Methodology

### Data collection

In this study, the target respondents are customers, especially who used to have experiences with ride-hailing services in Vietnam. Due to the COVID-19 pandemic, data collection process is carried out by online survey, from November 2021 to December 2021, in which Vietnamese social media sites (such as Facebook, Gmail, Google Drive, etc.) are remarkably important to approach target respondents. The questionnaire uses the 5-point Likert scale from (1) - Strongly disagree to (5) - Strongly agree. The sample is selected based on convenient samplings and by taking into account the balance of age, gender, occupation, and purchasing frequency in order to maximize the number of participants towards this topic. As a result, 252 respondents are recorded, but only 237 surveys are useable to be kept for further tests. According to Hair et al. (2013), the ideal sample size should be at least 5 times higher than total items in the questionnaire survey; as such, this number of respondents meets the sample size requirement and can be used for quantitative analysis (Hair et al., 2013).

### Data analysis

Structural equation modeling (SEM) is a label for a diverse set of methods used by scientists in both experimental and observational research across the sciences, business and other fields. It is used most extensively in the social and behavioral sciences. In this study, because the sample size is high enough (larger than 225) and the authors employ AMOS 26 with Covariance-based SEM for better consider the Goodness-of-fit and path analysis results (Hsu et al., 2006). A definition of SEM is difficult without reference to a highly technical language, but a good starting place is the name itself. By employing this technique, there are several steps to follow: Reliability test, Exploratory Factor Analysis (EFA), Confirmatory Factor analysis (CFA).

## Research results

### Reliability test

After conducting a descriptive analysis, the insights about the survey participants have been provided. The next step is to investigate the reliability of the data collected. Cronbach's Alpha results could be presented as follows:

*Table 2. Cronbach's Alpha for items and decisions*

| Dimensions                      | Items                                                                                                                                                          | Cronbach's Alpha | Decision   |
|---------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|------------|
| Functional quality (FQ)         | FQ1: I assume that technology-based ride-hailing service in Vietnam is reliable and dependable in performing activities                                        | 0.87             | Acceptable |
|                                 | FQ2: I assume that technology-based ride-hailing service in Vietnam has the customer's best interest at heart                                                  | 0.86             | Acceptable |
|                                 | FQ3: I assume that technology-based ride-hailing drivers understand the needs of their customers                                                               | 0.85             | Acceptable |
|                                 | FQ4: I assume that technology-based ride-hailing in Vietnam operates with the proper and appropriate equipment (vehicles, mobile phones, meters, trackers ...) | 0.83             | Acceptable |
| Technical quality (TQ)          | TQ1: I have no troubles in using ride-hailing service in Vietnam                                                                                               | 0.40             | Omitted    |
|                                 | TQ2: I have completed several bookings and trips by ride-hailing service                                                                                       | 0.58             | Acceptable |
|                                 | TQ3: I encounter no late pick-up in using ride-hailing service                                                                                                 | 0.42             | Acceptable |
|                                 | TQ4: I can easily contact the drivers before and after completing the trip                                                                                     | 0.04             | Omitted    |
| Information quality (IQ)        | IQ1: I am always well-informed about the price of the ride-hailing service trips                                                                               | 0.55             | Acceptable |
|                                 | IQ2: I receive intime mobile notifications about the trips and the drivers                                                                                     | 0.55             | Acceptable |
|                                 | IQ3: I am aware of the rating of the ride-hailing driver before and after completing the trip                                                                  | 0.30             | Omitted    |
|                                 | IQ4: I am warned about the price surge or increase before deciding to take the trip                                                                            | 0.06             | Omitted    |
| Perceived service quality (PSQ) | PSQ1: I assume that technology-based ride-hailing service in Vietnam provide prompt responses to customers                                                     | 0.71             | Acceptable |
|                                 | PSQ2: I assume that technology-based ride-hailing in Vietnam has a reliable technology platform                                                                | 0.83             | Acceptable |
|                                 | PSQ3: Technology-based ride-hailing is safe because it provides full information about drivers for customers                                                   | 0.69             | Acceptable |
|                                 | PSQ4: Technology-based ride-hailing is economical because it provides a lower cost for customers                                                               | 0.72             | Acceptable |
| Customer intention (CI)         | CI1: I only use technology-based ride-hailing service if I cannot call traditional vehicles                                                                    | 0.04             | Omitted    |
|                                 | CI2: I intend to using technology-based ride-hailing service in the COVID-19 pandemic                                                                          | 0.51             | Acceptable |
|                                 | CI3: I intend to recommend technology-based ride-hailing service for other people                                                                              | 0.65             | Acceptable |
|                                 | CI4: I intend to use technology-based ride-hailing service in near future                                                                                      | 0.65             | Acceptable |
|                                 | CI5: I intend to remain loyal to technology-based ride-hailing service in Vietnam                                                                              | 0.68             | Acceptable |

Source: Author's own elaboration.

Inferring from Table 2, there is sufficient statistical evidence to conclude that TQ1, TQ4, IQ3, IQ4 and CI1 need to be rejected from the research analysis due to a lower than acceptable level of Cronbach's Alpha (smaller than 0.5) (Huang et al., 2013; Heale and Twycross, 2015). Technical quality and Information quality seem to be in the shortage of items for further investigation. In order to reject the model, we would consider the exploratory factor analysis for deeper understanding.

### ***Exploratory Factor Analysis (EFA)***

The EFA is regarded as an essential part in conducting SEM analysis. Firstly, the correlation matrix is provided to present the relations among factors. According to Table 3, all variables are positively correlated to each other. In addition, there is no multicollinearity among these factors because these correlation values are almost smaller than 0.8 (Gujarati, 2004).

*Table 3. Correlations matrix*

|      | FQ1  | FQ2   | FQ3  | FQ4  | TQ2  | TQ3  | IQ1  | IQ2  | PSQ1 | PSQ2 | PSQ3 | PSQ4 |
|------|------|-------|------|------|------|------|------|------|------|------|------|------|
| FQ1  | 1.00 |       |      |      |      |      |      |      |      |      |      |      |
| FQ2  | 0.86 | 1.00  |      |      |      |      |      |      |      |      |      |      |
| FQ3  | 0.77 | 0.77  | 1.00 |      |      |      |      |      |      |      |      |      |
| FQ4  | 0.77 | 0.74  | 0.82 | 1.00 |      |      |      |      |      |      |      |      |
| TQ2  | 0.28 | 0.27  | 0.32 | 0.24 | 1.00 |      |      |      |      |      |      |      |
| TQ3  | 0.03 | -0.01 | 0.10 | 0.05 | 0.59 | 1.00 |      |      |      |      |      |      |
| IQ1  | 0.39 | 0.41  | 0.37 | 0.39 | 0.56 | 0.49 | 1.00 |      |      |      |      |      |
| IQ2  | 0.36 | 0.37  | 0.37 | 0.33 | 0.55 | 0.55 | 0.78 | 1.00 |      |      |      |      |
| PSQ1 | 0.39 | 0.36  | 0.38 | 0.37 | 0.31 | 0.27 | 0.40 | 0.40 | 1.00 |      |      |      |
| PSQ2 | 0.46 | 0.44  | 0.42 | 0.44 | 0.28 | 0.26 | 0.39 | 0.35 | 0.75 | 1.00 |      |      |
| PSQ3 | 0.54 | 0.55  | 0.53 | 0.55 | 0.21 | 0.12 | 0.33 | 0.29 | 0.54 | 0.67 | 1.00 |      |
| PSQ4 | 0.32 | 0.31  | 0.37 | 0.32 | 0.22 | 0.26 | 0.38 | 0.31 | 0.58 | 0.68 | 0.63 | 1.00 |

Source: Author's own elaboration.

Further investigation goes to the Kaiser-Meyer-Olkin and Bartlett's Test. Theoretically, the KMO and Bartlett test evaluate all available data together. A KMO value greater than 0.5 and a significance level for the Bartlett's test below 0.05 suggest there is substantial correlation in the data. The variable collinearity indicates how strongly a single variable is correlated with other variables (Saunders et al., 2018).

Particular results from the test give the value of KMO is  $0.89 > 0.5$  and the significance totals at 0.00, therefore, we can conclude that it is the solid foundation for the factor analysis to commence. More essentially, a striking purpose is to look at the pattern matrix to make final assurance about the validity of the research model, as Information and Technical analysis possess only two items each for analysis. Unless the two variables converge to form a better indicator, the research model should be discarded. We would employ the pattern matrix results to make the decision.

Table 4. Pattern matrix

|      | Component |      |      |      |
|------|-----------|------|------|------|
|      | 1         | 2    | 3    | 4    |
| FQ1  | 0.92      |      |      |      |
| FQ2  | 0.94      |      |      |      |
| FQ3  | 0.86      |      |      |      |
| FQ4  | 0.89      |      |      |      |
| TQ2  |           |      | 0.77 |      |
| TQ3  |           |      | 0.81 |      |
| IQ1  |           |      | 0.77 |      |
| IQ2  |           |      | 0.81 |      |
| PSQ1 |           | 0.86 |      |      |
| PSQ2 |           | 0.90 |      |      |
| PSQ3 |           | 0.65 |      |      |
| PSQ4 |           | 0.87 |      |      |
| CI2  |           |      |      | 0.85 |
| CI3  |           |      |      | 0.84 |
| CI4  |           |      |      | 0.46 |
| CI5  |           |      |      | 0.68 |

Source: Author's own elaboration.

Specifying the results from Table 4, the conclusion of continuing analyzing process for the research model should be created. Pattern matrix is a method of data reduction, where the underlying unobservable variables are reflected in the observed variables (Saunders et al., 2018). Generally, all items of FQ, PSQ and CI are underlined in one component, respectively, which theoretically indicate the composition of the manifest variables with respect to the factors involved. Moreover, as TQ and IQ have converged into one single variable, meaning that the survey participants may consider the dimensions share huge common characteristics and these items of TQ and IQ may express similar meanings in practical context. Therefore, the proposed research model needs modifications. The following analysis is Total Variance explained which has been moved to the Appendix of the study. The cumulative result reaches 71.94% and there are 4 items possess an Eigenvalue greater than 1 so the conclusion should be that the 4 abovementioned may explain 71.94% the variability of all 18 researched variables.

From the presented results, the EFA has been completely provided with the most important finding, that the research model can be continued with analysis. The modification must be created with Technical quality and Information quality merged into one independent variable (generally denoted as Information quality hereafter).

### Confirmatory Factor analysis (CFA)

In the process of conducting SEM analysis, CFA should be provided with strongly supported results. Using the Amos 20 software and the results from the pattern matrix, the authors may present the analysis:

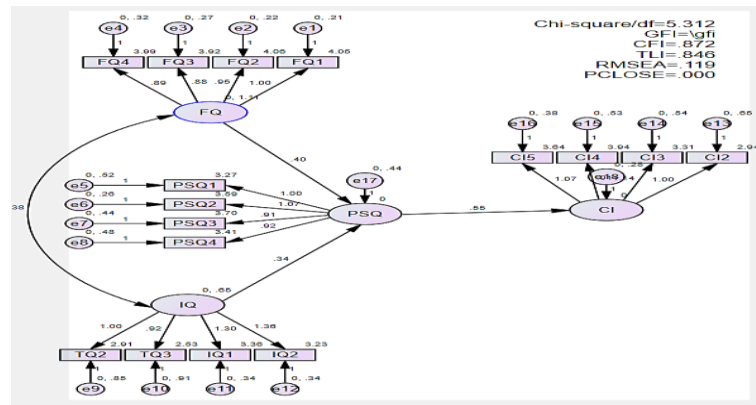


Figure 2. SEM analysis results

Source: Author's own elaboration.

Table 5. Summary of Goodness of Fit index

| No | Goodness of Fit Measures                        | Cut-off value                                       | Results | Evaluation   |
|----|-------------------------------------------------|-----------------------------------------------------|---------|--------------|
| 1  | Statistic Chi-square (X <sup>2</sup> )          |                                                     | 531.154 |              |
| 2  | Root Mean Square Error of Approximation (RMSEA) | 0.08 < RMSEA < 15%                                  | 11.9%   | Marginal fit |
| 3  | Trucker-Lewis Index (TLI)                       | TLI ≥ 0.90 good fit, 0.80 ≤ TLI < 0.90 marginal fit | 84.6%   | Marginal fit |
| 4  | Comparative Fit Index (CFI)                     | CFI ≥ 0.80 good fit                                 | 87.2%   | Good fit     |
| 5  | Parsimonious Goodness of fit Index (PGFI)       | PGFI < GFI                                          |         |              |
| 6  | Parsimonious Normed Fit Index (PNFI)            | The higher the better                               | 70.6    | Good fit     |

Source: Author's own elaboration.

The model fit is labelled as “Good fit” which represents sufficient evidence to conclude that the SEM analysis should be reliably conducted. The striking feature of the model is to consider the value of the Comparative Fit Index (CFI). Theoretically, when the CFI is positive, and the value exceeds 0.8, indicating that the model is significant. According to our findings, the CFI value accounts to 0.872 and meets the requirements for analysis. Therefore, we have sufficient statistical evidence to conclude that the model's explanatory power is strong. Therefore, the following results are obtained from the operations:

Table 6. Summary of analysis results

| Paths  | Hypotheses | Coefficients | P-values | Critical Ratio | Decision  |
|--------|------------|--------------|----------|----------------|-----------|
| FQ-PSQ | H1         | 0.40         | 0.00     | 7.77           | Supported |
| IQ-PSQ | H2         | 0.34         | 0.00     | 4.89           | Supported |
| PSQ-CI | H4         | 0.55         | 0.00     | 8.89           | Supported |

Source: Author's own elaboration.

Table 6 presents the finding of the research hypothesis (as well as the research paths), which are H1 – The correlation between Functional quality and Perceived service quality, H2 - The correlation between Information quality and Perceived service quality and H3 - The correlation between Perceived service quality and Customer intention. Importantly, the

remaining 3 hypotheses are proved to be “Supported” by the model with the path coefficients greater than 0.3 implying that there is a significant relationship between (1) Functional quality and Perceived service quality; (2) Information quality and Perceived service quality and (3) Perceived service quality and Customer intention. These relationships are discussed further in the next section.

## **Findings, Discussions, and Conclusions**

### ***Research findings***

From the results of SEM, the authors obtain several insights and provide several findings to critically explain the situation in Vietnam.

Firstly, Information quality and technical quality should be merged into one dimension. The previous study implied to separate the two with different functions. Al-Fraihat et al. (2019) clarified technical quality toward the Technological acceptance factors, such as perceived usefulness, perceived satisfaction, and ease of use. Therefore, the smoothness of the system or mobile application for ride-hailing service should be the top priority of the technical quality assurance process (Sciarelli et al., 2020). Information quality is a multilevel inter concept that is defined by aspects such as accessibility, correctness, and completeness (Gharib et al., 2016). Based on these characteristics, many models have been suggested for assessing the technology or knowledge about innovation and there is no agreement on the proportions that should be used for this purpose (Palazuelos et al., 2017; Bhatia and Awasthi, 2018). Generally, normal consumers may consider that technical quality and information quality move in one direction (Gorla et al., 2010; Nikolova-Jah, 2019;). Because of the similarities, in this research, the data collected is merged into one dimension, named information quality, which is the combination of 2 items in Information quality and 2 items in Technical quality. This would be a striking finding from the data analysis.

Secondly, Perceived service quality has been affected significantly by Functional quality (0.40) and Information quality (0.34). The direct connection between Functional quality and Perceived service quality has been improvised in numerous studies with different approaches. Generally, Perceived service quality perception is a subjective judgment made by consumers regarding the overall perfection or superiority of a product or a service they have received (Polyakova and Mirza, 2015). In order to improve this indicator, business managers should acquire better functional quality expressed in SERVQUAL dimensions: tangibility, reliability, responsiveness, assurance, and empathy (Pakurar et al., 2019). Based on their expectations and perceptions of service quality, customers would have a varying level of intention with the service (Tonder and Petzer, 2020). The perceived quality of items or services did not always correspond to the real quality of the products or services. Product or production orientation was used to determine genuine quality; perceived quality was established by customer assessment, but perceived quality was decided by product or production orientation (García-Fernández et al., 2017). Besides, customers' intentions to use or repurchase a service or product were more likely to increase if they believed the service or product was of good quality. In conclusion, functional quality, in terms of SERVQUAL or not, is directly related to the Perceived service quality.

Furthermore, Information quality, which is (in this study) the combination of information and technical quality is significantly connected with Perceived service quality. This relationship has previously been proved by scholars (Gharib et al., 2016; Konuk, 2018; Li and Shang, 2019). More precisely, information quality describes the ability of the ride-

hailing service application (either mobile or laptop version) to provide timely, accurate, comprehensive, concise, and relevant information in line with user's needs (Prakash, 2019). Moreover, reliability is required, meaning that the system crashes or technical support should be included in the service (Diep et al., 2019). When compared to conventional taxi services, the information and communication technology supplied by these platforms allow for a more dependable service with a shorter waiting time and a cheaper cost (Brown and LaValle, 2020; Vranceanu et al., 2020). The key to a long-term competitive advantage in a customer-centric market is to provide high-quality service that results in intended-to-purchase consumers (Prakash, 2019). The perceived quality of services provided across the value chain contributes to the development of loyal customers, which results in improved company success. Information quality, therefore, contributes remarkably to the success of ride-hailing service, by enhancing perceived service quality (overall quality) and further to enhance the customer intention.

Last but not least, the most important pathway is from perceived service quality to the customer's behavioral intention to purchase the service. Perceived service quality is a significant predictor of consumer behavioral intentions and also a predictor of customer satisfaction (Prybutok and Qin, 2008). The concept of service quality is based on a global customer evaluation of the excellence of the product or service (Parasuraman et al., 1988), and thus incorporates both consumer expectations for the service and the company delivering the service (Gonzalez et al., 2007; Kondasani and Kumar, 2015; Rita et al., 2019; Hoang et al., 2021). The overwhelming direct impact of perceived service quality on behavioral intentions demonstrates the critical need of monitoring and enhancing service quality. Researchers have paid considerable attention to the conceptual and empirical link between perceived service quality and customer behavioral intention, elevating it to one of the primary marketing tools (Farooq et al., 2018). Although service quality measurement has garnered much attention, the ride-hailing service quality is further proved to be customer-centric and related to the customer behavioral intention for better perceived quality (Tonder and Petzer, 2020).

## Limitations

Due to the severe impact of the COVID-19 pandemic, the process of survey distribution has faced challenges in reaching the projected participants. Moreover, the social distancing also made it harder to obtain the database. This may lead to nonresponse bias which can also affect the response rate. One striking constraint is that only the customer's behavioral intention is considered a mediator of the service quality-customer loyalty relationship. Previously, research found other significant categories as mediators, including image and perceived worth. Last but not least, caution should be used when implementing the study results. There may be instances of discrimination. The study's target demographic included all ride-hailing customers of different ages and professions, so mismatches in perception would arise. Future research might include these factors when examining gender's moderating effects.

## Conclusions

Ride-hailing services have used technology to deliver what passengers have long recognized as critical: affordability, service dependability, and accountability. More importantly,

application-based hailing has reshaped for-hire vehicle services, with quantifiable differences between ride-hail and taxi services. Taxis were also clearly higher in price and had a broader range of prices than ride-hailing trips, which may be ascribed in part to ride-hailing venture capital subsidies and excessively lengthy taxi routing. Therefore, the switching behavioral intention of customers to ride-hailing service can be the trending movement currently. While prior research has focused on the elements that influence customer behavioral intention in ride-hailing, this study sought to explain the process of establishing service quality through several variables before enhancing the customer intention. As a result, the research suggested and validated an integrated framework that included three components (perceived service quality, functional quality and information quality) in addition to the classic service quality– customer behavioral intention model. The findings significantly confirm the fundamental conventional link between (1) Functional quality and Perceived service quality; (2) Information quality and Perceived service quality; and (3) Perceived service quality and Customer intention, which are consistent with prior researches on customer behavioural intention (Kondasani and Kumar, 2015; Diep et al., 2019; Brown and LaValle, 2020; Kurniati and Rahayu, 2021).

In order to provide further research, there would be large room for better studies on service quality improvement. The transportation sector appreciates the role of service quality and must target more effective procedures for operations. Besides, it is stated that improving Perceived service quality also plays a significant part in determining a customer behavioral intention to a technology-enabled transportation service provider. Additionally, this study also sheds light on the merged decision of information quality and technical quality. The smoothness of the system or mobile application for ride-hailing service should be the top priority of the quality assurance process through both information and technical quality (Sciarelli et al., 2020).

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## Appendix

### Total Variance analysis

| Com. | Initial Eigenvalues |               |              | Extraction Sums of Squared Loadings |               |              | Rotation Sums of Squared Loadings |
|------|---------------------|---------------|--------------|-------------------------------------|---------------|--------------|-----------------------------------|
|      | Total               | % of Variance | Cumulative % | Total                               | % of Variance | Cumulative % | Total                             |
| 1    | 7.96                | 44.26         | 44.26        | 7.96                                | 44.26         | 44.26        | 6.48                              |
| 2    | 2.27                | 12.64         | 56.91        | 2.27                                | 12.64         | 56.91        | 4.45                              |
| 3    | 1.48                | 8.27          | 65.18        | 1.48                                | 8.27          | 65.18        | 5.29                              |
| 4    | 1.21                | 6.75          | 71.94        | 1.21                                | 6.75          | 71.94        | 4.45                              |
| 5    | 0.76                | 4.25          | 76.19        |                                     |               |              |                                   |
| 6    | 0.60                | 3.33          | 79.52        |                                     |               |              |                                   |
| 7    | 0.54                | 3.02          | 82.55        |                                     |               |              |                                   |
| 8    | 0.50                | 2.81          | 85.36        |                                     |               |              |                                   |
| 9    | 0.45                | 2.50          | 87.86        |                                     |               |              |                                   |
| 10   | 0.38                | 2.13          | 89.99        |                                     |               |              |                                   |
| 11   | 0.32                | 1.78          | 91.73        |                                     |               |              |                                   |
| 12   | 0.28                | 1.59          | 93.37        |                                     |               |              |                                   |
| 13   | 0.27                | 1.53          | 94.91        |                                     |               |              |                                   |
| 14   | 0.26                | 1.44          | 96.35        |                                     |               |              |                                   |
| 15   | 0.21                | 1.18          | 97.54        |                                     |               |              |                                   |
| 16   | 0.17                | 0.99          | 98.53        |                                     |               |              |                                   |
| 17   | 0.14                | 0.78          | 99.31        |                                     |               |              |                                   |
| 18   | 0.12                | 0.68          | 100.00       |                                     |               |              |                                   |

Source: Author's own elaboration.