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Customers' Perceived Value, Satisfaction, and Loyalty in Online Securities Trading:
Do Moderating Effects of Technology Readiness Matter?

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ABSTRACT

Information and telecommunication technologies, together with the internet, are completely changing the ways securities brokerages provide their products and services to customers. This study, conducted in a newly emerging country, looks at relationships among three major issues impacting brokerages' internet commerce: perceived value, customer satisfaction, and customer loyalty. It also examines whether the strength of these relationships is moderated by factors constituting customers' technology readiness: optimism, innovativeness, discomfort, and insecurity. Results reaffirm prior research that perceived value is positively related to customer satisfaction and customer loyalty, and customer satisfaction is positively related to customer loyalty. Technology readiness factors were not shown to moderate the strength of the relationships among perceived value, customer satisfaction, and customer loyalty.

KEYWORDS

Customer Loyalty, Customer Satisfaction, Online Securities Trading, Perceived Value, Technology Readiness

1. INTRODUCTION

Information and telecommunication technologies, together with the Internet, are completely changing the ways companies provide their products and services to customers (Pham & Doan, 2014). The financial services industry, including securities brokerage, is not an exception (Roca et al., 2009). Previously, in the traditional securities trading environment, customers had to go to securities brokerage firms' physical offices to conduct securities transactions, such as stocks, bonds, or other financial assets (Lin & Wei, 1999). Today, with the support of information and telecommunication technologies, along with the Internet, customers can conduct securities transactions anytime, anywhere

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(not limited by space and time) via a desktop computer or mobile device connected to the Internet (Feng et al., 2014).

A notable feature of online securities trading is that securities transactions are conducted through interactions between customers and a securities brokerage company's website (Yang & Fang, 2004). Consequently, online securities trading brings many benefits to both securities brokerage firms and clients (Roca et al., 2009). For securities brokerages, significant savings gained from not investing in physical trading offices are a major benefit. Expanding customer base is another. Opportunities to provide other value-added services (for example, investment portfolio management consulting) to increase profitability is still another benefit (Liu, 2015).

For clients, the most tangible benefit is that customers do not have to go to a brokerage firm's physical offices but can complete their securities trading via computers or other mobile devices connected to the Internet (Huang, 2005). A second benefit is that customers can save significant money and time. A third benefit besides buying and selling securities is that customers are provided with many online value-added services to enable them to make informed decisions, such as checking balances on securities accounts and cash balances on payment accounts, reading reports on securities market status, and updating periodic reports on gains/losses from securities trading or portfolio management services (Feng et al., 2014).

Despite these established benefits, in order to survive and develop sustainability in the face of competive forces securities firms are having to continue to improve the quality of products and services provided to customers (Feng et al., 2014). Customers value high quality, affordable products and services in online securities trading (Pham et al., 2020). The perceived value of a transaction or exchange stems from an overall evaluation of what is gained and sacrified when participating in that transaction or exchange (Bolton & Lemon, 1999). Perceived value will lead to customer satisfaction and, in turn, customer satisfaction will lead to customer loyalty (Pham et al., 2019). Customer loyalty plays an extremely important role in determining brokerage firms' profitability and sustainable development.

Reflecting these relationships, a comprehensive review of previous studies shows that in both traditional and e-commerce environments, the separate relationships between perceived value and customer satisfaction, between perceived value and customer loyalty, and between customer satisfaction and customer loyalty are positively related (Yang & Peterson, 2004). Parasuraman and Grewal (2000) argue that in the traditional commercial environment, service quality is positively correlated with perceived value, and perceived value is in turn positively correlated with loyalty. The positive relationship between customer satisfaction and customer loyalty has been confirmed in the traditional commercial environment (Jun & Cai, 2001). In the e-commerce environment, separate positive relationships among perceived value, customer satisfaction, and customer loyalty are also confirmed (Yang & Peterson, 2004).

However, an evaluation of previous studies points to a large research gap in the understanding of relationships among perceived value, customer satisfaction, and customer loyalty. These have been considered quite isolatedly from contextual factors' impacts such as technology readiness, one of the important contextual factors (Wang et al., 2017). There are indications customers' technology readiness can influence the strength of three relationships: between perceived value and customer satisfaction, between perceived value and customer loyalty, and between customer satisfaction and customer loyalty.

Technology readiness refers to the tendency to embrace and use new technology for purposes of accomplishing goals in everyday life, at work or at home (Parasuraman, 2000). Technology readiness represents a set of motivating and hindering factors which together determine a person's propensity to use new technology (Parasuraman & Colby, 2014). Technology readiness includes four components: optimism - a positive belief that using technology will increase flexibility, control, and efficiency in life; innovativeness - a tendency to become a technology pioneer and a thought leader; discomfort - a

state of lack of control over technology or a situation overwhelmed by technology; and insecurity - a doubt about technology, or a pessimism about technology's ability to get a job done.

Today with many outstanding advances in telecommunications and communication technologies, a range of technological applications have been deployed in the service industry, including the online securities trading sector (Liu, 2015). These applications are on the one hand expected to improve the effectiveness and efficiency in providing online securities trading services to clients (Feng et al., 2014). However, on the other hand, they also present a challenge related to customers' technology readiness (Pham et al., 2018). This raises a question as to whether customers' technology readiness affects the strength of the relationships among perceived value, customer satisfaction, and customer loyalty.

This current research attempts to fill out this gap by examining the relationships among perceived value, customer satisfaction, and customer loyalty in an integrated research model under the setting of online securities trading. It also aims to investigate whether the strength of these relationships is affected by customers' technology readiness. Specifically, the following two research questions are considered:

- What are the roles of perceived value and customer satisfaction in creating customer loyalty in the online securities trading environment?
- Is the strength of the relationships among perceived value, customer satisfaction, and customer loyalty affected by different degrees of customers' technology readiness?

This research can contribute to the literature in several ways. First, it re-evaluates the relationships among perceived value, customer satisfaction, and customer loyalty using the integrated research model under the setting of online securities trading in a newly emerging country where modern technology applications are increasingly applied in providing high quality services to customers. Second, this study is the first to examine whether the strength of the relationships among perceived value, customer satisfaction, and customer loyalty is influenced by factors constituting customers' technology readiness - optimism, innovativeness, discomfort, and insecurity. Such factors need to be further investigated (Parasuraman & Colby, 2014).

In the following sections, the theoretical framework and hypotheses development are presented. Research method is then described, followed by research results. Next, theoretical and practical implications are discussed. Finally, conclusions, limitations and future research directions are described.

2. THEORETICAL FRAMEWORK AND HYPOTHESES DEVELOPMENT

2.1. Technology Readiness

Technology readiness can be understood as embracing and using new technologies for purposes of improving the efficiency of human work, at home or at work (Parasuraman, 2000). Technology readiness refers to a person's emotional state related to both motivating and hindering factors towards the usage of new technologies (Parasuraman & Colby, 2014). If an individual's technology readiness is high, he or she tends to use new technologies, and vice versa, if the person's technology readiness is low, the individual is less likely to want to use new technologies for everyday life activities (Pham et al., 2018).

Parasuraman (2000) developed a technology readiness index called TRI 1.0, based on a series of exploratory and confirmatory factor analyses. TRI 1.0 includes four factors: optimism, innovativeness, discomfort, and insecurity. Optimism consists of 10 items; innovativeness, seven items; discomfort, 10 items, and insecurity, nine items. TRI 1.0 has been refined into TRI 2.0 by Parasuraman and Colby (2014). TRI 2.0 also includes four factors, but their total number of items is much fewer than 36.

Specifically, optimism includes four items; innovativeness, four items; discomfort, four items; and insecurity, four items:

- **Optimism:** This factor refers to people's belief that activities in daily life will be enhanced if they use new technologies. Optimism refers to an optimistic view and optimists are confident that new technology makes it easier for them to meet requirements related to their work or non-work activities. The perception is new technologies will give them greater control, flexibility, efficiency, and effectiveness. Thus optimists will find it not difficult to use and trust technology; instead they will find it useful. In other words, optimists expect that new technologies will provide them with valuable functions and utilities to accomplish any relevant tasks in the most efficient and effective way.
- **Innovativeness:** This factor encompasses a person's desire to become a thought leader and a technology pioneer. Innovative people want to be at the forefront of adopting new technologies. They are very interested in new technologies and their properties. Innovative people want to own new technologies before they become popular and owned by others. They are positive about new technologies and feel they have comparative advantages when they own the new technologies first. These advantages include such matters as cost savings, improved effectiveness and efficiency, increased flexibility, and enhanced profitability for activities at home or at work.
- **Discomfort:** This factor refers to situations in which people feel overwhelmed by technology and lose control over technology. Discomfort often leads to pessimism and anxiety about new features and attributes of technology, products, or services. Those scoring high on discomfort are not very confident in the face of new technologies because they often do not know how to start using the new technologies. Moreover, discomfort will make people less trusting of functions and attributes of new technology, leading to their dissatisfaction and unwillingness to accept this new technology. Discomfort increases a sense of loss of control of technology, especially with the uncertainties the technology can bring.
- **Insecurity:** This factor relates to situations where people do not trust technology, or in other words, people are pessimistic about technology's true ability to improve efficiency and effectiveness at work or at home. Note that the e-commerce environment is characterized by interactions between customers and the company's website. Lacking the richness of face to face communication, the perceived risk level in this environment is higher than that in the traditional commerce environment. Common risks involve situations where private and financial information can leak, be stolen, or used illegally. People with insecure feelings often fear when interacting with technologies with new attributes. They are dissatisfied and lack the confidence that technologies with new attributes can benefit them.

2.2. Perceived Value

The concept of perceived value can be considered in different perspectives (Bolton & Lemon, 1999). Perceived value is often analyzed based on equity theory (Kuo et al., 2009). The core idea of this theory is that perceived value is formed by comparing what the customer receives (its fairness, correctness, and worthiness) and what he or she sacrifies (perceived cost). In other words, perceived value is formed by comparing the customer's output-to-input ratio, in terms of benefits and costs associated with the purchase, with the company's output-to-input ratio in the purchase setting (Moliner, 2009; Oliver & DeSarbo, 1988; Tam, 2004).

In any transaction, interaction, or sale of a product or service, perceived value is influenced not only by the benefits the customer receives but also by the costs the customer pays (Yang & Peterson, 2004). The perceived costs consist of two parts: cash expenses and non-cash expenses (Bishop, 1984). Non-cash expenses include those associated with waiting time and fatigue (Zeithaml, 1988). It should also be noted that when an interaction, transaction, or purchase involves multiple entities of

a business, customers are interested not only in their output-to-input ratios, but also to these entities' output-to-input ratios (Oliver & DeSarbo, 1988).

The concept of perceived value plays a very important role in maintaining and nurturing customer loyalty (Bauer et al., 2006). In the e-commerce environment, customer loyalty is of paramount importance, because if customers are not loyal to a business, with just a few mouse clicks the customers can move to other businesses for their products and services transactions (Bai et al., 2008). This requires businesses to have an effective strategy to maintain customer loyalty (Wang et al., 2015). The difference between the traditional face to face business environment and the e-commerce environment is that it is easier in the e-commerce environment for customers to search for information related to relevant products and services offered by the firm's competitors (Pham et al., 2020). This search can be conducted anytime, anywhere, with just a computer or mobile device connected to the Internet (Jiang et al., 2015). Consequently, customers tend to set standards for forming the firm's output-to-input ratio based on comparisons among the firm's competitors that provide similar products or services' output-to-input ratios (Kuo et al., 2009).

E-commerce is increasingly evolving with the support of telecommunications and information technologies and the Internet (Pham et al., 2019). As a result, the level of competition among businesses for selling their products or services in the e-commerce environment is increasingly fierce (Yang & Peterson, 2004). Comparing outputs, inputs, and output-to-input ratios of businesses is less difficult, and perceived value becomes essential in maintaining and nurturing customer loyalty (Bauer et al., 2006). Like Yang and Peterson (2004), in this current study under the online securities trading environment, customer perceived value in a transaction involves the outputs and inputs in which service outcomes are outputs and perceived costs are inputs.

2.3. Customer Satisfaction

Customer satisfaction is an extremely important concept in both traditional and e-commerce environments (Wang et al., 2017). In the traditional commercial environment, the purchase or sale of products or services is conducted through direct interactions between customers and employees of the company (Parasuraman et al., 1985). In the e-commerce environment, such activities are conducted through interactions between customers and the company's website (Jun & Cai, 2001). The concept of customer satisfaction needs to be paid more attention in the e-commerce environment because if customers are not satisfied, just a few mouse clicks, the customers can easily switch to products or services offered by the company's competitors (Lui & Picolli, 2010).

An overall review of prior research shows that customer satisfaction is defined in a variety of ways (Tse & Wilton, 1988). However, the core idea of these definitions is that customer satisfaction is formed on the basis of evaluating the customer's experiences and expectations regarding his or her purchase and consumption of a product or service (Giese & Cote, 2000). Kotler (2000) argues that customer satisfaction is formed based on emotions of excitement or frustration by comparing the customer's experiences' results or outcomes with his or her initial expectations of the product or service. Parasuraman et al. (1988) emphasized that customer satisfaction is influenced by service quality and price.

There are many factors that influence the perceived outcome of a product or service purchase, including marketing mix, branding, corporate image, service quality, company reputation, and the customer's personal personalities (Giese & Cote, 2000). The customer's experiences relate to his or her perceived results (Boulding et al., 1993). If the customer's experiences or perceived results exceed his or her original expectations, the customer will be satisfied, and in the contrary, the customer will not be satisfied (Boulding et al., 1993).

Among theoretical foundations for understanding and evaluating customer satisfaction, the disconfirmation model is often mentioned (Zeithaml et al., 1993). The basic idea of this model is that the difference between the results of a product or service and the initial expectations will determine the level of customer satisfaction. The initial expectations are the initial beliefs of the customer about the

product or service, while the perceived results are considered as an evaluation of a product or service's superiority after its purchase and consumption. If the experiences exceed the original expectations, the customer will be satisfied. If the experiences are below the expectations, the customer will not be satisfied. This core idea in the disconfirmation model is employed in this research.

2.4. Customer Loyalty

In any commercial setting, traditional or electronic, customer loyalty is one of the most important goals of a business (Yang & Peterson, 2004; Anderson & Srinivasan, 2003). Customer loyalty will largely determine the firm's growth, sustainable development, and profitability (Long & Vy, 2016). Customer loyalty can be judged on measures of attitude and behavior (Boulding et al., 1993). Under the attitude perspective, customer loyalty is the customer's desire to maintain long-term relationships with the firm (Pham et al., 2019). Under the behavioral perspective, customer loyalty is understood as the customer's significant re-purchase of a given group of goods or services in relation to the customer's total number of purchases; and as conveying good messages about the firm's products or services to the customer's family members and friends (Pham et al., 2018).

Customers tend to increase their level of loyalty through both their attitude and behavior if they are confident that the firm can deliver superior value to them in relation to competitors (Pham et al., 2020). When customers are loyal to a firm they can save time in searching for general product information or comparing the firm's products and services with those of its competitors (Law & Hsu, 2006). Loyal customers tend to less interested in learning what is going on in competitors' business operations (Law & Cheung, 2006).

Further, loyal customers tend to less critical when the company's products or services are at fault (Wang et al., 2015). They are also not as sensitive to price levels and will communicate positve word of mouth advertising about the company and its products or services to friends and relatives (Yang & Peterson, 2004).

2.5. Hypotheses Development

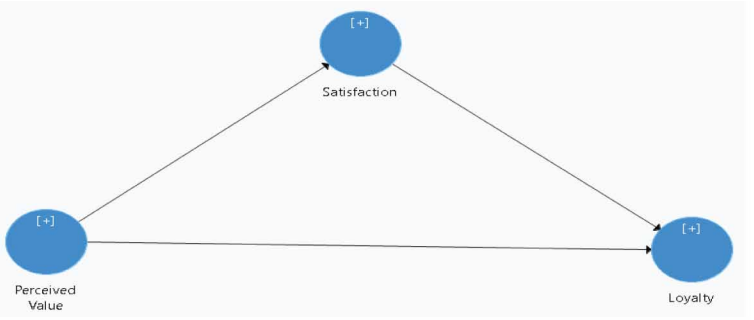
Based on a comprehensive and systematic review of previous studies in both traditional and e-commerce environments. A research model is proposed as follows. The model presents the relationships among three abstract variables, namely, perceived value, customer satisfaction, and customer loyalty (Jiang et al., 2015; Yang & Peterson, 2004; Parasuraman & Grewal, 2000). Moreover, the technology readiness construct is also integrated into the model. However, unlike other studies in the online securities trading environment, the technology readiness construct in this study is considered a moderating variable with four components - optimism, innovativeness, discomfort, and insecurity. The impacts of these four components on the relationships among perceived value, customer satisfaction, and customer loyalty are considered.

2.5.1 The Relationship Between Perceived Value and Customer Satisfaction

Customer satisfaction is one of the most important goals of an enterprise, regardless of whether it operates in the traditional commercial or e-commerce environment (Long & Thanh, 2016). In general, customers will be satisfied when they achieve pre-set goals regarding their purchase and consumption of products or services (Long & Vy, 2016). Customer satisfaction is established on the basis of evaluating and comparing the customer's experiences and initial expectations, regarding his of her purchase and consumption of products or services (Boulding et al., 1993). If the experiences exceed the original expectations, the customer will be satisfied. If the experiences are below the expectations, the customer will not be satisfied. This core idea is addressed in the disconfirmation model (Zeithaml et al., 1993).

There are many factors that affect customer satisfaction (Pham et al., 2018). One of those factors is perceived value (Yang & Peterson, 2004). Perceived value is considered as the output-to-input ratio associated with the purchase of a product or service (Tam, 2004). Outputs include benefits received

Figure 1. Research model



while inputs include costs to be sacrificed to obtain those outputs (Moliner, 2009). Theories and empirical evidence have shown that perceived value is positively associated with customer satisfaction in both traditional and e-commerce environments (Yang & Peterson, 2004). Consistent with this result, the following hypothesis is proposed:

H1: Perceived value has a positive relationship with customer satisfaction in the online securities trading environment.

2.5.2 The Relationship Between Perceived Value and Customer Loyalty

Customer loyalty is considered as one of the most important business goals of companies in both traditional commercial and e-commerce environments (Long & Vy, 2016). Customer loyalty determines e-commerce's growth and development (Pham et al., 2019). Customer loyalty helps businesses grow and develop sustainably, and determines their long-term profitability (Pham et al., 2020). Customer loyalty can be seen from the perspectives of attitude and behavior (Boulding et al., 1993). In the attitude perspective, customer loyalty is the desire or enthusiasm of customers who want to maintain long-term relationships with the firm (Pham et al., 2019). Under the behavioral perspective, customer loyalty is understood as situations where the customer's repurchase level of given products and services is maintained and enhanced (Pham et al., 2018).

Loyal customers tend to have increased tolerance towards businesses when products or services provided by these businesses fail to meet expectations; they are more likely to say good things about the businesses and their products or services; they spread positive comments about the businesses and their products or services; they are less price sensitive; their loyalty tends to increase when they feel their businesses can bring them superior value in relation to the competition (Law & Cheung, 2006).

Perceived value is formed on the basis of comparing and analyzing the outputs the customer receives and the costs the customer spend to get the outputs (Oliver & DeSarbo, 1988). Theories and empirical evidence from studies in both traditional commercial and e-commerce environments indicate that perceived value is positively related to customer loyalty (Jiang et al., 2015). Consistent with these results, the following hypothesis is proposed:

H2: Perceived value has a positive relationship with customer loyalty in the online securities trading environment.

2.5.3 The Relationship Between Customer Satisfaction and Customer Loyalty

Customer satisfaction is the result of evaluating all aspects related to a product or service in interactions and transactions with the company (Boulding et al., 1993). In other words, customer

satisfaction is formed on the basis of comparing the customer's experiences with prior expectations (Jun & Cai, 2001). If the experiences exceed the original expectations, the customer will be satisfied; however, if the experiences fail to meet the original expectations, the customer will not be satisfied (Parasuraman et al., 1988). Customer loyalty is considered through both attitude and behavior. It demonstrates customers' desire to maintain long-term relationships with the company (Jun et al., 2004). Moreover, it is reflected in the size and extent of the repurchase of given products or services, positive word of mouth for the company, greater tolerance for situations in which the company's products or services have errors, price insensitivity, and the degree of enhanced relationships with the firm (Wang & Sparks, 2014).

Theories and evidence from previous empirical studies in both traditional commercial and e-commerce environments have shown that customer satisfaction is positively related to customer loyalty (Lin & Wang, 2006). Consistent with these research results, the following hypothesis is proposed:

H3: Customer satisfaction has a positive relationship with customer loyalty in the online securities trading environment.

2.5.4 The Moderating Role of Technology Readiness in the Relationships Among Perceived Value, Customer Satisfaction, and Customer Loylaty

With great advances in information and communication technologies, as well as high speed Internet, many self-service technologies have been implemented in the service industry, and the field of securities trading is not is an exception (Roca et al., 2009). Previously, in the traditional securities trading environment, securities trading activities were conducted through interactions between customers and the securities brokerage firm's employees at physical trading offices (Lin & Wei, 1999). Today, such securities buying and selling activities are conducted through interactions between customers and the securities brokerage firm's website (Feng et al., 2014). Customers can conduct these transactions and interact with the firm's website anytime and anywhere via computers or mobile devices connected to the Internet (Huang, 2005).

Securities brokerage firms that deploy new self-service technologies in the field of securities trading can bring benefits to both the securities brokerage firms and their clients (individual investors). The benefits for the securities brokerage firms include cost savings and an expanded customer base that can improve the firms' profitability (Roca et al., 2009). The benefits to customers are that their securities trading activities can be carried out through interactions between the customers and the securities brokerage firm's website, and thus the customers can save money and time costs, and enjoy many other value-added services (Liu, 2015).

However, despite the aforementioned benefits, a challenge facing brokerage firms is related to customers' technology readiness. Customers' technology readiness is understood as a tendency to embrace and use new technologies because these new technologies are expected to enhance people' results of activities at work or home (Parasuraman, 2000). Technology readiness includes both motivating and hindering factors for using new technologies. Two motivating factors are optimism and innovativeness while two hindrancing factors are discomfort and insecurity (Parasuraman & Colby, 2014).

There have been empirical studies showing that technology readiness affects customer satisfaction, technology adoption, and intention to use technology (Pham et al., 2020). However, so far no research has considered technology readiness as a moderating variable which can influence the strength of relationships among perceived value, customer satisfaction, and customer loyalty, with the exception of a study by Wang et al. (2017).

Wang et al. (2017) argued that technology readiness is a moderating variable, affecting the strength of relationship between service quality of self-service technologies, in addition to satisfaction with,

and adoption of, these technologies. Specifically, these relationships will be stronger when there is an increase in customers' optimism and innovativeness. However, that study was conducted in a travel environment. Surprisingly, there are no studies that examine technology readiness as a moderating variable in the online securities trading environment. This current research seeks to fill the research gap. The following hypotheses are proposed.

H4: Optimism has a positive impact on the relationships among perceived value, customer satisfaction, and customer loyalty.
H5: Innovativeness has a positive impact on the relationships among perceived value, customer satisfaction, and customer loyalty.
H6: Discomfort has a negative impact on the relationships among perceived value, customer satisfaction, and customer loyalty.
H7: Insecurity has a negative impact on the relationships among perceived value, customer satisfaction, and customer loyalty.

3. RESEARCH METHOD

This study examines the relationships among perceived value, customer satisfaction, and customer loyalty. Moreover, this study also examines the role of technology readiness in these relationships. The study was conducted in Vietnam, a country with an emerging economy making it a worthy sample population.

To ensure content validity, the measurement scales in this study were borrowed and adapted from previous studies. These measurement scale has been confirmed with respect to reliability and validity. Specifically, the measurement scales for perceived value were adapted from Yang and Peterson (2004) and Jiang et al. (2015). The measurement scale for customer satisfaction was adapted from Yang et al. (2004) and Rod et al. (2009). The measurement scale for customer loyalty was adapted from Yang and Peterson (2004). The measurement scales for technology readiness were adapted from Parasuraman and Colby (2014).

There are five items for customer satisfaction; six items for customer loyalty; three items for switching costs; and 16 items for technology readiness. Furthermore, demographic information about customers including gender, age, education, Internet usage, and time of using the online securities trading system were also included.

Content validty of the measurement scales in the questionnaire was assessed by a group of four lecturers who have experience in teaching finance, operations management, statistics, and quantitative analysis for business. All lecturers had experience with online securities trading as individual investors. The group members agreed that the measurement scales had content validity.

The English questionnaire was translated into Vietnamese by a Vietnamese scholar. Another scholar translated back the Vietnamese version into English. The purpose of this reverse translation was to evaluate the consistency and accuracy of the two versions. Two other scholars who were fluent in both Vietnamese and English assessed the two versions independently and agreed that the translation was consistent and accurate. The Vietnamese version was then tested by 30 individual investors. Some semantic and wording adjustments were made based on the feedback of these individual investors.

A shortened version of the measuremnt scales is provided in the appendix. The respondents were asked to answer items that constitute perceived value, customer satisfaction, customer loyalty, technology readiness, and switching costs using a Likert scale with five levels where 1 is "strongly disagree" and 5 is "strongly agree."

The data collection was conducted using a securities brokerage's clients. This firm is one of Vietnam's largest securities brokerages in terms of number of customers, market share, and revenue. With the help of this firm the questionnaire was sent to individual online investors. An email was sent out explaining the purpose of the research was to help the firm develop solutions aimed at improving

customers' satisfaction and loyalty. A total of 335 complete and valid responses were collected for the statistical analysis. Table 1 below presents demographic information on the participants.

Male respondents account for 49.9 percent. By age, 3.3 percent are under 20 years old, 14.3 percent between 20 and 24 years old, 43.9 percent between 25 and 34 years old, 30.4 percent between 35 and 44 years old, 3.3 percent between 45 and 54 years old, and 4.8 percent, 55 years old or more. In terms of the highest education level attained, 3.3 percent had a high school diploma; 69.6 percent, bachelor's degrees; and 27.2 percent, master's degrees or higher. In describing Internet usage, 45.3 percent of the respondents use two to five times a week; 3.9 percent, from five to eight times a day; and 50.8 percent, nine times or more a day. Regarding online trading system usage, 37.9 percent of the respondents had used the system for less than five months; 10.1 percent, between five months and a year; 19.1 percent, between two and three years; 5.7 percent, between four and five years; and 27.2 percent, over five years.

The sample size in this study is 335, which is suitable for obtaining reliable statistical results. The construct with largest number of items is customer loyalty with six items. The required minimum sample size thus becomes 60, or 10 times the number of items constituting the loyalty construct (Chin, 1998).

One of the concerns when conducting survey research is non-response bias. In order to consider whether non-response bias exists, differences between early and late respondents in terms of items constituting the constructs were analyzed. Specifically, *t*-tests were performed and the results showed that there are no differences between the two groups at the five percent significance level, thereby confirming that non-response bias is not a problem in this study (Armstrong & Overton, 1977).

Table 1. Profiles of the survey respondents

Profile	Category	Total	Proportion (Percent)
Gender	Male	167	49.9
	Female	168	50.1
Age	Less than 20	11	3.3
	20 – 24	48	14.3
	25 – 34	147	43.9
	35 – 44	102	30.4
	45 - 54	11	3.3
	55 or over	16	4.8
Education	High school	11	3.3
	Bachelor	233	69.6
	Master degree or above	91	27.2
Internet usage level	2 – 5 times per week	152	45.3
	5 – 9 times per day	13	3.9
	9 or more per day	170	50.8
The company's online trading system's usage time	Less than 5 months	127	37.9
	5 months – 1 year	34	10.1
	2 years – 3 years	64	19.1
	4 years – 5 years	19	5.7
	Over 5 years	91	27.2

In this study, statistical techniques, such as descriptive statistics, correlation coefficients, factor analysis, and structural equation modeling were used. Structural equation modeling technique was used to estimate path coefficients for the relationships hypothesized in the research model. To obtain reliable hypotheses test results, the two-step process suggested by Bollen (1989) was followed. Specifically, in step one, the measurement model was evaluated and validated. In step two the structural model was analyzed to test the hypotheses. Note that the model is reliable and valid when both measurement and structural models are reliable and valid. The statistical software packages used for data analysis were SPSS 25 and SmartPLS 3.2.9.

4. RESULTS

In this study, technology readiness is a moderating variable, which is assumed to influence the relationships among perceived value, customer satisfaction, and customer loyalty. The technology readiness scale is TR 2.0, borrowed from Parasuraman and Colby (2015), which has been confirmed in terms of reliability and validity. Using factor analysis for the data collected showed that the KMO coefficient = 0.868, Chi-Square = 4215.848, and p-value = 0.000.

Moreover, all the four original factors are retained with their corresponding items. Cronbach's alpha coefficient for optimism is 0.954; for innovativeness, 0.882; for discomfort, 0.874; and for insecurity, 0.891. All Cronbach's alpha coefficients are greater than 0.7. Moreover, values of loadings of items on respective factors are greater than 0.7; AVE coefficients for the four factors are greater than 0.5 (optimism, 0.838; innovativeness, 0.652; discomfort, 0.638; and insecurity, 0.672). The correlation coefficients of a given factor with the remaining factors are smaller than the square root of AVE of that factor. This evidence confirms validity and reliability of TR 2.0.

Following Bollen (1989)'s suggestion, the measurement model is first considered. Note that data was collected via one source (email), so it is necessary to assess whether common method bias exists. The Harmon test was performed (Podsakoff et al., 2003) and the results showed that when all items were loaded into only one factor, that factor explained less than 50 percent of the variability. Therefore, common method bias is not a serious problem. Moreover, the items that make up each factor have no outliers.

Reliability, convergent validity, and discriminant validity are analyzed through factor analysis using SmartPLS 3.2.9 after eliminating two items of the "customer satisfaction" factor and two items of the "customer loyalty" factor because these items' VIF values are greater than 5 or their loading coefficients on corresponding factors are less than 0.6 (Bagozzi & Yi, 1988). Table 2 shows the loading coefficients are greater than 0.7; Cronbach's alpha coefficients and composite reliability coefficients are greater than 0.8; and AVE coefficients are greater than 0.6, indicating that the measurement model is confirmed.

Discriminant validity is considered based on comparing correlation coefficients of a specific factor with the remaining factors and that factor's square root of AVE. Table 3 shows that the correlation coefficients between a specific factor and the remaining factors are less than that factor's square root of AVE (located on the diagonal of the matrix), except for the fact that the correlation coefficient between perceived value and customer satisfaction is 0.854, slightly higher than 0.822. This confirms convergent validity of the measurement model.

Another way to assess discriminant validity is to use HTMT (Heterotrait-Monotrait) values. Table 4 presents the HTMT values and these values are less than 0.85 (except for customer satisfaction, 0.854, slightly higher than 0.85). This evidence shows that the discriminant validity of the measurement model is confirmed.

After confirming the measurement model's reliability, convergent validity, and discriminant validity, the structural model is examined to test hypotheses. Figure 2 shows estimates of path coefficients R^2 values.

Table 2. Loadings, Cronbach's Alpha, composite reliability, and average variance extracted

Construct	Indicator	1	2	3
1. IL	IL1			0.888
CR = 0.915	IL2			0.814
CA = 0.915	IL3			0.849
AVE = 0.730	IL4			0.865
2. IS	IS1		0.894	
CR = 0.912	IS4		0.839	
CA = 0.912	IS5		0.909	
AVE = 0.776				
3. PV	PV1	0.767		
CR = 0.912	PV2	0.819		
CA = 0.912	PV3	0.85		
AVE = 0.676	PV4	0.813		
	PV5	0.859		
Note: IL – Loyalty; IS – Satisfaction; PV – Perceived Value; CR – Composite Reliability; CA – Cronbach's Alpha; AVE – Average Variance Extracted. All loadings are statistically significant at p-value < 0.001.				

Table 3. Correlations and square root of AVEs

Construct	1	2	3
PV	0.822		
IS	0.854	0.881	
IL	0.75	0.797	0.854
Note: IL – Loyalty; IS – Satisfaction; PV – Perceived Value; Diagonal numbers are square root of AVEs			

Table 4. HTMT values

Construct	1	2	3
PV			
IS	0.854		
IL	0.751	0.796	
Note: IL – Loyalty; IS – Satisfaction; PV – Perceived Value			

As shown in Figure 2, path coefficients from perceived value to satisfaction and loyalty are positive. Path coefficient from satisfaction to loyalty is also positive. The R-squared values lay in endogenous variables' circles.

Figure 3 shows t-value estimates. In Figure 3, t-values for paths from perceived value to satisfaction and loyalty are greater than 2. Also, t-value for path from satisfaction to loyalty is greater than 2.

Figure 2. Path coefficient estimates and R-squared values

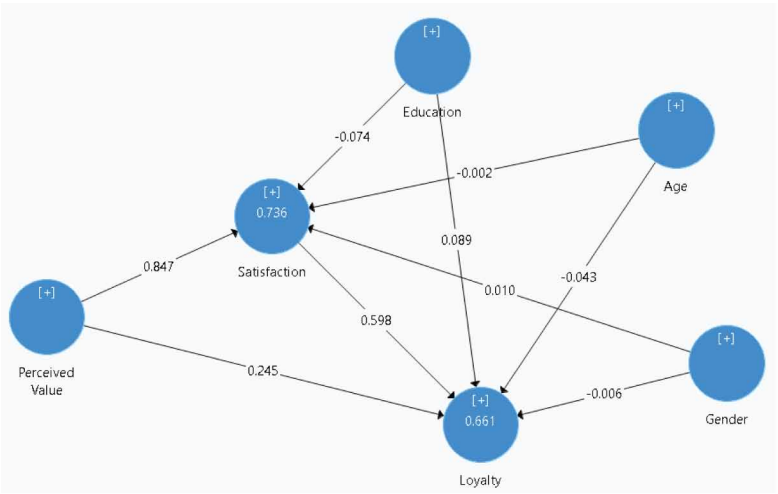
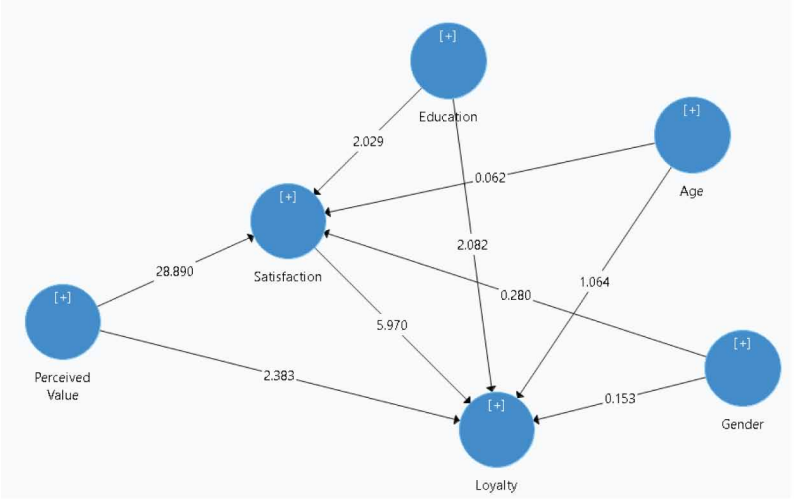


Figure 3. t-value estimates



We can conclude that hypotheses H1, H2, and H3 are statistically supported. Moreover, of the three control variables, namely gender, age, and education, only education affects customer satisfaction and customer loyalty. Table 5 below summarizes the results of testing hypotheses H1, H2, and H3.

To examine the moderating effects of TR dimensions, a widely adopted median split method was used, dividing the overall sample into subgroups (i.e., high innovativeness vs. low innovativeness, high optimism vs. low optimism) (Henseler & Fassott, 2010). Differences in the model parameters between the different data groups are interpreted as moderating effects. While such an analysis has often been conducted by examining path differences using a *t*-test based on the pooled standard errors obtained via a re-sampling procedure such as bootstrapping (Vinzi, Trinchera, & Amato, 2010), problems can occur if a normal population or similar sample size is assumed (Chin & Dibbern, 2010). The permutation-based procedure provides an alternative distribution-free approach based on

Table 5. Significance testing results of the structural model path coefficients

Path	Hypothesis	Path coefficient	*t*-value	*p*-value	Result
PV - IS	H1	0.847	28.890	0.000***	Supported
PV - IL	H2	0.245	2.383	0.017**	Supported
IS - IL	H3	0.598	5.970	0.000***	Supported
Control variables					
Gender - IS		0.010	0.280	0.779^{ns}	
Age – IS		-0.002	0.062	0.951^{ns}	
Education - IS		-0.074	2.029	0.043**	
Gender - IL		-0.006	0.153	0.878^{ns}	
Age – IL		-0.043	1.064	0.288^{ns}	
Education - IL		0.089	2.082	0.037**	
Note: IL – Loyalty; IS – Satisfaction; PV – Perceived Value; ***$p < 0.001$; **$p < 0.05$					

an approximate randomization test, where a subset of all possible data permutations between sample groups is made (Vinzi, Trinchera, & Amato, 2010). Having examined measurement invariance, using this approach, multi-group analyses were conducted to examine the differences in path coefficients (Hypotheses 4 – 7).

Table 6 shows that the three links -- between perceived value and satisfaction (difference = 0.156, *p*-value = 0.997), between perceived value and loyalty (difference = 0.118, *p*-value = 0.168), and between satisfaction and loyalty (difference = 0.132, *p*-value = 0.865) are not statistically significantly different between the high-optimism group and the low-optimism group, indicating that Hypothesis 4 is not statistically supported.

Table 7 shows that the three links -- between perceived value and satisfaction (difference = 0.171, *p*-value = 0.996), between perceived value and loyalty (difference = 0.022, *p*-value = 0.570), and between satisfaction and loyalty (difference = 0.007, *p*-value = 0.483) are not statistically significant different between the high-innovativeness group and the low-innovativeness group, indicating that Hypothesis 5 is not statistically supported.

Table 8 shows that the three links – between perceived value and satisfaction (difference = 0.142, *p*-value = 0.992), between perceived value and loyalty (difference = 0.085, *p*-value = 0.743), and between satisfaction and loyalty (difference = 0.044, *p*-value = 0.637) are not statistically significant different between the high-discomfort group and the low-discomfort group, indicating that Hypothesis 6 is not statistically supported.

Table 6. Results of moderating effect of optimism

Path	Group 1: High Optimism		Group 2: Low Optimism		Group 1 vs. Group 2	
	Path Coefficient	t-value	Path Coefficient	t-value	Path Difference	p-value
PV - IS	0.683	15.037***	0.839	25.088***	0.156	0.997
PV - IL	0.327	3.853***	0.208	2.317**	0.118	0.168
IS – IL	0.431	5.494***	0.563	6.220***	0.132	0.865
Note: IL – Loyalty; IS – Satisfaction; PV – Perceived Value; ***$p < 0.001$; **$p < 0.05$; $p^* < 0.1$						

Table 7. Results of moderating effect of innovativeness

Path	Group 1: High Innovativeness		Group 2: Low Innovativeness		Group 1 vs. Group 2	
	Path Coefficient	*t*-value	Path Coefficient	*t*-value	Path Difference	*p*-value
PV - IS	0.620	11.103***	0.791	20.830***	0.171	0.996
PV - IL	0.270	3.313***	0.292	3.076***	0.022	0.570
IS – IL	0.467	6.359***	0.460	5.071***	0.007	0.483
Note: IL – Loyalty; IS – Satisfaction; PV – Perceived Value; ***$p < 0.001$; **$p < 0.05$; $p^* < 0.1$						

Table 8. Results of moderating effect of discomfort

Path	Group 1: High Discomfort		Group 2: Low Discomfort		Group 1 vs. Group 2	
	Path Coefficient	*t*-value	Path Coefficient	*t*-value	Path Difference	*p*-value
PV - IS	0.677	14.333***	0.819	23.010***	0.142	0.992
PV - IL	0.256	2.698***	0.340	3.775***	0.085	0.743
IS – IL	0.460	5.172***	0.503	5.745***	0.044	0.637
Note: IL – Loyalty; IS – Satisfaction; PV – Perceived Value; ***$p < 0.001$; **$p < 0.05$; $p^* < 0.1$						

Table 9 shows that the three links -- between perceived value and satisfaction (difference = 0.170, p-value = 0.999), between perceived value and loyalty (difference = 0.226, p-value = 0.954), and between satisfaction and loyalty (difference = 0.110, p-value = 0.181) are not statistically significant different between the high-insecurity group and the low-insecurity group, indicating that Hypothesis 7 is not statistically supported.

5. DISCUSSION AND IMPLICATIONS

5.1. Discussion

This study enhances an understanding of investors' experience in the online securities trading environment through analyzing the research model integrating the relationships among perceived value, customer satisfaction, and customer loyalty. The results show that Hypothesis 1 - perceived value has a positive relationship with customer satisfaction in the online securities trading environment

Table 9. Results of moderating effect of insecurity

Path	Group 1: High Insecurity		Group 2: Low Insecurity		Group 1 vs. Group 2	
	Path Coefficient	*t*-value	Path Coefficient	*t*-value	Path Difference	*p*-value
PV - IS	0.674	13.804***	0.844	26.199***	0.170	0.999
PV - IL	0.204	2.575***	0.430	4.037***	0.226	0.954
IS – IL	0.536	6.925***	0.425	4.568***	0.110	0.181
Note: IL – Loyalty; IS – Satisfaction; PV – Perceived Value; ***$p < 0.001$; **$p < 0.05$; $p^* < 0.1$						

- is statistically supported (path coefficient 0.847, t -value 28,890, p-value < 0.001). This result is consistent with that of Yang and Peterson (2004), Kuo et al. (2009), and Pham et al. (2020).

The results also indicate that Hypothesis 2 - perceived value has a positive relationship with customer loyalty in the online securities trading environment - is statistically supported (path coefficient 0.245, t -value 2.383, p-value < 0.05). This result is consistent with that of Parasuraman and Grewal (2000), Yang and Peterson (2004), Kuo et al. (2009), Jiang et al. (2015), and Pham et al. (2020).

In addition, the results also show that Hypothesis 3 - customer satisfaction has a positive relationship with customer loyalty in the online securities trading environment - is statistically supported (path coefficient 0.598, t-value 5,970, p-value < 0.001). This result is consistent with that of almost all previous studies in both traditional and online commercial settings, such as Yang and Peterson (2004), Kuo et al. (2009), and Pham et al. (2020).

The contextual factor considered in this study is technology readiness. Many studies have looked at the direct impact of technology readiness on outcome variables, such as satisfaction, technology adoption, perceived ease of use, or perceived usefulness in both traditional commerce and e-commerce environments (Huy et al., 2019; Pham et al., 2018). However, no studies have examined the moderating role of technology readiness in the relationships among perceived value, customer satisfaction, and customer loyalty in the online securities trading environment.

There are four hypotheses regarding the moderating role of technology readiness proposed in this study: optimism has a positive impact on the relationships among perceived value, customer satisfaction, and customer loyalty (H4); innovativeness has a positive impact on the relationships among perceived value, customer satisfaction, and customer loyalty (H5); discomfort has a negative impact on the relationships among perceived value, customer satisfaction, and customer loyalty (H6); and insecurity has a negative impact on the relationships among perceived value, customer satisfaction, and customer loyalty (H7).

However, the results do not provide support for the moderating role of optimism and innovativeness in the relationships among perceived value, customer satisfaction, and customer loyalty (H4 and H5). In other words, the strength of the relationships among perceived value, customer satisfaction, and customer loyalty is not affected by individual investors' level of optimism or innovativeness. This result is different from that of Wang et al. (2017).

Similarly, this study does not provide support for the moderating role of discomfort and insecurity in the relationships among perceived value, customer satisfaction, and customer loyalty (H6 and H7). In other words, the strength of the relationships among perceived value, customer satisfaction, and customer loyalty is also not affected by individual investors' level of discomfort or insecurity. This result is consistent with that of Wang et al. (2017). Note that the context of research by Wang et al. (2017) is related to tourism technology (aviation).

One reason technology readiness does not affect the strength of the relationships among perceived value, customer satisfaction, and customer loyalty may be that individual investors may have become accustomed to, and comfortable with, the e-commerce setting in general and the online securities trading setting in particular. In the online securities trading environment, the technologies used are geared towards increasing utilities and ease of use, minimizing anxiety, and ensuring security and privacy for individual investors. In other words, the technologies used for online securities trading are standardized to such a degree that they successfully maximize benefits and at the same time minimize factors that hinder their acceptance and use.

5.2. Theoretical Contributions

In the era of Industrial Revolution 4.0, advances in information and communication technology are changing all sectors of the economy and the service industry is no exception. More and more new technology applications are being deployed to provide services to customers. The most important and ultimate success of service providers is to gain customer loyalty. There have been many studies

showing important factors affecting customer loyalty towards service providers, but the two most outstanding factors are perceived value and customer satisfaction.

The relationship between perceived value and customer loyalty and the relationship between customer satisfaction and customer loyalty are investigated separately and confirmed in previous studies. However, there are no studies that integrate these three constructs into a common research model to examine the effects of perceived value and customer satisfaction on customer loyalty, except for the study of Yang and Peterson (2004). Yang and Peterson (2004) examined the role of switching costs in the relationships among perceived value, customer satisfaction, and customer loyalty. However, the "customer satisfaction" construct seems to be the "service quality" construct (including five factors: customer services, order fulfillment, ease of use, product portfolio, and security/privacy).

The biggest contribution of this research is that the three constructs, perceived value, customer satisfaction, and customer loyalty, are integrated into a common research model to study the effects of both perceived value and customer satisfaction at the same time on customer loyalty in one of the most dynamic online commerce environments - the online securities trading environment. The results show that perceived value is positively related to customer satisfaction and that both perceived value and customer satisfaction are positively related to customer loyalty.

The second major contributor of this research to the literature is that almost all separate relationships between perceived value and customer satisfaction, between perceived value and customer loyalty, and between customer satisfaction and customer loyalty have been confirmed (although not yet integrated into a common research model) in developed countries. However, automatically generalizing these results to developing or newly emerging countries' settings is likely to have errors, because these developing or newly emerging countries have characteristics that are different from those of developed countries. This research has been conducted in Vietnam - a newly emerging country, belonging to one of the countries with the highest economic growth rate in the world, especially its stock market's impressive development in recent years (Bui et al., 2020). The results of this study once again confirm the relationships among perceived value, customer satisfaction, and customer loyalty in the integrated research model.

Table 10 presents the results of this study in comparison with that of Yang and Peterson (2004). Although the construct "customer satisfaction" in Yang and Peterson (2004), conducted in the US, appears to be the construct "service quality", the study by Yang and Peterson (2004) and this study (conducted in Vietnam) both confirm the premise that regardless of whether developed or developing/newly emerging countries, and regardless of whether in traditional or online commercial environments, in order to enhance customer loyalty, service providers must increase perceived value and customer satisfaction.

It is recognized in Table 10 that although the relationships among perceived value, customer satisfaction, and customer loyalty are statistically significant in the online commerce environment in both developed and newly developing countries. However, the relationship between perceived value and customer satisfaction and the relationship between customer satisfaction and customer loyalty are stronger in the newly emerging country than in the developed country. By the contrary,

Table 10. Results of this study versus that of Yang and Peterson (2004)

Relationship	This study	Yang and Peterson (2004)
Perceived value → Customer satisfaction	Support (+0.847)	Support (+0.65)
Perceived value → Customer loyalty	Support (+0.245)	Support (+0.60)
Customer satisfaction → Customer loyalty	Support (+0.598)	Support (+0.34)
Notes: Numbers in parentheses mean standardized regression coefficients. + means a positive relationship		

the relationship between perceived value and customer loyalty is stronger in the developed country than in the newly emerging country. Future studies need to test these points.

5.3. Practical Implications

Perceived values are examined based equity theory (Jiang et al., 2015; Pham et al., 2019). These include fairness and perceived costs (Yang & Peterson, 2004). Fairness refers to the situation in which customers evaluate whether the benefits gained in interactions or transactions are fair, correct, and worthy of costs sacrificed. Perceived costs include both cash and non-cash costs. Non-cash costs relate to the time customers spend in searching for information on interested products and services and the time it takes to prepare for decisions to buy favorite products and services. Furthermore, non-cash costs may include stress and frustration that may occur during the process of engaging in transactions and exchanges.

The significant difference between the traditional securities trading environment and the online securities trading environment is that in the online securities trading environment, individual investors only need to use a desktop computer connected to the Internet to easily search for relevant financial information and make securities trading decisions (Nguyen et al., 2020). As a result, in the online securities trading environment the competitive pressure among securities brokerage firms to retain individual investors is very high. Given these competitive pressures, it can be concluded that for securities firms the best way to retain customer loyalty is to increase customer perceived value. If clients feel a low perceived value in their relationships with a securities brokerage firm, it is inevitable that they will switch to another firm because the switching costs are so low in the online securities trading environment.

In order to increase customer perceived value, securities brokerage firms must develop and implement specific, clear, and transparent guidelines for the completion of transactions, rights of customers, and the firm's responsibilities in cases of trading errors. Brokerage firms must build a culture that always puts their customers' interests first and creates incentives to improve their employees' morale and responsibility in the process of creating added value for customers.

Securities brokerage firms also need to invest in state-of-the-art online securities trading technology infrastructure with the latest equipment to ensure continuous, effective and efficient online securities trading activities. These investments must meet securities trading regulators' most stringent requirements as well as individual investors' increasing expectations. Profit potential from providing online securities trading services is immense, so investing in modern online securities trading technology infrastructure is necessary for these firms' future growth and development, and for customer value generation.

As previously noted, the level of perceived risk in the online securities trading environment is greater than in the traditional securities trading environment. Because customers can conduct securities transactions anytime, anywhere, there are many issues related to security. Information on financial transactions can be stolen, modified or misused in a way that would damage customers (Van et al., 2021). Privacy risks relate to situations in which a customer's personal information is used without the customer's permission (Nguyen et al., 2020).

In the online securities trading environment, when performing transactions, customers are required to provide personal information to complete these transactions, but they cannot control whether their personal information is misused. In order to minimize security and privacy risks, and increase customer perceived value when participating in online securities trading, securities brokerage firms must implement encryption systems with advanced algorithms, firewalls, digital signatures, and multi-layer identification procedures. In addition, securities brokeragage firms must clearly identify their employees' rights and responsibilities in handling transactions related to securities trading so that customers have reason to believe that their interests are of utmost importance and their security and privacy information will be effectively protected.

Besides perceived value, customer satisfaction is also a factor that leads to customer loyalty (Nguyen et al., 2020). Customer satisfaction is one of the important goals of businesses in general and securities brokerage firms in particular. In order to achieve customer satisfaction, businesses must first understand service quality attributes perceived by customers. Then necessary actions need to be taken to enhance overall quality in order to bring about customer satisfaction. In order to survive and remain in the online securities trading environment characterized by intense competition, brokerage firms must implement customer care strategies and action plans. Securities brokerage firms must do their best to provide high-quality products and services to their clients. Providing high-quality products and services will bring customer satisfaction, and in turn, customer satisfaction will lead to customer loyalty, and ultimately positive financial results.

6. CONCLUSION, LIMITATIONS, AND FUTURE RESEARCH

This study confirms the theoretical framework for the relationships among perceived value, customer satisfaction, and customer loyalty in the online commerce environment. The roots of this theoretical framework are derived from the results of Parasuraman and Grewal (2000). Parasuraman and Grewal (2000) argued that service quality is positively related to perceived value, and perceived value in turn leads to customer loyalty. These relationships are confirmed by Parasuraman and Grewal (2000) in the traditional commercial environment. Yang and Peterson (2004) confirmed the relationships among perceived value, customer satisfaction, and customer loyalty in the online commerce environment, despite the abstract variable "customer satisfaction" in their research seems to be the abstract variable "service quality". Jiang et al. (2015) also confirmed the relationships among service quality, perceived value, and customer loyalty in the online commerce environment.

Note that the studies of Yang and Peterson (2004) and Jiang et al. (2015) were conducted in a developed country, so it is difficult to automatically generalize the research results to the e-commerce environment of a developing or newly emerging country. This current research is to fill those research gaps. Specifically, the current research integrated three abstract variables, perceived value, customer satisfaction, and customer loyalty, into the common research model to examine the impacts of perceived value and customer satisfaction on customer loyalty in the online securities trading setting in Vietnam – a newly emerging country, belonging to a group of countries with the highest economic growth rate in the world. The results of this study are consistent with those of Parasuraman and Grewal (2000), Yang and Peterson (2004), and Jiang et al. (2015). However, there are some limitations.

First, although technology readiness is integrated into the theoretical framework, there is no evidence that individual investors' technology readiness affects the relationships among perceived value, customer satisfaction, and customer loyalty. Specifically, the degree of optimism, innovativeness, discomfort, and insecurity appears not to affect the relationships among perceived value, customer satisfaction, and customer loyalty. Future studies should be conducted to confirm this conclusion. Moreover, some other contextual factors, such as types of services or business environment, which may play a moderating role in the relationships among perceived value, customer satisfaction, and customer loyalty should be integrated into the framework and tested.

Second, the data collected in this study is based on responses of individual investors of a securities brokerage firm in Vietnam. Although this firm is one of the leading brokerage firms in Vietnam in terms of number of customers, services provided, and revenues, the generalization of the research's results to other securities brokerage firms of Vietnam or another developing country needs to be done with caution. Future studies need to collect data from individual investors of other securities brokerage firms in Vietnam or in other developing countries to get more comprehensive, systematic and reliable results.

Third, while the relationships among perceived value, customer satisfaction, and customer loyalty are reaffirmed in the context of online securities trading in Vietnam, future studies should be conducted to compare differences in the model parameters between a developing country and a

developed country. This is because it is likely that a developing country's online securities trading setting can be significantly different from a developed country's online securities trading setting.

Last but not least, the theoretical framework of perceived value, customer satisfaction, and customer loyalty needs to be expanded. There may be some other factors that directly affect these three variables. These other factors need to be evaluated and incorporated as appropriate to have a more comprehensive model. The relationships specified in the resulting model would then need to be verified by empirical studies.

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