



温州肯恩大学  
WENZHOU-KEAN UNIVERSITY

**Customer attitude influences behavioral intention to use self-service technology: A study  
of 7FRESH store of JD**

In Partial Fulfillment of the Requirements  
for the Bachelor of Science in Accounting

by

XIA Xinran

1025904

May, 2020

## **Customer Attitude Influences Behavioral Intention to Use Self-Service Technology: A Study of 7FRESH Store of JD**

### **ABSTRACT**

This paper aims to analyze the direct effect of compatibility (CB), complexity (CX), observability (OV), relative advantage (RA), and trialability (TB), and the mediating effect of customer attitudes on behavioral intention to use fruit magic mirror in 7FRESH of JD. This research uses quantitative method by sending out questionnaires in China to test the diffusion of innovation theory to evaluate factors (RA, CB, CX, TB, and OV) and the mediator (customer attitude) that may influence customer behavioral intention to use self-scanning (fruit magic mirror in 7FRESH of JD). The Hayes' Process Macro is used as the statistical analysis method in SPSS to test coefficient value for each path. The results indicate that customer attitude towards self-service technology significantly influences behavioral intention in relative advantage and complexity path.

**Keywords:** self-Service technology, diffusion of innovation, in-Store technology

**JEL Classifications:** M31 O31 O33

## I. INTRODUCTION

Rapid technological advances encourage more and more people to accept using technology (Rust 2001; Weijters, Rangarajan, Falk, and Schillewaert 2007). China, as the biggest retailing market, has been through momentous changes due to the development of technology (Hardaker 2018). The appearance and growth of e-commerce in China, for instance, Taobao and Jingdong, offer opportunities for customers to shop online and remove the barrier of purchasing hours compared to the traditional retail store. Thus, consumers can shop online and buy products at any time they prefer (Kim, Leung, and Leung 2006). Most consumers in China choose to use digital interfaces such as mobile app to check for new products and purchase goods that they like (Griffiths, 2015). Retailers need to face the difficult situation that physical retail stores have become less attractive gradually. That is the reason why retailers tend to introduce in-store technology, for example, self-service technology to deliver enriched and customized service to consumers and reduce direct interaction with employees (Iqbal, Ul Hassan, and Habibah 2017; Rudolph, Schröder, and Böttger 2012). By introducing the use of self-service technology inside retail stores, retailers try attracting customers back with differentiated quality service (Griffiths, 2015). However, comprehensive researches studying self-service technology in the Chinese retail industry are limited, and using self-service technology inside retail stores is relatively new for Chinese customers. Hence, this study focuses on understanding how the use of self-service technology (SST) inside retail store influences Chinese customer behavioral intention and their in-store shopping experience with the existence of customer attitude.

Previous researches show significant interest in studying the use of self-service technology and its effects on improving retail productivity and customer service quality. Researches demonstrate that self-service technology promotes customer service quality in the retail store (Beatson & Coote 2007; Curran, Meuter, and Surprenant 2003; Fernandes & Pedroso 2016; Meuter, Ostrom, Roundtree, and Bitner 2000). Also, various studies indicate that the application of self-service technology using influences customer attitude in their innovation adoption process (Curran et al. 2003; Kaur & Gupta 2012; Srinivasan 2014; Weijters et al. 2007; Yunus 2014). Diffusion of innovation theory is tested in previous studies to analyze potential users' technology adoption process and five attributes of innovation significantly affect user behavioral intention (Al-Jabri & Sohail 2012; Bradford & Florin 2003; Franceschinis et al. 2017; Min et al. 2018; Park & Chen 2007; Premkumar et al. 1994; Rambocas 2012; Walker 1999; Yunus 2014). Self-scanning, as an essential example of self-service technology used in the physical retail store, is discussed in previous researches as well (Ekman 2016; Elliott, Hall, and Meng 2013; Marzocchi & Zammit 2006). However, studies related to self-scanning that applied in the physical retail stores are limited, especially in the Chinese retail industry.

Before the emergence of the new retail concept, China's retail industry has gone through four stages of department stores, supermarkets, chain operation stores, and e-commerce, while the new retail industry brings the fifth change of online convergence and offline integration. The ministry of commerce of China defines the new retail concept as a consumer-focused, technology-driven, cost-efficient, innovation-driven approach to commodity trading (Ministry of Commerce 2018). At present, the retail industry is changing

from the stage of rapid user growth to the stage of focusing on user value improvement, and the new retail model of online and offline merging can meet the needs of improving customer service and user value. The development of technology promotes the innovation of new retail model. With the integration of big data, Internet and PC terminal, the retail industry can make enriched customer service possible and have advanced information analysis tools. Moreover, with the stable development of the economy in China, residents have more disposable income, and they have a gradually increasing purchasing power. Also, consumers tend to have personalized premium service and have higher requirements for the retail stores, such as high quality of commodity and products.

In China, with the widely use of the Internet, the appearance of online shopping platforms allows retailers to deliver products and services through online interaction (Zhao 2012). The rapid development and expansion of e-commerce slow down the growth of the physical retail store. The retail industry meets its bottleneck and urgently needs for new growth drivers. Thus, retailers now try building the new retail pattern by bringing self-service technology into retail stores to stimulate the development of the physical retail stores. This new retail model raises a concept that creates a seamless merging between online platforms and brick-and-mortar stores, by using in-store technology, such as mobile payment, artificial intelligence, and self-scanning (Tse & Wang 2017). Consequently, by introducing self-service technology and combining big data, customers can provide themselves with personalized shopping experience without retail store staff involving.

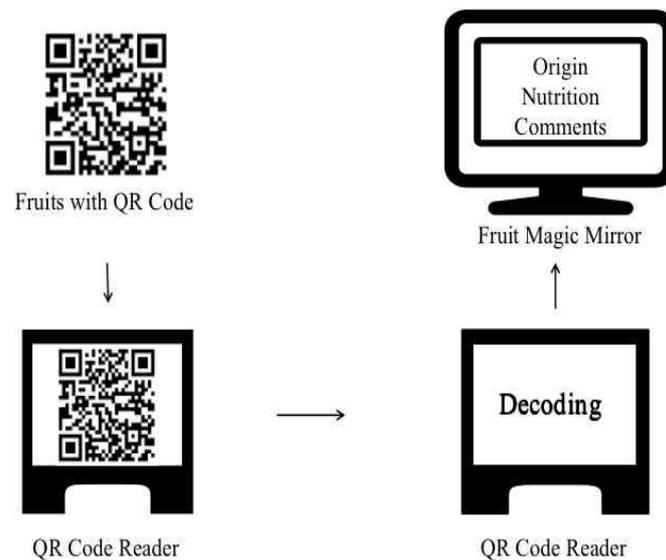
The new retail model was firstly introduced by Jack Ma, the founder of Alibaba, to establish online merging offline in 2016 (Achim, 2019). The core meaning of the new retail

model is that retailers can transform and upgrade the commodities production, circulation, and sales processes by relying on the Internet and combining technology advances such as big data and cloud computing. Thus, the retailers can reshape the retail industry structure and deeply merge online platforms, offline experience, and modern logistics into a new retail model. With advanced data analysis tools by combining the Internet, big data, and PC terminal, retail stores can perceive styles of consumers' consumption behavior, predict their consumption preferences accordingly, guide the process of manufacturing products, and provide consumers with differentiated and premium products and services.

JD, as a significant competitor of Alibaba, opened the first retail store called 7FRESH using self-service technology in Beijing in 2018 (JD 2108). 7FRESH of JD is now one of the leading retail stores, which provides thousands of fresh products and a 30-minutes delivery for customers who place orders online, aiming to offer a convenient way for customers to enjoy fresher foods in the shortest time (Long 2018; JD 2018). 7FRESH store offers different in-store technologies for consumers. The autonomous shopping cart allows customers to shop hands-free because the smart cart follows customers during shopping, and the self-checkout and mobile payments help consumers to pay for the products without traditional cashiers present (Rompaey 2018).

Moreover, 7FRESH develop a self-scanning technology called the fruit magic mirror for customers (Rompaey 2018). The use of fruit magic mirror is based on the scanning of quick response (QR) code. A quick response (QR) code is a digital image with two dimensions and is often used combined with the specific QR code reader or customers' smartphones (Lou, Tian, and Koh 2017). When customers shop for fresh fruits in the

7FRESH store, they can use the fruit magic mirror to check various interesting information about different types of fruits. Every kind of fruit in the 7FRESH store has a unique QR code, and there is a reader machine on each fruit shelf. Customers can scan the QR codes of fruits using the QR code reader, and the reader will decode it to allow the fruit magic mirror to display the detailed information of the fruit, such as the origin place, the nutrition value, and overall comments of one fruit (JD 2018; Liao 2018). Consumers can choose their preferred fruits based on the information they can get from the fruit magic mirror. JD is trying to build a premium and customized offline food shopping experience for customers by introducing and encouraging consumers to use self-service technology (JD 2018). The scanning and decoding process of how the fruit magic mirror of the 7FRESH store works is shown below in Figure 1.



**Figure 1.** Fruit Magic Mirror

This research uses the quantitative method by sending out designed questionnaires in random Chinese cities to gain detailed primary data. The empirical results show that for relative advantage and complexity path, the p-value is less than 0.05, indicating customer attitude influence behavioral intention in the relative advantage and complexity path. The results suggest retailers who plan to introduce self-service technology into physical stores need to pay more attention to how customers feel about using it inside stores by bringing more perceived benefits and reducing the difficulty of using the SST for consumers to help them better accept and adopt the self-service technology. With the new retail concept appears, and retail stores take action to set up SST, consumers start to try using it when shopping. However, because the amount of stores with SST using and previous researches are both limited, adoption for Chinese consumers remains unclear. For retailers, it is crucial for them to understand customer adoption process for better designs and improvements.

This research aims to study Chinese consumers' adoption of using SST inside retail stores and fill in the gap of this topic in China. Based on the results, this study contributes to the academics by delivering a primary understanding of customer attitude towards SST that may influence behavioral intention of using fruit magic mirror in the 7FRESH store of JD. This study analyzes the direct effect of five innovation attributes (RA, CB, CX, TB, and OV) towards behavioral intention, the mediating effect of customer attitudes towards SST between the innovation attributes and consumer intention to use SST. Results and implications of this research can help Chinese retailers to understand better how customers evaluate existing self-service technology. Besides, this research can motivate the Chinese retail industry to focus on designing and improving the performance of self-service technology, such as bring

more benefits to customers and reduce the difficulty or provide guidance for them to use it to help consumers adopt the self-service technology and have better shopping experience inside retail stores.

This paper has the following structures: Section II provides a review of previous studies of SST, self-scanning, and the five attributes (RA, CB, CX, TB, and OV) of diffusion of innovation theory. Section III generates the conceptual framework and develops hypotheses for different paths according to the conceptual framework for this research. Following Section IV gives an introduction to the methodology of this research, including the data collection method, the questionnaire development, and the statistic method for analyzing the primary data. Empirical results are analyzed and presented in section V. At last, section VI draws the conclusion, highlights the implications for the Chinese retail industry, discusses the potential limitations of this study, and provides accordingly directions for future researches.

## **II. LITERATURE REVIEW**

Previous studies have been widely conducted to demonstrate the substantial role of using advanced technology in the retail industry, and the concept of self-service technology (SST) has obtained continuously increasing interest recently (Dbholkar 1994, 1996; Fernandes & Pedroso 2016; Meuter 2000). Some researchers point out that the traditional interpersonal contact between customers and sellers is gradually being replaced by SST (Rayport & Sviokla 1994; Wang, Harris, and Patterson 2013). The development of the new retail model stimulates the demand for applying the self-service technology in the physical retail store (Achim, 2019). SST, firstly introduced by Dbholkar (1994), is the technology

interface that requires no interpersonal involvement and connection with direct service employees and encourages customers to provide preferred service on their own (Chih-Hung Wang 2012; Demoulin & Djelassi 2016; Fernandes & Pedroso 2016; Meuter et al. 2000).

### **Self-Service Technology (SST)**

Self-service technology (SST), which combines telecommunication and the Internet, is being increasingly used to deliver better service in the retail industry (Fernandes & Pedroso 2016; Walker & Johnson 2006). When customers use SST in the retail store, they become the co-producer of service, which means that the service customers provide for themselves is initially offered by retailers (Demoulin & Djelassi 2016; Fernandes & Pedroso 2016). Such service participation of customers is crucial for retailers because it increases productivity and offers convenient service channels for customers, eventually contributes to build competitive advantages for retail stores and deliver differentiated service for consumers who use SST (Demoulin & Djelassi 2016; Fernandes & Pedroso 2016). Widely used self-service technology can be generally categorized into two types: "online" options such as online shopping platforms and "in-store" options such as self-scanning device (Dbholkar & Bagozzi 2002). With the increasing maturity of new retail-related application technologies, the innovation and development of retail self-service technologies, such as self-scanning, autonomous shopping cart, and self-checkout, aim to bring consumers a new and differential experience of easy shopping and convenient payment (Achim, 2019).

### **Self-Scanning**

Self-scanning, as a significant example of self-service technology used in 7FRESH store, is a technology-based service device offering customers interactive shopping experience by allowing them to provide shopping service on their own (Ekman 2016; Marzocchi & Zammit 2006). In the 7FRESH store, customers use QR codes readers as the self-scanning devices, which defines as a terminal contains optical reader to capture the QR codes of the product and decode the it into displayed product information in the fruit magic mirror, including nutrition value, origin, and logistics information (Ekman 2016; Marzocchi & Zammit 2006). Self-scanning pulls customers to have a closer connection with the products they purchased (Elliott et al. 2013; Marzocchi & Zammit 2006). For retailers, the use of self-scanning contributes to reduce operating costs and establishes a closer connection with customers shopping in-store (Marzocchi & Zammit 2006). Moreover, customers view self-scanning using as generally positive and appealing, and self-scanning raises non-users' incentives to try and use as well (Ekman 2016).

### **Diffusion of Innovation Theory**

Scholars have shown a long interest in analyzing the SST adoption process, and numerous researches on understanding the process of adopting technology rely on using the diffusion of innovation theory (AI-Jabri & Sohail 2012; Dingfelder & Mandell 2010; Min, So, and Jeong 2018; Rambocas 2012; Shim & Kotsiopoulos 1994; Yunus 2014). Diffusion of innovation theory (DOI), firstly propounded by Everett M. Rogers (Walker, 1999), tries to analyze the factors which can influence an individual's new technology adoption process based on finding adoption patterns and measure the level of adoption (AI-Jabri & Sohail 2012; Min et al. 2018; Rogers 2003).

Diffusion describes a process that members in a particular social system communicate with each other about an innovation over time (Dingfelder & Mandell 2010; Rogers 2003). Previous research also explains diffusion as voluntary or planned spread of a new practice (Walker 1999). Innovation defines as a practice or idea that is relatively new for individuals (Franceschinis, Thiene, Scarpa, Rose, Moretto, and Cavalli 2017). The newness of an idea or practice is emphasized, which suggests that an invention of technology can be viewed as an innovation when consumers are aware of this technology (Walker 1999; Franceschinis et al. 2017). Accordingly, diffusion of innovation theory focuses on explaining how an individual spontaneously share and communicate with others about the innovation of technology and if the individual tend to reject or adopt the innovation of technology (Walker 1999). Rogers (2003) identifies five innovation attributes that have critical impacts when adopting innovations, namely RA, CB, CX, TB, and OV (AI-Jabri & Sohail 2012; Rambocas 2012).

### **Relative Advantage**

Relative advantage (RA) measures that an innovation is discerned with more benefit and is better than prior for the users (Dingfelder & Mandell 2010; Min et al. 2018; Yunus 2014;). Customers intend to adopt new self-service technology when they realize innovation is superior and more useful than the predecessor, and the benefit perceived can be economic benefits, improved effectiveness, and customer satisfaction (Min et al. 2018; Yunus 2014). Relative advantage tends to positively relate to the degree of adoption. Specifically, the higher the relative advantage recognized by the customers, the higher the possibility that the customers will adopt the innovation (AI-Jabri & Sohail 2012; Yunus 2014).

## **Compatibility**

Compatibility (CB) refers to that the innovation is aligned with a potential adopter's value, lifestyle, and needs (Min et al. 2018; Premkumar, Ramamurthy, and Nilakanta 1994). Previous studies have demonstrated the significant role that compatibility played in determine the customer attitude towards SST and when measuring the innovation adoption process (AI-Jabri & Sohail 2012; Premkumar et al. 1994). Thus, when an innovation of technology lacks compatibility, consumers may take a longer time in the adoption process (Walker 1999). Researchers also illustrate that compatibility is positively related to acceptance of SST (Premkumar et al. 1994). For an innovation that has higher compatibility, it will decrease the uncertainty for adopters (Vagnani & Volpe 2017).

## **Complexity**

Complexity (CX) of an innovation is the difficult degree of innovation for the potential adopters to use or understand (Franceschinis et al. 2017). Complexity is a significant barrier for potential adopters to accept the innovation, and perceived complexity by customers lead to resistance to new technology (Bradford & Florin 2003). Prior studies point out that the complexity negatively affects customer attitudes and the adoption of self-service technology (AI-Jabri & Sohail 2012; Bradford & Florin 2003). Namely, customers tend to be inhibited when they realize the self-service technology requires more effort than they expect (AI-Jabri & Sohail 2012; Premkumar et al. 1994).

## **Trialability**

Trialability (TB) measures the degree to which the capacity to test and evaluate innovation before commit to accept it (Franceschinis et al. 2017; Rogers 2003). Trialability provides potential adopters opportunities to experiment with the innovation for customers to reduce uncertainty and eliminate concerns related to the adoption process (Rogers 2003; Rambocas 2012; Tan & Teo 2000). Also, consumers can explore the potentialities of the innovation when experimenting with it and deal with any problem before actually adopting the innovation technology (Vagnani & Volpe 2017). Evaluations of the innovation during the trial period can contribute to positive customer attitude towards self-service technology as well (Yunus 2014). A higher level of trialability tends to have a positive effect on the innovation adoption process (Vagnani & Volpe 2017).

### **Observability**

Observability (OV) describes the degree of visible results that the innovation provides for potential adopters, and the results can be detected and communicated easily among customers (Rogers, 2003). When the benefits and results are tangible for customers, they have a higher possibility to accept the innovation (Min et al. 2018). Consumers can gain and learn more about positive characters with more visible benefits to the adoption process (Vagnani & Volpe 2017). According to Park & Chen (2007), observability can positively affect customer attitude and increase the probability of innovation adoption. In which case, for consumers at 7FRESH stores who use the fruit magic mirror, when they can see the results and benefits of using this innovation, they have a higher chance and faster rate to accept and adopt the magic mirror (Walker 1999).

### **Customer Attitude**

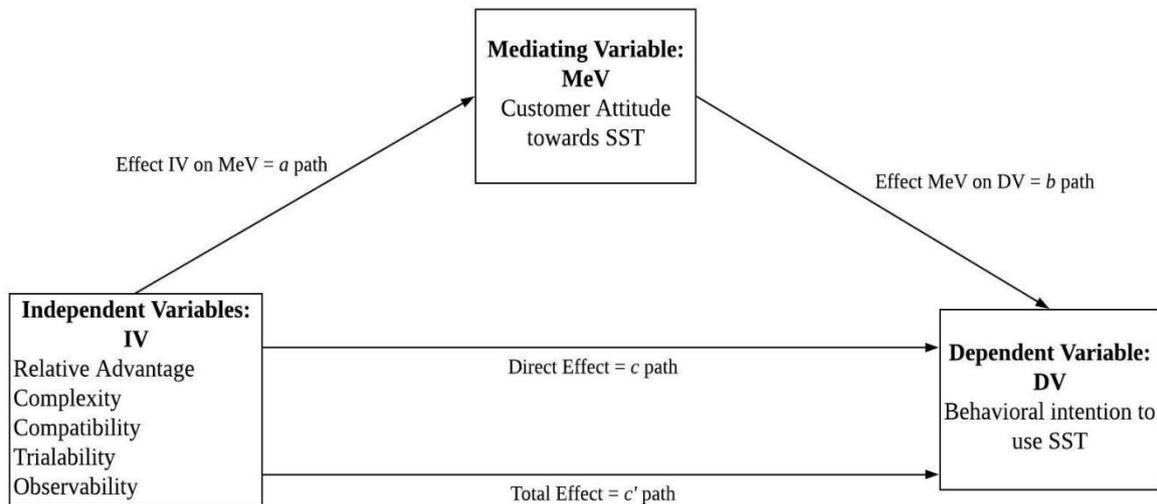
A previous study shows that customer attitudes built are influenced by the five diffusion of innovation attributes within the innovation adoption process (Tylor 1995). Customer attitude defines as an individual's after-using evaluation and desirability response towards the specific item (Weijters et al. 2007; Yunus 2014). Specifically, when customers use technology innovation, attitude refers to the consumers' feelings, assessments, and reactions towards the specific technology innovation (Pantano & Di Pietro 2012). For customers, when they use self-service technology inside the physical retail store or are exposed to an SST-using environment, customer attitude towards self-service technology will be formulated (Curran et al. 2003). Furthermore, customer attitude links the five diffusion of innovation and customer behavioral intention and serves as a connection between them because formulated customer attitude is an active driver of behavioral intention (Ajzen 1991; Curran et al. 2003; Kaur & Gupta 2012; Srinivasan 2014).

### **Behavioral Intention**

Behavioral intention refers to a likelihood motivation for an individual to engage in certain behaviors (Kaur & Gupta 2012). Namely, behavioral intention is the potential adopter's reactions towards innovation, specifically, when the potential adopters are customers, behavioral intention refers to customers' motivation to adopt or reject the self-service technology (Yunus 2014). Behavioral intention describes customer firm intention to perform a specific behavior, in which case, behavioral intention refers to use self-service technology in the physical retail store (Kaur & Gupta 2012). Previous study shows that customer's behavior of using self-service technology can be predicted by their intention (Ajzen & Fishbein 1980). Also, the research shows that if customers have a higher behavioral

intention, it will promote the possibility for customers to use self-service technology in the future (Ngcwabe & Chiliya 2014).

### III. CONCEPTUAL FRAMEWORK & HYPOTHESIS DEVELOPMENT



**Figure 2.** Conceptual Framework

#### Hypothesis Development

Relative Advantage (Franceschinis et al. 2017; Min et al. 2018; Roger, 2003)

H1c. Relative advantage significantly affects behavioral intention to use self-scanning.

H1a. Relative advantage significantly affects customer attitude towards self-scanning.

H1b. Customer attitude significantly affects behavioral intention in relative advantage path.

H1c'. Customer attitude towards SST mediates the correlation between relative advantage and behavioral intention to use self-scanning.

Compatibility (AI-Jabri & Sohail 2012; Min et al. 2018; Premkumar et al. 1994)

H2c. Compatibility significantly affects behavioral intention to use self-scanning.

H2a. Compatibility significantly affects customer attitude towards self-scanning.

H2b. Customer attitude significantly affects behavioral intention in Compatibility path.

H2c'. Customer attitude towards SST mediates the correlation between compatibility and behavioral intention to use self-scanning.

Complexity (Al-Jabri & Sohail 2012; Bradford & Florin 2003; Franceschinis et al. 2017)

H3c. Complexity significantly affects behavioral intention to use self-scanning.

H3a. Complexity significantly affects customer attitude towards self-scanning.

H3b. Customer attitude significantly affects behavioral intention in Complexity path.

H3c'. Customer attitude towards SST mediates the correlation between complexity and behavioral intention to use self-scanning.

Trialability (Franceschinis et al. 2017; Rogers 2003; Yunus 2014)

H4c. Trialability significantly affects behavioral intention to use self-scanning.

H4a. Trialability significantly affects customer attitude towards self-scanning.

H4b. Customer attitude significantly affects behavioral intention in Trialability path.

H4c'. Customer attitude towards SST mediates the correlation between trialability and behavioral intention to use self-scanning.

Observability (Min et al 2018; Park & Chen 2007; Rogers 2003)

H5c. Observability significantly affects behavioral intention to use self-scanning.

H5a. Observability significantly affects customer attitude towards self-scanning.

H5b. Customer attitude significantly affects behavioral intention in Observability path.

H5c'. Customer attitude towards SST mediates the correlation between observability and behavioral intention to use self-scanning.

#### IV. RESEARCH METHODOLOGY

This study aims to examine customers' potential behavioral intention towards self-scanning technology in the 7FRESH store. This study applies the quantitative method to better observe the attributes that influence individuals. The data of this research was collected by sending out questionnaires randomly to collect primary data of Chinese customers. The survey was designed, adapted, and modified from the careful review of previous studies on self-service technology (SST), self-scanning, diffusion of innovation theory (DOI), and customer attitudes towards self-service technology. The questionnaire of this research is shown in the Table I. All five attributes of diffusion of innovation theory (RA, CB, CX, TB, and OV) are included in the survey questions to test the relationship among five innovation attributes, customer attitude, and behavioral intention to have a better and deeper understanding about Chinese customers' innovation adoption process.

The questionnaire consists of two sections. The first section is about questions used to capture respondents' demographic characteristics such as respondents' age, gender, education level, and monthly income level and if the respondents had QR code scanning experience before. Questions related to demographic characteristics were designed to understand respondents' basic information better.

The second section of the questionnaire contains the data of respondents' preference towards five diffusion of innovation attributes (RA, CB, CX, TB, and OV), customer attitude towards self-service technology, and consumer behavioral intention. A total of 35 items were developed in the survey questions. Each variable is adapted and represented by a selected

pool of items from the review of previous studies with related topics, and the respondents rate each item based on their self-scanning using experience or their understanding and judgments towards self-scanning in the 7FRESH store. All the variables were measured by using the 7-point Likert scale in the questionnaire that 1 stands for strongly disagree, 4 means neutral opinion, and 7 represents strongly agree to the selected items.

The samples are chosen from Chinese cities randomly. Moreover, before officially start sending out and collecting the questionnaires, a pre-test of 50 respondents was conducted to examine and make sure the reliability of each survey items and all the measured items showed fitness to the employed constructs. Green's study (1991) points out the number of respondents required for the correlation or regression analysis based on the number of independent variables (IVs) or the factors to dependent variables (DVs). The study also demonstrates that for the  $R^2$  evaluation, the number of respondents required need to be  $N > 50 + 8p$ . When the research needs to test multiple correlations or regressions among different variables, the amount of respondents should be  $N > 104 + p$ . In which case, considering there are total five independent variables and one dependent variable, this research needs at least  $N = (50+8*5) + (104+5) = 199$  respondents for proper regression and relationship analysis (Green, 1991). For this research, a total of 209 respondents were randomly approached online for this study, and their questionnaires were checked to be valid. Table II lists the respondents' demographic information and QR codes scanning experience.

This study uses Statistical Package for the Social Sciences (SPSS) for data analysis to generate a flexible method for the data sets to check for data reliability test and regression

analysis. Specifically, Hayes' Process Macro is applied for mediation process analysis in this research. Hayes' Process Macro is a statistical mediation analysis method which is conducted in SPSS to estimate coefficient value for each path in the conceptual framework using the multiple regression. It can generate a deep understanding of the direct effects of independent variables (IVs) to the dependent variable (DV), and indirect effects of independent variables (IVs) to the dependent variable (DV) through the mediation variables (MVs) (Preacher & Hayes 2004). In this study, Hayes' Process Macro is applied to analyze the direct effect that five diffusion of innovation attributes (CA, CB, CX, TB, and OV) as the independent variables have on customer intention to use the self-service technology. Also, it is applied to examine the indirect effects from the five diffusion of innovation attributes (CA, CB, CX, TB, and OV), through the mediation variable customer attitude towards self-service technology to the dependent variable customer behavioral intention.

## V. EMPIRICAL RESULTS

In this research, independent variables of five innovation attributes that would directly influence customer behavioral intention and through the customer's attitude towards self-service technology to indirectly affect behavioral intention were tested. Analysis and results of the data are discussed below.

Reliability analysis was tested by measuring the value of Cronbach's alpha. The summary of the results are listed in Table III. The reliability test results indicate that all the independent variables, the mediating variable, and the dependent variable have a high value of Cronbach's values from 0.777 to 0.820, which are higher than the minimum acceptable

level with alpha value equaling to 0.7. Previous research points out with a higher value of Cronbach's alpha that is close to 1, indicating a higher consistency and better reliability of factors measured in the study (Nunnally 1978). In which case, all the Cronbach's values measured in this study reach the general acceptance level. Thus, data of each variable shows an internal consistency and reliability for further analysis.

**Table III.** Cronbach's alpha of Each Variable

Variables	No. of items	Cronbach's alpha
Relative Advantage	5	0.820
Compatibility	5	0.784
Complexity	5	0.802
Trialability	5	0.803
Observability	5	0.783
Customer Attitudes	5	0.781
Behavioral Intention	5	0.777

This paper uses Hayes' Process Macro to test the mediation effects of this study, which is a statistical analysis method used to test the mediation effect in SPSS (Preacher & Hayes 2008; Chiu, Bool, and Chiu 2017; Hayes 2013). It presents the indirect and direct effect of independent variables (IVs) to the dependent variables (DV) via the mediating variable (MeV), which locates between independents variables and the dependent variable.

In this study, Model 4 of Process Macro was applied to check the mediation effect. The mediating variable, which serves as a covariate, is customer attitudes towards SST. Also, based on the research of Pearson & Hayes (2008), 95% confidence intervals, and 5,000 bias-corrected bootstrap samples were used for analysis. The results are shown in Table IV.

**Table IV.** Summary of Mediation Analysis Using Hayes' Process Macro

	Coefficient	SE	<i>t</i>	<i>p</i>	LLCI	ULCI
<i>Path c</i>						
Relative Advantage (RA)	0.0947	0.0608	1.5565	0.1211	-0.0253	0.2147
Compatibility (CB)	0.0476	0.0674	0.7054	0.4814	-0.0854	0.1805
Complexity (CX)	0.1072	0.0671	1.5967	0.1119	-0.0252	0.2395
Trialability (TB)	-0.0733	0.0639	-1.1463	0.2530	-0.1993	0.0528
Observability (OV)	-0.0603	0.0682	-0.8837	0.3779	-0.1949	0.0742
<i>Path a</i>						
Relative Advantage (RA)	0.0433	0.0613	0.7071	0.4803	-0.0775	0.1642
Compatibility (CB)	-0.0658	0.0672	-0.9792	0.3286	-0.1983	0.0667
Complexity (CX)	0.0411	0.0673	0.6098	0.5427	-0.0917	0.1738
Trialability (TB)	0.0863	0.0637	1.3533	0.1768	-0.0393	0.2119
Observability (OV)	0.0530	0.0681	0.7778	0.4376	-0.0813	0.1873
<i>Path b</i>						
Relative Advantage (RA)	-0.1362	0.0689	-1.9763	0.0495**	-0.2721	-0.0003
Compatibility (CB)	-0.1282	0.0693	-1.8487	0.0659	-0.2649	0.0085
Complexity (CX)	-0.1359	0.0688	-1.9740	0.0497**	-0.2715	-0.0002
Trialability (TB)	-0.1246	0.0694	-1.7953	0.0741	-0.2613	0.0122
Observability (OV)	-0.1280	0.0692	-1.8486	0.0659	-0.2645	0.0085
<i>Path c'</i>						
Relative Advantage (RA)	0.0888	0.0612	1.4511	0.1483	-0.0318	0.2094
Compatibility (CB)	0.0391	0.0672	0.5823	0.5610	-0.0933	0.1716
Complexity (CX)	0.1128	0.0667	1.6900	0.0925	-0.0188	0.2443
Trialability (TB)	-0.0625	0.0639	-0.9790	0.3287	-0.1884	0.0634
Observability (OV)	-0.0535	0.0679	-0.7878	0.4317	-0.1875	0.0804

Notes: \*\* $p < 0.05$

In the *path b* with the independent variable of relative advantage, results show that p-value is less than 0.05, so there is a significant relationship between the customer attitude and behavioral intention, namely, customer attitude towards self-scanning positively affects behavioral intention in relative advantage path. Thus, the hypothesis H1b is supported.

Similarly, in the *path b* of the complexity, p-value < 0.05 and coefficient value of -0.1359 indicate that customer attitude towards self-service technology significantly

influences behavioral intention, and there is a negative relationship between customer attitude and behavioral intention in complexity path. Thus, customer attitude with a high level of difficulty in using self-service technology negatively affects their intention to use self-service technology. Results indicate that customers have little intention to use the self-service technology, or it may take a longer time for customers to adopt self-service technology. Hence, the hypothesis H3b is supported.

According to Sobel (1982), the indirect effect that independent variables have on the dependent variable is defined as  $ab$ . Generally,  $ab = c'-c$ , which means that the total effect of IVs on DV can be divided into indirect effect of *path*  $ab$  and direct effect *path*  $c$ . When there is no zero between ULCI (upper limit confidence interval) and LLCI (the lower limit confidence interval), the indirect effect is significant. In this study, as for the relative advantage path, LLCI is -0.2721, and ULCI is -0.0003. Similarly, in the complexity path, LLCI is -0.2715, and ULCI is -0.0002. Thus, no zero occurred in the LLCI and ULCI interval for both relative advantage path and complexity path. The result of this research shows that in relative advantage and complexity path, customer attitude towards SST significantly affects behavioral intention.

In summary, the results of this study have provided evidence to the mediation effect analysis in the innovation adoption process of self-service technology and act as a start point to interpret how Chinese consumers view the self-service technology inside the physical retail stores. Nevertheless, some hypotheses were not supported in this study which are inconsistent to previous researches (Al-Jabri & Sohail 2012; Bradford & Florin 2003; Franceschinis et al.

2017; Min et al. 2018; Park & Chen 2007; Premkumar et al. 1994; Rambocas 2012; Walker 1999; Yunus 2014). The reasons why some hypotheses were not supported are because introducing the self-service technology into the physical retail store is at the primary stage, and self-service technology is relatively new. Also, the 7FRESH stores are limited only in several first-tier cities. For most consumers, the use of self-service technology inside the retail stores is not popularized in China. The summary of the hypotheses of this study is shown below.

*c path*

H1c. Relative advantage significantly influences behavioral intention to use fruit magic mirror. - Reject

H2c. Compatibility significantly influences behavioral intention to use fruit magic mirror. - Reject

H3c. Complexity significantly influences behavioral intention to use fruit magic mirror. - Reject

H4c. Trialability significantly influences behavioral intention to use fruit magic mirror. - Reject

H5c. Observability significantly influences behavioral intention to use fruit magic mirror. - Reject

*a path*

H1a. Relative advantage significantly influences customer attitude towards fruit magic mirror. - Reject

H2a. Compatibility significantly influences customer attitude towards fruit magic mirror. -

Reject

H3a. Complexity significantly influences customer attitude towards fruit magic mirror. -

Reject

H4a. Trialability significantly influences customer attitude towards fruit magic mirror. -

Reject

H5a. Observability significantly influences customer attitude towards fruit magic mirror. -

Reject

*b path*

H1b. Customer attitude significantly influences behavioral intention in relative advantage path. - Support

H2b. Customer attitude significantly influences behavioral intention in Compatibility path. -

Reject

H3b. Customer attitude significantly influences behavioral intention in Complexity path. -

Support

H4b. Customer attitude significantly influences behavioral intention in Trialability path. -

Reject

H5b. Customer attitude significantly influences behavioral intention in Observability path. -

Reject

*c' path*

H1c'. Customer attitude towards SST mediates the correlation between relative advantage and behavioral intention to use self-scanning. - Reject

H2c'. Customer attitude towards SST mediates the correlation between compatibility and

behavioral intention to use self-scanning. - Reject

H3c'. Customer attitude towards SST mediates the correlation between complexity and behavioral intention to use self-scanning. - Reject

H4c'. Customer attitude towards SST mediates the correlation between trialability and behavioral intention to use self-scanning. - Reject

H5c'. Customer attitude towards SST mediates the correlation between observability and behavioral intention to use self-scanning. - Reject

## **VI. CONCLUSION, LIMITATION AND FUTURE RESEARCH**

With the rapid development of the Internet, big data analysis, Internet of Things, and artificial intelligence, technology advance accelerates and enhances the innovation of improving new retail shopping experience with the appearance of self-service technology. This study indicates that for consumers, they value more about their attitudes and feelings towards the fruit magic mirror, and their evaluations significantly influence their adoption potentiality and their future use. Also, the results of this study suggest that the retail industry should focus more on improving customers' attitudes by increase the relative advantage of the self-service technology with more perceived benefits and superior functions for customers. The retail industry can attempt to reduce the complexity to use the self-service technology for potential adopters to better understand and learn to use it as well. Hence, the retail industry should emphasize the usefulness and benefits consumers can perceive when using self-service technology inside the retail store, also focus on designing easy-to-use interface to reduce the potential barrier of adopting innovation in order to satisfy customer's needs and meet their requirements.

This study contributes to a primary attempt to investigate various elements that influence customers to adopt innovation inside the retail store in China, given that self-service technology is relatively new in China. The new development of retail technology, composed of self-service technology (SST), big data analysis, cloud computing, and other innovation of information technologies, has emerged to stimulate the rise of new retail concept in China and become a vital driving force for innovation in the retail industry. Retail industry introduces in-store technologies to realize the integration of traditional offline retailers and online e-commerce, cooperate with the collection and application of big data, and provide personalized and efficient services to customers. The goal is to ecologically reconstruct the traditional retail industry to stimulate the growth of the retail sector and attach more importance to improve consumers' shopping experience.

However, there are some remaining limitations of this research. First of all, although the cities of distributing questionnaires are randomly selected, the sample size is small for 209 respondents and may not reflect the population's opinions in general. Moreover, geographic characters are not considered in this research. Considering that the use of self-service technology in the physical retail stores is relatively new, geographic characters may affect customer adoption process of new innovation inside the retail store. Also, this study does not consider demographic characteristics such as gender, age, and education level into consideration. Demographic characters may influence consumer innovation adoption process as well. Male and female may have different attitudes towards using self-service technology and age difference can also be considered as a moderate factor in customers' innovation adoption process.

For future studies, researchers can select a larger sample size to reduce sample bias for more precise results. Furthermore, future researches can focus more on specific demographic areas. Compare with previous studies, RA, CB, CX, TB, and OV were proved to be influential to customer attitudes and behavioral intention (AI-Jabri & Sohail 2012; Bradford & Florin 2003; Franceschinis et al. 2017; Min et al. 2018; Park & Chen 2007; Premkumar et al. 1994; Rambocas 2012; Walker 1999; Yunus 2014). The reason why this study has insignificant results for some factors may be lacking focus on specific demographic areas. Considering that there are only twelve 7FRESH stores concentrated in first-tier cities in China now like Beijing and Guangzhou, self-service technology is not popularized for most customers to try and use it. Thus, in the future, researchers can limit demographic areas; for instance, Beijing, because 7FRESH was first introduced in Beijing and have stores in Shanghai, Guangzhou, and Chengdu. Finally, future researches can try analyzing different self-service technologies, such as self-checkout in Chinese retail stores as well.

## Appendices

**Table 1.** Questionnaire Development

Factors	Items	Sources
Relative Advantages (RA)	<p>Fruit Magic Mirror improves my overall in-store shopping experience in 7FRESH store.</p> <p>Fruit Magic Mirror is useful for my shopping experience in 7FRESH store.</p> <p>Fruit Magic Mirror makes my shopping experience in 7FRESH store easier.</p> <p>Fruit Magic Mirror is beneficial for my shopping experience in 7FRESH store.</p> <p>Fruit Magic Mirror is convenient for my shopping experience in 7FRESH store.</p>	<p><i>Kolodinsky et al. (2004);</i></p> <p><i>Yuen et al. (2018);</i></p> <p><i>Shih et al. (2004)</i></p>
Compatibility (CB)	<p>Fruit Magic Mirror adapts well with the way I like to shop in 7FRESH Store.</p> <p>Fruit Magic Mirror fits my needs in 7FRESH store.</p> <p>Fruit Magic Mirror is compatible with my shopping demand when I am in 7FRESH Store.</p> <p>Fruit Magic Mirror is suitable when I shop in 7FRESH store.</p> <p>Fruit Magic Mirror is suitable for my shopping style.</p>	<p><i>Al-Jabri et al. (2012);</i></p> <p><i>Koenig-Lewis et al. (2010);</i></p> <p><i>Oliveira et al. (2016);</i></p> <p><i>Yuen et al. (2018);</i></p> <p><i>Shih et al. (2004)</i></p>
Complexity (CX)	<p>Fruit Magic Mirror is frustrating for me to use in 7FRESH store.</p> <p>Fruit Magic Mirror is difficult for me to use in 7FRESH store.</p> <p>Fruit Magic Mirror demands a lot of effort to use.</p> <p>Fruit Magic Mirror is troublesome for me to use in 7FRESH store.</p> <p>I feel burdensome to learn to use Fruit Magic Mirror in 7FRESH store.</p>	<p><i>Yuen et al. (2018);</i></p> <p><i>Meuter et al. (2005)</i></p>
Trialability (TB)	<p>I would like to at least try Fruit Magic Mirror once in 7FRESH store.</p> <p>I want to try out Fruit Magic Mirror when I shop in 7FRESH store.</p> <p>I can use Fruit Magic Mirror on a trial basis when I shop in 7FRESH store.</p> <p>Before I decide whether to adopt Fruit Magic Mirror, I would like to try using it.</p> <p>I am permitted to attempt to use Fruit Magic Mirror when I shop in 7FRESH store.</p>	<p><i>Al-Jabri et al. (2012);</i></p> <p><i>Ndubisi et al. (2006);</i></p> <p><i>Ntemana et al. (2012);</i></p> <p><i>Yuen et al. (2018)</i></p>
Observability (OV)	<p>I have no difficulty telling others about the results of using Fruit Magic Mirror in 7FRESH store.</p> <p>I can communicate with other customers about the result of using Fruit Magic Mirror in 7FRESH store.</p> <p>I can identify if using Fruit Magic Mirror is beneficial in 7FRESH store.</p> <p>I can tell the result of using Fruit Magic Mirror in 7FRESH store.</p> <p>The result of using Fruit Magic Mirror is clear for me in 7FRESH store.</p>	<p><i>Al-Jabri et al. (2012);</i></p> <p><i>Yuen et al. (2018)</i></p>
Customer Attitudes (CA)	<p>I like using Fruit Magic Mirror in 7FRESH Store.</p> <p>I have a positive attitude towards using Fruit Magic Mirror in 7FRESH store.</p> <p>I am interested in using Fruit Magic Mirror in 7FRESH store.</p> <p>I think it is a good idea to use Fruit Magic Mirror in 7FRESH store.</p> <p>I like the idea of using Fruit Magic Mirror when I am shopping in 7FRESH Store.</p>	<p><i>Teo et al. (2007);</i></p> <p><i>Yu et al. (2005)</i></p>
Behavioral Intention (BI)	<p>I will recommend others to use Fruit Magic Mirror in 7FRESH store.</p> <p>I will encourage others to use Fruit Magic Mirror in 7FRESH store.</p> <p>I intend to use Fruit Magic Mirror in 7FRESH store in the future.</p> <p>I will become a loyal user of Fruit Magic Mirror in 7FRESH store.</p> <p>I will positively use Fruit Magic Mirror in 7FRESH store.</p>	<p><i>Gil-Saura et al. (2016);</i></p> <p><i>Gu et al. (2009);</i></p> <p><i>Park et al. (2011);</i></p> <p><i>Liaw et al. (2007)</i></p>

**Table II. Profile of Respondents**

<i>Item</i>	<i>Number of Respondents</i> <i>(n=209)</i>	<i>Percentage (%)</i>
<i>Gender</i>		
Female	107	51.20%
Male	102	48.80%
<i>Age</i>		
≤24	35	16.75%
25-34	49	23.44%
35-44	55	26.32%
45-54	38	18.18%
55-64	26	12.44%
65-74	2	0.96%
≥75	4	1.91%
<i>Education Level</i>		
Less than High School	30	14.35%
High School	31	14.83%
College	35	16.75%
Bachelor's Degree	93	44.50%
Master's Degree and Above	20	9.57%
<i>Monthly Individual Income</i>		
Lower than ¥4,999	72	34.45%
¥5,000 - ¥9,999	50	23.92%
¥10,000 - ¥14,999	27	12.92%
¥15,000 - ¥19,999	19	9.09%
¥20,000 - ¥24,999	18	8.61%
¥25,000 - ¥30,000	16	7.66%
¥30,000 and Above	7	3.35%
<i>QR Code Scanning Experience</i>		
Yes	137	65.55%
No	72	34.45%

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