Technology readiness and satisfaction in Vietnam's luxury hotels

Le Van Huy

University of Economics,
University of Da Nang,
71 Ngu Hanh Son,
Da Nang, Vietnam
Email: levanhuy@due.edu.vn

Pham Thi Hoan Nguyen

Department of Tourism,
University of Khanh Hoa,
01 Nguyen Chanh, Loc Tho,
Nha Trang, Vietnam
Email: phamthihoannguyen@ukh.edu.vn

Long Pham*

School of Management,
College of Business and Social Sciences,
University of Louisiana at Monroe,
700 University Ave,
Monroe, LA 71209, USA
Email: pham@ulm.edu
and
Department of Economics and Management,
Thuyloi University,
Hanoi, Vietnam
Email: phamlong@tlu.edu.vn
*Corresponding author

Ronald Berry

College of Business and Social Sciences,
University of Louisiana at Monroe,
700 University Ave,
Monroe, LA 71209, USA
Email: rberry@ulm.edu

Abstract: The objective of this study was to examine the relationships among customer's technology readiness, technology acceptance, and satisfaction with technologies commonly available in luxury hotels. The data for this study was collected from 828 international tourists who stayed in luxury hotels in

Vietnam. The results showed that optimism and innovativeness positively influenced perceived ease of use, while four dimensions of technology readiness positively influenced perceived usefulness. In addition, optimism, discomfort, and insecurity had impacts on customer satisfaction with technologies. Moreover, perceived ease of use had impacts on perceived usefulness and on customer satisfaction with technologies. Finally, theoretical contributions, managerial implications, and future research directions are discussed.

Keywords: technology acceptance; technology readiness; satisfaction; luxury hotels; Vietnam.

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Biographical notes: Le Van Huy is an Associate Professor of Economics at the University of Danang. His research interests are marketing, e-commerce, and innovation in banking. He has published his research papers in journals such as *Journal of Global Information Management*, *Journal of Applied Global Research*, *Journal of Economic Development* and *Journal of Economic Studies*, among others.

Pham Thi Hoan Nguyen is a Lecturer in the Department of Tourism at the University of Khanhhoa, Vietnam. Her research focuses on economics, business, behaviour, and value chains. She has published in journals such as *Journal of Economics and Development* and *Journal of Economic and Management*.

Long Pham is an Assistant Professor of Operations Management and Quantitative Analysis for Business, School of Management, College of Business and Social Sciences, University of Louisiana at Monroe; and Department of Economics and Management, Thuyloi University, Hanoi, Vietnam. He received his PhD in Management at the New Mexico State University. His research interests are negotiation analysis, e-negotiation, online auctions, e-commerce, e-purchasing and multiple criteria decision making. He has published in journals such as *Business Studies Journal*, *International Journal of Entrepreneurship*, *Journal of International Business Research*, *International Journal of Strategic Decision Sciences*, *International Journal of Enterprise Information Systems*, *Decision Support Systems* and *European Journal of Operational Research*, among others.

Ronald Berry is a Professor of Information Systems and the Dean of the University of Louisiana at Monroe College of Business and Social Sciences. He earned his doctorate from the Mississippi State University. He was the founding editor of *The Journal of Internet Commerce* and has published numerous articles in areas of information systems, information security, risk management, and business education. He has taught courses in computer programming, management information systems, decision support systems, and systems analysis and design.

1 Introduction

The current advancements in technologies, especially in self-service technologies, are changing business processes of many different service industries (Lin and Hsieh, 2007). The hotel industry is no exception (Wang et al., 2017). Self-service technology has revolutionised interactions between hotels and their customers (Barrett et al., 2015; Xiang et al., 2015). In the traditional business environment, the creation and provision of services to customers are made through interactions between hotel service staff and customers (Parasuraman et al., 1985, 1988). However, in the business environment driven by self-service technologies, the creation and delivery of services to customers are made based on interactions between self-service technologies and customers (Tsou and Hsu, 2017).

The emergence of self-service technologies in hotels has become increasingly popular (Leung and Matanda, 2013). There are many types of self-service technologies with different functional options, depending on hotels' business purposes (Schumann et al., 2012). In general, there are four broad types of self-service technologies, including telephone-based technologies or interactive voice response systems, internet-based technologies, interactive kiosks, and image (video)-based technologies (Meuter et al., 2000). These four types of self-service technologies are primarily focused on customer services with the aim of helping customers quickly complete transactions and experiencing a better service experience (Kelly et al., 2017).

Self-service technologies in hotels can bring many benefits to customers (Yang and Klassen, 2008). First, self-service technologies help customers engage more directly into processes of service creation and delivery, especially for convenient services, without direct involvement of service personnel (McGrath and Astell, 2017). Second, some self-service technologies such as internet-based technologies can help customers complete transactions without time or space limitations (Meuter et al., 2000; Schumann et al., 2012); for example, customers sitting at home can plan their vacation via making airline, hotel, restaurant, and other entertainment reservations (Iqbal et al., 2018). Third, by completing transactions without time and space limitations, self-service technologies can help customers save time and money and better control service delivery (Xiang et al., 2015).

With these significant potential benefits and to maintain their competitive edge, a number of hotels have been equipped with self-service technologies (Wang et al., 2017; Tussyadiah and Wang, 2016). Unfortunately, although hotels have focused their resources on enhancing the results of self-service technologies, many self-service technologies are still not meeting customers' growing demands and expectations, resulting in customer dissatisfaction (Beldona et al., 2018).

To be able to survive in the fiercely competitive hotel business environment, it is clear that hotels must invest in appropriate self-service technologies (Bilgihan and Wang, 2016). Such investments can help customers realise and optimise self-service technology generated potential benefits and ultimately impact customer satisfaction (Beldona et al., 2018). To do this, hotels are first required to understand what factors can influence customer satisfaction with self-service technologies (Beldona et al., 2018). Then, necessary steps can be taken to monitor and enhance the performance of self-service technologies (Cobanoglu et al., 2011).

There has been a great deal of research on technology adoption behaviours through the use of one or more models of theory of reasoned action (TRA), theory of planned behaviour (TPB), decomposed theory of planned behaviour (DTPB), technology acceptance model (TAM), and diffusion of innovation (IDT) (Godoe and Johansen, 2012). Among these models, TAM is considered the most commonly used model to explain users' acceptance behaviour or satisfaction with technology in general and self-service technology in particular (King and He, 2006). TAM consists of two factors that affect users' acceptance behaviour or satisfaction with new technology, namely, perceived usefulness (PU) and perceived ease of use (PEU) (Davis, 1989). PU refers to the extent to which a person believes that a particular technology (system) will increase his or her work (or life) productivity (Davis, 1989). PEU refers to the extent to which a person believes that a particular technology (system) does not require great efforts to use (Davis, 1989). TAM's implicit philosophy is that a new technology that is easy to use and beneficial to users will lead to their acceptance or satisfaction with that technology (Lai, 2017).

Although TAM has been used in a variety of research settings, it focuses only on characteristics of technology, namely, PEU and PU, but ignores other characteristics, such as individual differences in explaining users' acceptance or satisfaction with technology in general and self-service technology in particular (Lin and Chang, 2011). Parasuraman (2000) argues that a person's technology readiness (TR) can affect his or her acceptance or satisfaction with self-service technology. TR is a person's tendency to embrace and use new technologies for accomplishing his or her goals at home and in the workplace (Parasuraman, 2000).

TR consists of four factors: optimism, innovativeness, discomfort, and insecurity (Parasuraman and Colby, 2015; Parasuraman, 2000). Optimism and innovativeness are the two drivers of adoption of new technologies, where discomfort and insecurity are the two factors hindering adoption of new technologies (Parasuraman and Colby, 2015; Parasuraman, 2000). According to Parasuraman and Colby (2015) and Parasuraman (2000), optimism is seen as a positive view of technology and a belief that technology will give people increased control, flexibility and efficiency in their lives. This factor considers technology as a positive thing. Innovativeness is the tendency to be a technological pioneer and a thought leader. It refers to a degree to which a person is trying out new technology products or services. Highly innovative people are seen as thought leaders on technology-related issues. Discomfort is seen as a lack of control over a technology and a sense of being overwhelmed by this technology. Discomfort refers to the extent to which people have a general fear of using technology because of their inability to control it. Insecurity is seen as a distrust of technology or pessimism about the technology's ability to work correctly. Insecurity focuses on transactional aspects of technology rather than the lack of control as in discomfort. As a result, users become suspicious of new functionality and are unwilling to adopt the technology.

The TR framework has been used in various studies to examine users' acceptance or satisfaction with technology in general and self-service technology in particular (Mummalaneni et al., 2016). Many studies have suggested that TR is an important driver of customer satisfaction with self-service technologies (Lin and Hsieh, 2007). However, in addition to these positive results, some other studies suggest that TR' explanatory power is limited because this construct focuses only on individual differences, but ignores specific characteristics related to technology (Gelderman et al., 2011).

Based on a combination of factors related to individual differences and specific characteristics related to technology, TR has been integrated into TAM to form a new theoretical framework – TRAM (Widyawan and Santosa, 2017). TRAM is expected to be able to better explain users' acceptance and satisfaction with technology in general and self-service technology in particular (Lin and Chang, 2011). However, very few studies have used TRAM to examine customer satisfaction with self-service technologies. Some studies, for example, Chen et al. (2009), Lin and Chang (2011), Son and Han (2011), and Walczuch et al. (2007) used TRAM to examine factors leading to customer satisfaction with self-service technology in business environments, but not in the hotel environment.

Moreover, previous studies have mainly taken place in the context of developed countries while no research has been conducted in Vietnam – an emerging economy on the path of transition from a centrally planned economy to a market economy (Huy et al., 2012; Pham and Doan, 2014). Vietnam has made a great deal of economic achievements since 1986 after implementing its economic reforms (Huy et al., 2017; Tang et al., 2016). One of the economic achievements is the development of Vietnam's tourism industry (Hampton et al., 2017). Vietnam tourism is a spearhead economic sector (Shih and Do, 2016) and has rich and diverse potential (Hampton et al., 2017). According to Nhan Dan Online (2017), in 2016, Vietnam's tourism sector attracted nearly 10 million international visitors and 62 million domestic visitors. These numbers are expected to grow in 2020 to 17–20 million international visitors and 82 million domestic visitors. Revenue from tourism in Vietnam is expected to reach $18–19 billion by 2020 (Dung, 2017).

In the past six years, the number of four and five-star hotels doubled while the number of three-star hotels increased by 1.6 times. The total of five-star hotels in Vietnam is currently 109 and 10–15 hotels are waiting to be recognised in the five-star hotel category. There are now approximately 32,000 five-star hotel rooms, 31,000 four-star hotel rooms and 33,000 three-star hotel rooms (Nguyen, 2017). These rooms provide access to a variety of advanced self-service technologies to serve the diverse needs of customers during their stay.

The objective of this study is to apply TRAM in a new research setting – the hotel industry in Vietnam – a newly emerging country. More specifically, this study will integrate the construct TR – TR 2.0 (Parasuraman and Colby, 2015) with TAM to better explain customer satisfaction with self-service technology in luxury hotels in Vietnam. More specifically, the objectives of this study are as follows:

1 Examine if customer TR influences self-service technology's PEU in hotels in Vietnam.

2 Investigate if customer TR influences self-service technology's PU in hotels in Vietnam.

3 Explore if self-service technology's PEU has an impact on self-service technology's PU in hotels in Vietnam.

4 Examine if customer TR has an impact on customer satisfaction with self-service technology in hotels in Vietnam.

5 Investigate if self-service technology's PEU is related to customer satisfaction with self-service technology in hotels in Vietnam.

6 Explore if self-service technology's PU is related to customer satisfaction with self-service technology in hotels in Vietnam.

In the next section, the paper presents the relevant literature related to self-service technology, TAM, TR, and customer satisfaction. This review is followed by how the research model and hypotheses are developed along with a discussion of the research methodology. Next, results of this study are discussed. The paper concludes with the implications of the results, limitations, and avenues for future research.

2 Literature review

2.1 Self-service technology

Major advances in information and communication technologies over the past few decades have had a positive impact on all industries and sectors (Jun and Cai, 2001). The service sector is no exception (Barrett et al., 2015). One of the most striking aspects of changes is that the service sector has deployed technology-driven applications, or self-service technologies (Wang et al., 2012). Self-service technology enables customers to be more proactive in engaging in the creation and delivery of services without the involvement of service provider staff (Schumann et al., 2012). Some examples of typical self-service technologies include automated teller machines (ATMs), voice mail systems, automated ticketing machines, check-in and check-out systems, telephone banking, and a variety of other internet-based services (Schumann et al., 2012).

To better understand the role of self-service technologies, a distinction between two types of services in the service sector, self services and delivered services, needs to be clarified. A provided service can be considered as a service result. Specifically, for this kind of service, the service provider has an active role in providing services. As for self-service, it is more process-oriented and customers have a more active role. Schumann et al. (2012) summarised the differences between delivered services and self-services as shown in Table 1.

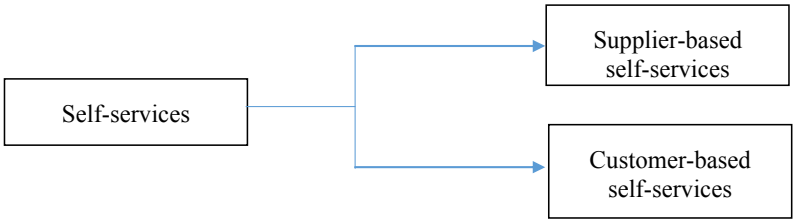
Table 1 Characteristics of delivered services and self-services

Characteristics	*Delivered services*	*Self-services*
Active role	Service supplier (or both customer and service provider)	Customer
Customer participation	Customer as co-creator	Customer as co-producer
Interactions between service supplier and customer	High	Low
Concurrence of service supplier and customer in the service process	Yes	No
Automation	No	Yes
Complexity	High	Low
Customisation	Customised	Standardised
Representative of service supplier	Service employees	Technologies (systems)

Source: Schumann et al. (2012)

In addition to pointing out the differences between delivered services and self-services, Schumann et al. (2012) also argues that self-services can be further broken down into provider-based self-services and customer-based self-services (Figure 1). The difference between these two self-service groups is that provider-based self-services are located based on decisions of the service provider, for example, ATMs. As for customer-based self-services, they can be accessed via customer selection of devices, such as mobile devices or desktops.

Figure 1 Self-service classification (see online version for colours)



Source: Schumann et al. (2012)

Nowadays, there are many self-service technologies with diverse options of functions implemented in hotels (Kasavana, 2008). Self-service technologies allow customers to engage more directly in the creation and delivery of services, and help customers have more enjoyable service experiences (Cunningham et al., 2009). One of the most popular self-service technologies deployed in hotels is self-service kiosks (Meuter et al., 2000). There are two services provided by self-service kiosks that are commonly accepted: check-in and check-out applications (Meuter et al., 2000). Other services include printing restaurant coupons in hotels or printing boarding passes when checking out. In general, the services provided by self-service kiosks are numerous, depending on the business purposes of the hotels (Ostrowski, 2010).

In addition to self-service kiosks, self-services based on the internet are offering a wide range of options for customers (Kasavana, 2008). Today's customers are able to interact directly with hotels to search for information, ask questions, or communicate with service staff via email or forums (Law and Hsu, 2006). Through the internet, hotels can interact and meet customer service needs without the constraints of time and space (Kasavana, 2008). For example, more and more hotels are taking advantage of the internet to effectively deploy marketing programs or provide customised products and services for customers (Lui and Picolli, 2010).

It should also be noted that today's mobile technologies are becoming very popular and facilitating mobile interactions based on 3G and 4G networks (Ashraf et al., 2017). The significant increase in the use of mobile devices (for example, mobile phones) has contributed to the growth of mobile commerce (Schetzina, 2010). The hospitality industry has recognised the important role mobile commerce plays in enhancing service experiences for customers. More and more hotels are using the mobile environment to create and deliver services to customers (Lombardi, 2010). For example, customers can use their smartphone to check in, check out, book a restaurant table, or print boarding passes when checking out from the hotel (Kumar, 2010).

In addition to the self-service technologies mentioned above, other self-service technologies such as telephone-based technologies and interactive voice-based response

systems are also widely deployed in hotels in order to provide services to visitors such as helping visitors complete transactions related to the hotel (Meuter et al., 2000). However, in order to be successful in deploying self-service technologies, hotels need to study factors that can affect the level of customer satisfaction (Bogicevic et al., 2017).

2.2 Technology acceptance model

Introduced by Davis (1989), TAM is viewed as an adaptation of the TRA, especially adapted for modelling and understanding user acceptance of information systems (Gefen et al., 2003). One of the primary goals of TAM is to bring about an interpretation of factors determining computer acceptance (Walczuch et al., 2007). TAM is expected to be capable of investigating user behaviour in a large domain of end-user computing technologies and user populations, but at the same time, be both specifically and theoretically justified (Lu et al., 2009). It is ideal that one has a model that is useful not only for prediction but also for interpretation such that people from academic and practitional circles are able to estimate why a particular system might be unacceptable so that appropriate corrective actions can be implemented (Ho and Ko, 2008). Because of this, TAM is mainly aimed at building a foundation for understanding effects of external factors on internal beliefs, attitudes, and intentions (Dabholkar and Bagozzi, 2002). To put it another way, TAM is established in an effort to gain such aforementioned goals via incorporating fundamental variables studied by prior research that are concerned with the cognitive and affective determinants of computer acceptance, and with the utilisation of TRA as a foundation for establishing theoretical relationships among these variables (Davis, 1989).

TAM focuses on two particular beliefs, namely, PU and PEU, which play an important role under the perspective of computer acceptance behaviour (Davis, 1989). PU refers to the degree to which a prospective user believes that utilising a particular system will improve his or her job outcome. This argument is based on the meaning of the word 'useful' – 'capable of being used advantageously' (Davis, 1989). In organisations, people are generally motivated by raises, promotions, bonuses, and other rewards to have good performance (Pfeffer, 1982). Lai (2017) argued that a system which is perceived useful is very likely to lead a user to believe that there exists a positive use-performance relationship.

PEU is defined as the degree to which a prospective user believes that utilising a particular system will be free of efforts (Davis, 1989). This argument is based on the meaning of the word 'ease' – 'freedom from difficulty or great efforts' (Lai, 2017). Effort is considered as a limited resource utilised by a person to allocate for various activities for which he or she is responsible (Gefen et al., 2003). If other things are kept equal, then a system, which is perceived to be easier to utilise than another, will have a higher probability of being accepted by users (Venkatesh, 2000).

2.3 Technology readiness

TR reflects people's state of mind which explains the common characteristics of people when using new technology (Parasuraman, 2000). According to Parasuraman (2000), TR is the tendency of people to embrace and use new technologies to achieve their goals in life at home and/or at their workplace. This concept emphasises the basic human needs for applying technology for their usability and interactivity (Parasuraman and Colby,

2015). To measure TR, Parasuraman (2000) developed a technology readiness index (TRI). This is a multivariate scale involving the psychological properties of humans, which measures people's technology acceptance. Initially, the scale (TRI 1.0) consisted of 36 items with four different constructs: optimism (ten items), innovativeness (seven items), discomfort (ten items), and insecurity (nine items). Parasuraman (2000) noted that optimism and innovativeness are the tendency to promote people's use of technology where discomfort and insecurity are the tendency to hinder people's use of technology. More specifically:

- *Optimism:* A positive view of technology by people (Parasuraman, 2000). Optimists often believe that technology helps them increase their control, flexibility and efficiency. They have a strategic vision and will produce promising and effective results (Walczuch et al., 2007). Therefore, optimists are always ready and willing to embrace and use new technology.
- *Innovativeness:* A pioneering trend, leading the way in technology (Parasuraman, 2000). Innovative people like to pursue the latest technologies and enjoy the challenge of finding technologies' utilities. When new technologies come into play, they like to own and use them before other people (Parasuraman, 2000).
- *Discomfort:* A lack of awareness in technology control and is overwhelmed by technology (Parasuraman, 2000). People in this group are always skeptical about technology-based products and services. They always feel depressed when using new technologies (Parasuraman, 2000).
- *Insecurity:* Referring to the loss of confidence in technology and to the skepticism when interacting with features of the technology (Parsuraman, 2000). For this group of people, when interacting with and using new technologies, they always carry a fear (Kwon, 2000) and are not confident in manipulating new technologies. They often have low technology satisfaction (Parasuraman and Colby, 2015).

As technologies evolved rapidly and through the application of the TRI 1.0 scale in studies, researchers expressed concerns over the length of the scale. Thus, Parasuraman and Colby (2015) studied and streamlined the items in the scale and published a more compact TRI 2.0 scale which consists of 16 items where optimism includes four items, innovativeness four items, discomfort four items, and insecurity four items.

Many researchers have suggested that the personality traits of people will influence their technology use behaviours (McElroy et al., 2007; Devaraj et al., 2008; Odlum, 2016; Penz et al., 2017). Researchers (Walczuch et al., 2007; Lin and Hsieh, 2007; Erdogmus and Esen, 2011; Liu et al., 2012; Godoe and Johansen, 2012; Kuo et al., 2013) have used the TRI 1.0 scale to study the impact of TR on technology adoption in various contexts and concluded that TR has impacts (partly or fully) on technology adoption.

2.4 Customer satisfaction

It should be noted that the expectancy/disconfirmation paradigm in the process theory established the foundation for significant research on satisfaction (Mohr, 1982). This paradigm consists of four constructs: expectations, performance, disconfirmation, and satisfaction (Mohr, 1982). Based on the expectancy/disconfirmation paradigm, Tse and Wilton (1988) have defined satisfaction as "the consumer's response to the evaluation of

the perceived discrepancy between prior expectations and the actual performance of the product as perceived after its consumption." This definition is very close to that of the service quality construct. However, there are a web of distinctions between customer satisfaction and service quality. Satisfaction is a post decision customer experience, whereas quality is not (Bolton and Drew, 1991a, 1991b; Boulding et al., 1993; Cronin and Taylor, 1992; Oliver, 1980, 1993; Parasuraman et al., 1985). Moreover, in the satisfaction literature, expectations reflect anticipated performance (Churchill and Suprenent, 1982) made by the customer as to the levels of performance during a transaction. In contrast, in the service quality literature, expectations are regarded as a normative standard of future wants (Boulding et al., 1993). These normative standards symbolise prolonged wants and needs that are kept unaffected by the adequate domain of marketing and competitive forces. Normative expectations are, hence, more stable and can be considered as representing the service the market oriented provider must constantly strive to provide (Zeithaml et al., 2009).

In attempts to specify the customer satisfaction construct, Giese and Cote (2000) have implemented research that addressed a review of the satisfaction literature together with group and personal interviews. They view the customer as the final user of a product. Their study findings reveal three attributes that incorporated the construct of customer satisfaction:

1 customer satisfaction is a summary affective response that varies in intensity

2 the response is related to a particular focus, a product choice, a purchase, or consumption

3 the response happens at a given time varying by circumstance, but is in general confined to time.

3 Research model and hypotheses

3.1 Reasons for integrating TR and TAM

Intuitively, it is possible to accept a relationship between TAM and TR, although PEU and PU in TAM are specific to a particular system, whereas TR involves technology beliefs in general (attached to an individual). When faced with a choice situation, consumers generally engage in an internal search by reviewing memories related to existing information (Bettman, 1979). As a result, besides heterogeneous features of the system, the general belief in technology derived from past experiences can be used to refer to the perception of PEU and PU. This experience-based assessment can be applied to new consumers who have to consider process selection alternatives using non-specific generic criteria (Bettman and Sujan, 1987). Thus, there seems to be a practical and theoretical basis that can be used when people evaluate an intention to adopt technology where the cognitive information about TR is restored and processed prior to specific evaluation (PEU and PU) are recovered and processed (Chen et al., 2014, 2013, 2009; Lin and Chang, 2011; Lin and Hsieh, 2007; Lin and Hsieh, 2007; Nugroho and Fajar, 2017; Pires et al., 2011; Son and Han, 2011; Walczuch et al., 2007; Widyawan and Santosa, 2017; Yang et al., 2012). It should be noted that all these studies have been conducted in business environments in developed countries, not in Vietnam, an emerging

country. Thus, the authors of this study would like to test if TRAM can be applicable in the hotel industry in Vietnam.

3.2 Research model and hypotheses

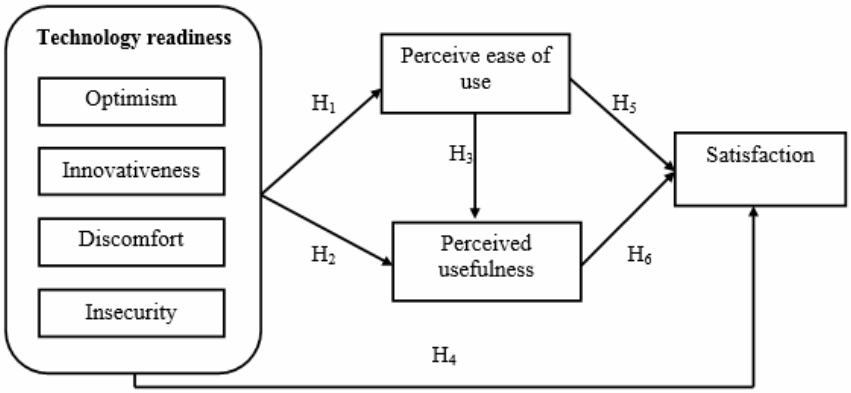
Many researchers have suggested that the personality traits of people will influence their technology use behaviours (McElroy et al., 2007; Devaraj et al., 2008). Researchers (Walczuch et al., 2007; Lin and Hsieh, 2007; Erdogmus and Esen, 2011; Godoe and Johansen, 2012; Kuo et al., 2013) have used the TRI 1.0 scale to study the impact of TR on PEU and PU in various contexts and found that TR had impacts (partly or fully) on PEU and PU, but depending on the field of study, the degrees of impact were varied. In addition, previous studies have also found that PEU has a positive influence on PU (Venkatesh and Davis, 2000). Therefore, the following hypotheses are proposed:

H1 TR (H1a: optimism; H1b: innovativeness; H1c: discomfort; H1d: insecurity) influences PEU with technologies in hotels in Vietnam.

H2 TR (H2a: optimism; H2b: innovativeness; H2c: discomfort; H2d: insecurity) influences PU of technologies in hotels in Vietnam.

H3 PEU influences PU of technologies in hotels in Vietnam.

Figure 2 Research model



Customer satisfaction refers to customer evaluation of a product or service that meets the needs and expectations of the customer (Zeitham et al., 2009). Customer satisfaction is measured based on the customer's subjective judgment of experiences and outcomes deriving from purchase behaviour (Westbrook, 1980). Customers are satisfied when service quality is higher than expected by the customer (Kotler et al., 2003). In the hotel business, hotel guests are satisfied when the services provided by the hotel meet or exceed customer expectations (Bowen and Shoemaker, 1998). In a research on customer satisfaction when interacting with technology, Chakrabarty et al. (2007) found that satisfaction is considered as a common feeling stemming from the beliefs of people in technologies that are able to meet people's requirements when they are utilised.

Previous studies have shown the effect of TR on customer satisfaction. Lin and Hsieh (2007) have indicated that TR has a significant impact on customer satisfaction with

technology-based services. Chen et al. (2009), Abdullah (2012), and Wang et al. (2017) have shown that optimism and innovativeness influence customer satisfaction. Therefore, the following hypotheses are proposed:

H4 TR (H4a: optimism; H4b: innovativeness; H4c: discomfort; H4d: insecurity) influences customer satisfaction with technologies in hotels in Vietnam.

Regarding the impact of technology adoption on customer satisfaction, many researchers have confirmed the existence of this relationship (Chang et al., 2008; Stoel and Lee, 2003). Therefore, the following hypotheses are proposed:

H5 PEU influences customer satisfaction with technologies in hotels in Vietnam.

H6 PU influences customer satisfaction with technologies in hotels in Vietnam.

4 Research design

4.1 Research setting

This study was conducted in Vietnam, an emerging economy on the path of transition from a centrally planned economy to a market economy (Pham and Doan, 2014). Vietnam has made a great deal of economic achievements since 1986 after implementing its economic reforms (Tang et al., 2016). One of the economic achievements is the development of Vietnam's tourism industry (Hampton et al., 2017). Vietnam tourism is a spearhead economic sector (Shih and Do, 2016) and has rich and diverse potential (Hampton et al., 2017). According to Nhan Dan Online (2017), in 2016 Vietnam's tourism sector attracted nearly 10 million international visitors and 62 million domestic visitors. These numbers are expected to grow in 2020 to 17–20 million international visitors and 82 million domestic visitors. Revenue from tourism in Vietnam is expected to reach $18–19 billion by 2020 (Dung, 2017).

In the past six years, the number of four and five-star hotels doubled while the number of three-star hotels increased by 1.6 times. The total of five-star hotels in Vietnam is currently 109 and 10–15 hotels are waiting to be recognised in the five-star hotel category. There are now approximately 32,000 five-star hotel rooms, 31,000 four-star hotel rooms and 33,000 three-star hotel rooms (Nguyen, 2017), indicating a rapid and strong growth rate. As expected, these rooms provide access to a variety of advanced self-service technologies to serve the diverse needs of customers during their stay. The objective of this study is to apply TRAM in a new research setting – the hotel industry in Vietnam, a newly emerging country. More specifically, this study will integrate the construct TR – TR 2.0 (Parasuraman and Colby, 2015) with TAM to better explain customer satisfaction with self-service technology in luxury hotels in Vietnam.

4.2 Measures of the constructs

In this study, Parasuraman and Colby's (2015) TRI 2.0 is utilised (with permission) with 16 items where four items are used for each dimension (optimism, innovativeness,

discomfort, and insecurity). PEU consists of four items in which four items are from Davis (1989) and one item was developed via interviews with customers, experts, and managers of hotels. PU consists of five items where four items are from Davis (1989) and one item was developed via interviews with customers, experts, and managers of hotels. Customer satisfaction consists of four items from Lin and Hsieh (2007), Makanyeza and Mumiriki (2016), adapted to be suitable in the hotel setting. All these items are measured by the Likert scale from 1 to 5 where 1 represents 'totally disagree' and 5 represents 'totally agree'.

These tentative scales (in English) were reviewed by four hotel managers who had been involved in management of initiatives on hotels' self-technologies enabled services and five academicians whose expertise is in hotel and tourism management. These experts/managers were very proficient in the English language. Several revisions were made based on the managers/experts' feedback/comments. The tentative questionnaire was sent to a group of ten tourists who came from Britain for their review and the results showed that the questions were understandable by these tourists. The final questionnaire consisted of 29 items with the following: four items for optimism, four items for innovativeness, four items for discomfort, four items for insecurity, four items for PEU, five items for PU, and four items for customer satisfaction with technologies.

The translation of the questionnaire into French was conducted by two Vietnamese teachers of French language; into Russian by two Vietnamese teachers of Russian language; and into Chinese by two Vietnamese teachers of Chinese language. All of the teachers are very good at English as well. The reason for using two teachers for each language was that the two teachers could translate the English version of the questionnaire independently, then they could discuss their own products with each other to make sure that inconsistency issues could be solved and the translated version was a reliable one. Prior to the translation, the authors explained all issues related to the measurement scale in order to provide these teachers with an understanding of the subject matter. Within ten days, these teachers completed the translation and the translated version of the questionnaire in each specific language (French, Russian, or Chinese) was tested by four international tourists whose language corresponds to the language of the questionnaire. Opinions of these international tourists helped adjust usage of words to make the questionnaire more understandable and meaningful.

4.3 Data collection

Respondents were tourists staying in luxury hotels in Vietnam. The authors focused on tourists who came from China, Russia, the USA, the UK, and other countries. Data collection was based on direct interviews with tourists via semi-structured questionnaires. The interviews were conducted by 12 tour guides. The tour guides were trained on knowledge of self-service technologies applied in hotels and interview methods so that they could explain to interviewees or answer questions asked by the interviewees. In total, 1,105 international guests who stayed in luxury hotels in Vietnam completed the questionnaire. Among them, 828 were appropriate for further analysis. The time frame of data collection was from March 2017 to Nov 2017. Table 2 summarises the demographics of the respondents and indicates that their background is quite diverse.

Table 2 Profiles of the survey respondents

Profile	*Count and proportion*	
	Count	*Proportion (%)*
Sex		
Male	398	48.1
Female	430	51.9
Total	*828*	*100.0*
Sources of international tourists		
China	186	22.5
Russia	193	23.3
The US	93	11.2
The UK	64	7.7
Others	292	35.3
Total	*828*	*100.0*
Age		
Less than 20 years old	59	7.1
20–30	216	26.1
31–40	284	34.3
41–50	147	17.8
51–60	73	8.8
Over 60	49	5.9
Total	*828*	*100.0*
Education		
High school	196	22.5
College/university bachelor's degrees	488	58.9
Masters'/PhD degrees	*154*	*18.6*
Total	*828*	*100.0*
Visit purpose		
Rest and relaxation	452	54.67
Business/affairs	166	20.0
Seminars/conferences	102	12.3
Study	50	6.0
Others	58	7.0
Total	*828*	*100.0*

4.4 Statistical analysis techniques

Structural equation modelling was selected as the main research tool. In our study, we follow the two-step approach suggested by Bollen (1989) where the construct reliability must first be assured to create a sound measurement model followed by fitting the structural model. For the measurement model, model adequacy is verified by 'fit'

between the sample covariance and the reproduced covariance from the causal model. Based on the two-step approach, the reliability of observed variables (indicators) were carefully examined before fitting the structural model (Hair et al., 1998). SPSS 21.0 and AMOS 21.0 software were utilised in this study.

5 Statistical analysis and results

5.1 Reliability analysis

The TRI 2.0 scale consists of four constructs: optimism (OPT), innovativeness (INN), discomfort (DIS), and insecurity (INS). Each construct has four items (observation variables). Results of the TRI 2.0 evaluation showed acceptable Cronbach's alpha coefficients. Specifically, Cronbach's alpha coefficients were: OPT = 0.823, INN = 0.842, DIS = 0.829 and INS = 0.827. Each were greater than 0.7. The correlation coefficients between each construct and its individual components are greater than 0.3.

As for PEU, the Cronbach's alpha coefficient was 0.841, which is greater than 0.7. The correlation coefficient between PEU and PEU1, PEU2, PEU4, and PEU5 respectively are greater than 0.3, but between PEU and PEU3 it was 0.213, which is less than 0.3. Therefore, PEU3 was removed from further analyses. The coefficient of Cronbach's alpha after the removal of PEU3 is 0.900, which is greater than 0.7 and the correlation coefficient between PEU and its individual components (PEU1, PEU2, PEU4 and PEU5) are all greater than 0.3. As for PU, the Cronbach's alpha coefficient is 0.872. The correlation between PU and its individual components are all greater than 0.3.

As for customer satisfaction with technologies (TSAT), the results showed that the Cronbach's alpha coefficient is 0.896. The correlation coefficient between TSAT and its individual components was greater than 0.3.

In summary, the reliability of TRI 2.0, PEU, PU, and TSAT was satisfactory for EFA analysis (Nunnally and Bernstein, 1994).

5.2 EFA analysis

The results of EFA analysis showed that the KMO coefficient was 0.854 and the significance level of Bartlett's test was less than 5% (sig. = 0.000). Eigenvalues are 1.446 (greater than 1) and factor loadings of each item on its respective factor were greater than 0.5. The results of EFA analysis in Table 3 indicated satisfactory convergent validity.

As shown in Table 5, all the correlations do not exceed 0.6, and the squared correlation between each of the construct is less than the average variance extracted from each pair of constructs (the lowest value at 0.539), which constitutes discriminant validity (Fornell and Larcker, 1981).

5.3 Hypothesis test results

Based on the results of the SEM model shown in Figure 3, it is indicated that the four factors of TRI 2.0 include OPT; INN, DIS, and INS are closely associated. The structural model reflects the dependence among TR (TRI), ease of use (PEU), PU, and satisfaction (TSAT). The four factors of TR are independent variables; and PEU, PU, and satisfaction (TSAT) are dependent variables.

Table 3 Exploratory factor analysis results

	Components						
	1	*2*	*3*	*4*	*5*	*6*	*7*
TSAT1	.869						
TSAT4	.866						
TSAT3	.865						
TSAT2	.842						
PEU4		.866					
PEU2		.837					
PEU1		.826					
PEU5		.785					
PU4			.866				
PU1			.842				
PU3			.813				
PU2			.683				
INN3				.818			
INN4				.798			
INN1				.780			
INN2				.760			
INS1					.821		
INS4					.790		
INS2					.781		
INS3					.780		
DIS1						.807	
DIS3						.804	
DIS4						.798	
DIS2						.780	
OPT1							.803
OPT4							.802
OPT3							.780
OPT2							.766
Cronbach alpha	0.896	0.900	0.872	0.842	0.827	0.829	0.823
KMO				0.854			
Sig				.000			

It is shown that the chi-square/df = 2.886 is less than 0.3 with p-value of 0.000, indicating 'statistically significant'. In addition, the RMSEA value = 0.048 was less than 0.08, and GFI = 0.925, TLI = 0.942, CFI = 0.949, higher than the recommended level (Browne and Cudeck, 1993). With the significance level of 5% (the 95% confidence), the model was shown to be consistent with the data. Table 6 presents the hypothesis test results.

Table 4 Constructs, factor loadings, composite reliability and variance extracted

Constructs	*Indicators*	*Factor loading*	*Cronbach's (reliability)*	*Average variance extracted (AVE)*
OPT	OPT1	.744	0.824	0.539
	OPT4	.738		
	OPT3	.686		
	OPT2	.767		
INN	INN3	.747	0.843	0.574
	INN4	.732		
	INN2	.811		
	INN1	.738		
DIS	DIS1	.741	0.830	0.550
	DIS3	.720		
	DIS4	.721		
	DIS2	.783		
INS	INS1	.743	0.827	0.545
	INS4	.716		
	INS2	.756		
	INS3	.738		
PU	PU4	.940	0.890	0.673
	PU1	.813		
	PU3	.845		
	PU2	.659		
PEU	PEU5	.786	0.907	0.710
	PEU1	.855		
	PEU2	.843		
	PEU4	.884		
TSAT	TSAT2	.806	0.896	0.648
	TSAT3	.837		
	TSAT4	.828		
	TSAT1	.836		

Table 5 Descriptive statistics and correlations

Variables	*Mean*	*Standard deviation*	*OPT*	*INN*	*DIS*	*INS*	*PEU*	*PU*	*TSAT*
OPT	3.84	1.06	1.00						
INN	3.88	1.00	0.227	1.00					
DIS	2.70	1.11	–0.185	–0.263	1.00				
INS	2.59	1.21	–0.183	–0.281	0.290	1.00			
PEU	3.69	1.22	0.395	0.401	–0.176	–0.212	1.00		
PU	3.94	1.22	0.293	0.497	–0.118	–0.245	0.505	1.00	
TSAT	3.16	1.40	0.140	0.044^{ns}	0.220	0.157	0.099	0.212	1.00

Note: ^{ns}: insignificant.

Figure 3 Relationships among TRI, TAM and TSAT (see online version for colours)

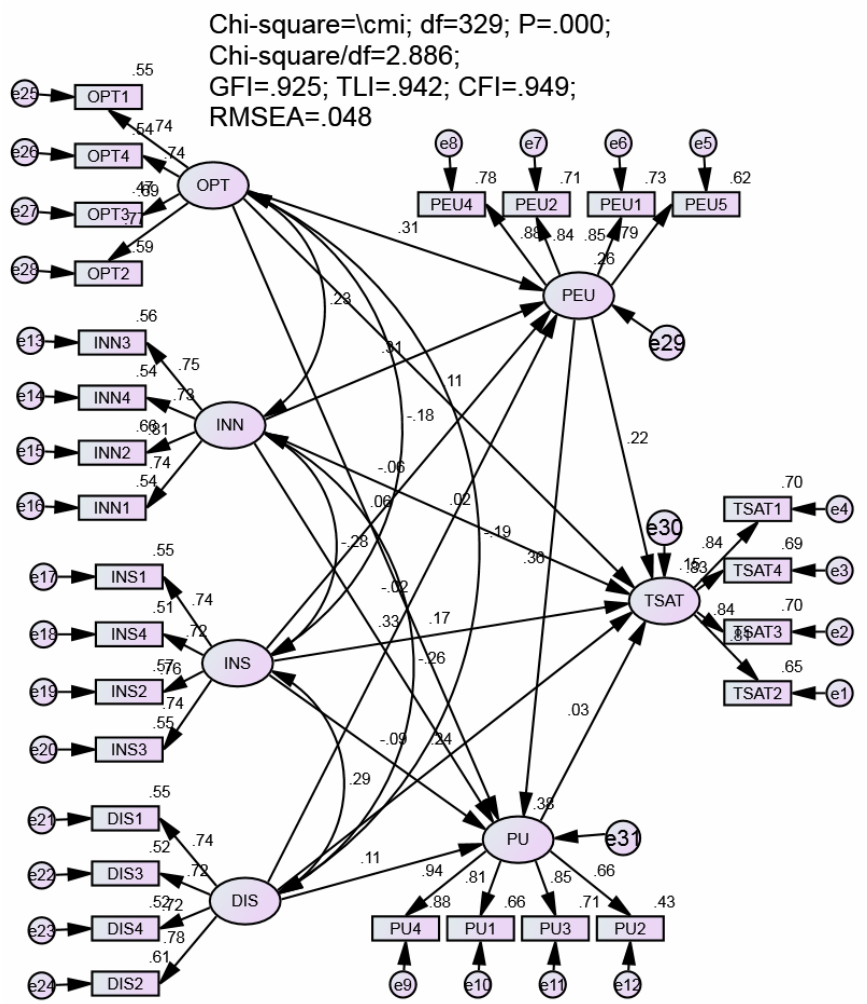


Table 6 Hypothesis test results

Relationship			*Hypothesis*	*Path coefficient*	*P-value*	*Results*
PEU	←	OPT	H_{1a}	.433	***	Accept
PEU	←	INN	H_{1c}	.514	***	Accept
PEU	←	DIS	H_{1d}	–.024	.628^{ns}	Reject
PEU	←	INS	H_{1d}	–.077	.112^{ns}	Reject
PU	←	OPT	H_{2a}	.094	.096*	Accept
PU	←	INN	H_{2b}	.605	***	Accept
PU	←	DIS	H_{2c}	.148	.003**	Accept
PU	←	INS	H_{2d}	–.120	.014**	Accept

Note: *p < 0.010; **p < 0.05; ***p < 0.001; ^{ns}: not statistically significant.

Table 6 Hypothesis test results (continued)

Relationship			*Hypothesis*	*Path coefficient*	*P-value*	*Results*
PU	←	PEU	H_3	.394	***	Accept
TSAT	←	OPT	H_{4a}	.146	.010**	Accept
TSAT	←	INN	H_{4b}	.037	$.619^{ns}$	Reject
TSAT	←	DIS	H_{4c}	.287	***	Accept
TSAT	←	INS	H_{4d}	.195	***	Accept
TSAT	←	PEU	H_5	.205	***	Accept
TSAT	←	PU	H_6	.027	$.510^{ns}$	Reject

Note: *p < 0.010; **p < 0.05; ***p < 0.001; ^{ns}: not statistically significant.

6 Discussion

The objective of this research is to integrate TR 2.0 (TR) into TAM to explain customer satisfaction with self-service technologies in the hotel business environment in Vietnam. TR consists of four factors: optimism, innovativeness, discomfort, and insecurity (Parasuraman and Colby, 2015; Parasuraman, 2000). Optimism and innovativeness are the two drivers of adoption of new technologies, where discomfort and insecurity are the two factors hindering adoption of new technologies (Parasuraman and Colby, 2015; Parasuraman, 2000). According to Parasuraman and Colby (2015) and Parasuraman (2000), optimism is seen as a positive view of technology and a belief that technology will give people increased control, flexibility and efficiency in their lives. This factor considers technology as a positive thing. Innovativeness is the tendency to be a technological pioneer and a thought leader. It refers to a degree to which a person is trying out new technology products or services. Highly innovative people are seen as thought leaders on technology-related issues. Discomfort is seen as a lack of control over a technology and a sense of being overwhelmed by this technology. Discomfort refers to the extent to which people have a general fear of using technology because of their inability to control it. Insecurity is seen as a distrust of technology or pessimism about the technology's ability to work correctly. Insecurity focuses on transactional aspects of technology rather than the lack of control as in discomfort. As a result, users become suspicious of new functionality and are unwilling to adopt the technology.

The research results showed that Hypothesis 1 (TR influences PEU with technologies in hotels in Vietnam) was partially supported. More specifically, H1a (optimism influences PEU with technologies in hotels in Vietnam) and H1b (innovativeness influences PEU with technologies in hotels in Vietnam) were statistically significant. These findings are the same as that of Walczuch et al. (2007). However, H1c (discomfort influences PEU with technologies in hotels in Vietnam) and H1d (insecurity influences PEU with technologies in hotels in Vietnam) were not statistically significant). These findings are consistent with that of Erdogmus and Esen (2011) and Kuo et al. (2013).

Hypothesis 2 (TR influences PU with technologies in hotels in Vietnam) was fully supported. More specifically, H2a (optimism influences PU with technologies in hotels in Vietnam), H2b (innovativeness influences PU with technologies in hotels in Vietnam), H2c (discomfort influences PU with technologies in hotels in Vietnam), and H2d

(insecurity influences PU with technologies in hotels in Vietnam) were statistically significant. These results are different from that of previous studies. For example, Walczuch et al. (2007) found that optimism, innovativeness, and insecurity had impacts on PU but discomfort did not have impacts on PU. Kuo et al. (2013) found that only optimism had an impact on PU but innovativeness, discomfort and insecurity did not have impacts on PU.

Hypothesis 3 (PEU influences PU of technologies in hotels in Vietnam) is statistically supported. This result is expected and consistent with that of previous studies, for example, Venkatesh and Davis (2000) and Kuo et al. (2013).

Hypothesis 4 (TR influences customer satisfaction with technologies in hotels in Vietnam) was partially supported. More specifically, H4a (optimism influences customer satisfaction with technologies in hotels in Vietnam) was statistically significant. H4b (innovativeness influences customer satisfaction with technologies in hotels in Vietnam) was not statistically significant. H4c (discomfort influences customer satisfaction with technologies in hotels in Vietnam) and H4d (insecurity influences customer satisfaction with technologies in hotels in Vietnam) were statistically significant. These results are different from that of other studies, for example, Chen et al. (2009), Abdullah (2012) and Wang et al. (2017).

Hypothesis 5 (PEU influences customer satisfaction with technologies in hotels in Vietnam) was supported. Hypothesis 6 (PU influences customer satisfaction with technologies in hotels in Vietnam) was not supported.

In summary, this research results have unique characteristics. This research has made a significant contribution to the literature because it is the first study to combine the TR (TR 2.0) and TAM to explain customer satisfaction with self-service technologies in luxury hotels in Vietnam. The results show that TR has a partial effect on PEU. TR influences PU. PEU affects PU. TR partly influences customer satisfaction with self-service technologies. PEU affects customer satisfaction with self-service technologies, but PU do not have an impact on customer satisfaction with self-service technologies. These results are valuable inputs for hotel managers in Vietnam in effectively implementing customer relationship management strategies.

7 Managerial implications and directions for future research

Nowadays, the rapid trend of technology development has changed the behaviours of people in general and behaviours of hotel guests in particular. Understanding people's acceptance of technology and satisfaction is very important in investing and improving the quality of service, and enhancing the prestige and image of a hotel, especially when the industry is in a fiercely competitive situation. Thus, through the results of this research, hotel managers have additional business solutions and investment strategies to upgrade products and services of the hotel and enhance customer care to increase technology acceptance and customer satisfaction. Based on the results of this study, the authors make the following recommendations.

First, for customers who are optimistic and innovative, hotels must constantly focus on investing and upgrading new technologies. In addition, the hotel needs to integrate the hotel's technology with customer's existing technologies to increase the usability and interactivity in order to enhance their customers' experiences with usefulness of the technologies and improve satisfaction. In addition, the hotel needs to invest in the latest

technologies with multiple utilities for innovative customers to meet their technology needs.

Second, hotels need to focus on adequate care for customers with discomfort and insecurity. Hotels must provide clear information on how to use and how to operate relevant technologies, and help customers interact with the technologies so that the customers will perceive that the technologies are easy to use and useful, leading to customer satisfaction.

Third, in plans of investing or upgrading technologies, hotels need to pay attention to the compatibility between hotels' technologies and customers' own high-tech devices in order to bring usefulness and satisfaction for customers.

This study was conducted in luxury hotels in Vietnam based on a convenient sampling method. Therefore, the research results might not be comprehensive and representative for the whole picture of the hotel business today. In the future, more research should be conducted with a broader scope and larger random samples. In addition, future research should explore additional factors that might have effects on customer satisfaction with technologies in the hotels (for example, demographic factors).

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