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Cross-Cultural Investigation of Consumer Perceived Value of Technology: A Study of Quick Respond (QR) Codes in Emerging and Developed Markets (Korea and US)

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Abstract As a consequence of the rapid growth of digitalization and the spread of internet technology across countries, the mobile device has become a key means of receiving digital information via the help of a QR code. This study examines how consumer perceptions differ in developing and emerging markets regarding the value derived from using QR codes. A web-based survey was developed to collect data from QR code users of two countries: the USA and South Korea. A total of 274 American and 239 Korean responses were obtained. The findings show that there are differences in consumers' perceptions of QR codes and their perceived value. The intention to continue using QR codes differs across countries, which implies the important role played by cultural difference, beliefs, experience, and lifestyle on patterns of consumers scanning QR codes of various types of content, for various items, and at various places.

Keywords QR code · perceived value · USA · South Korea · consumer behavior

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Introduction

The diffusion of innovation across different nations is always an interesting topic among international marketing scholars. Morgeson, Sharma, and Hult (2015) investigate the differences in consumer satisfaction with mobile services across five countries representing developing and emerging nations. In particular, a comparison of innovation consumption patterns, such as online shopping behavior across different countries, is drawing immense attention (e.g. Smith et al., 2013; Ashraf, Thongpapanl, & Auh, 2014). The rapid growth and proliferation of mobile technology has made mobile phones ubiquitous in modern society across the globe (Schultz, 2013). In the present day, mobile phone users install quick response (QR) code applications onto their mobile phones to enable them to access data more quickly (Demir, Kaynak, & Demir, 2015). QR codes were developed by Denso Wave (1994) and are two-dimensional bar codes that are considered to have incredible advantages with much higher information storage capacities, allowing text, video, advertisements, personal information, and any type of digital file to be embedded (Demir, Kaynak, & Demir, 2015). A consumer scanning a QR code is provided with the details of the product or service which have been already determined and prepared (Okazaki, Li, & Hirose, 2012). In this case, QR codes enable consumers to have a better way to access the digital information regarding products and services via their mobile devices. The QR code is considered as a new smartphone-related technology (Watson, McCarthy, and Rowley, 2013) currently used in many different business sectors across countries. Further, it also plays an important role in promoting mobile marketing (Ryu & Murdock, 2013), which leads to mobile shopping. While QR codes are popular and have emerged as the next marketing communication that fulfills the consumer desire for smart, convenient, and experiential shopping via the mobile phone (Ryu, 2013), academic researchers have paid less attention to QR-code consumer behavior (Watson, McCarthy, and Rowley, 2013), in particular cross-cultural examination is relatively underdeveloped in the QR code context, so that further investigation is called for (Okazaki, Li, & Hirose, 2012).

This research examines differences in QR-code use behavior among consumers from two countries: the USA and South Korea. It aims to identify the important aspects of QR code value and continued intention to use. Although comparisons among consumers from these countries have appeared in number of studies and contexts (e.g. Jung & Sung, 2008; Lim & Palacios-Marques, 2011; Khan, Yoon, & Park, 2014), this current paper takes another advanced step to explore differential perceptions between Korean and U.S. consumers in the QR code context.

Literature review

Differential perspectives in the USA and South Korea

This study compares and collects the data from two countries in order to investigate QR-code behavior and the level of usage and development. Korea and the USA seem to be a logical pair of countries for this study for two reasons: (1) the emerging Asian markets (EAMs) including South Korea are ranked lower than the USA in terms of network readiness and availability of

the latest technologies (Baller, Dutta, & Lanvin, 2016), and (2) the extreme cultural differences between the two countries. Franke, Hofstede, and Bond (1991) state that Korea is a highly collectivistic country, whereas the USA is a highly individualistic country, and thus culture is believed to influence individual values and affect behavior.

Quick response code

As a consequence of the rapid growth of digitalization and the spread of internet technology, the mobile device has become a key means of sending and receiving digital information and provides a convenient way to access service information. Since information technology (IT) has emerged, communication technology, such as the QR code, has impacted our daily life and permeated our society. During recent years, a number of researchers have paid immense attention to the impact of the QR code and its usage expansion in several fields. According to Soon (2008), the QR code has been adopted in various business sectors and in different countries. It has been adopted by leading hospitals in Singapore and Hong Kong to identify patients, and in other countries such as South Korea and Japan for several purposes related to mobile phones; for instance, retrieving information, or scanning QR codes on food products to check detailed information of food producers as well as the production process. Further, QR codes are used in the transportation sector in Tokyo. Public transportation users can scan the code to access service timetables of bus and subway and locate the nearest stations. Airline passengers can also pay for tickets using a mobile device via a QR code, and restaurant managers allow consumers to scan their restaurant code that shows both location and special dishes, so that communicating the restaurant's marketing via QR code can bring in sales. The extant literature shows that QR codes have been extensively used in the health care industry. Al-Khalifa (2008), for instance, reports the utilization of scanning QR codes with mobile devices for blind patients. In the banking industry, Lee et al. (2010) propose a new online banking authentication system using the combination of mobile phone and QR code in order to increase safety and security and provide an improved customer financial experience as online banking services become more secure, safer, and more convenient. In the education sector, QR codes are used to promote a mobile learning (m-learning) system. To motivate m-learning of English activities in Taipei, Liu, Tan, and Chu (2010), for example, show that the student scans the given code and then can receive learning materials anywhere and anytime. They find that students who have scanned and accessed m-learning through a QR code report ease of use and usefulness of the system to assist their learning. McCabe and Tedesco (2012), Durak, Ozkeskin, and Ataizi (2016), and Ali, Santos and Areepattamannil (2017) also observe that IT has played an important role in education. A QR code applied in learning easily helps teachers and students and has a positive impact on learning outcomes. As discussed above, the QR code can add value to teaching and learning. A human-computer interaction study also has recognized QR code technologies that offer outstanding opportunities to improve the consumer experience in museum-like environments. The experimental study was conducted by Pérez-Sanagnustí et al. (2016), and the results reveal that the QR code has provided the most effective way of delivering digital information in the case of museum information. The code has been found to be useful for potential museum visitors to search for information about an exhibition, thus boosting

greater positive engagement through use of QR code technology. Gu et al. (2016) explore the role of the QR code as a channel in recruiting young people to an online survey. The results show that the QR code represents the highest response rate with a cost-effective approach for recruiting the research population among other selected social media channels such Facebook and Twitter. A QR code, when linked to a mobile loyalty promotion, yields primary benefit because it bridges offline and mobile media in multichannel marketing, and consumers view the QR code, in this case, as an ability to transfer from one medium to another channel instantaneously (Okazaki, Li, & Hirose, 2012).

Prior research (Shin, Jung, & Chang, 2012) has discussed and viewed QR code user behavior through a theoretical lens, such as the theory of planned behavior proposed by Ajzen (1991) and the technology acceptance model developed by Davis, Bagozzi, & Warshaw (1989) (e.g. Kim & Woo, 2016). Another important study has investigated the degree to which consumers perceive QR codes as a safe, trustworthy tool (Okazaki, Li, & Hirose, 2012). However, what drives consumers to perceive the value of using QR codes has as yet been unexplored, resulting in a lacuna in the current understanding of technology consumption, in particular QR code usage. Therefore, this study addresses this issue. Given that the study of consumer satisfaction with mobile services is widespread, the current study contends that lacking an understanding of consumer perceived value and its drivers can lead to inappropriate utilization of QR codes for a specific service, with the consequence that users are not motivated enough to use it, because a certain factor can either promote or cause resistance to usage. Therefore, this study aims to provide useful current insights and offer potential implications for creating an effective marketing strategy to encourage usage intention and improve the customer experience with technology. Of note, other studies examining the adoption of QR codes and user psychology when interacting with them (e.g. Shin, Jung, & Chang, 2012; Denir, Kaynak, & Denir, 2015; Schultz, 2013) demonstrate that the use of QR codes is quite low in general, but smartphone owners use them more frequently. Thus, this implies that the QR code is a promising technology and has potential for greater usage intention with proper implementation (Pérez-Sanagnustí et al., 2016).

Conceptual framework and hypothesis development

Research hypothesis

Within this context, consumer perceived value of QR code and its determinants is defined and conceptualized by reviewing related literature on marketing and technology adoption. As shown in Figure 1, the conceptual framework of this study incorporates four components that are conceptualized as the determinants of perceived value of QR code.

Convenience refers to the ease of use and usefulness of a specific technology to perform a given task regardless of time and place (Shin, 2010). Lin and Liu (2015) suggest that favorable aspects of convenience directly and positively influence the perceived value of the mobile phone and increase loyalty (Ozturk et al., 2016). In the QR code context, this study proposes that smartphone users enjoy convenience when scanning information offline and being directed

seamlessly to an online platform. Convenience also has a direct influence on perceived value (Gupta & Kim, 2010). This implies that consumers can derive value from a QR code as long as they are positively favorable to the convenience of using QR codes because they can easily scan and receive digital information in a useful format anytime, so it makes users' lives easier (Ashford, 2010). Further, convenience perception is enhanced when a system is fast and safe. Thus, the following hypothesis is posited.

Hypothesis 1: Convenience has a positive effect on perceived value of QR code.

Hedonic consumption has a greater influence on continued use (Kim, Kim, & Wachter, 2013). Hedonic value seeking consumers are likely to derive fun and pleasure from performing a specific behavior. Das (2017) contends that consumer responses such as behavioral intention to purchase or to spend time in a store are influenced by pleasure and arousal during service consumption. *Pleasure* involves a person's emotions and refers to an expression of feeling good, joyful, sad, upset, or happy in a situation (Bigné, Andreu, & Gnoth, 2005). Previous researchers have noted a link between emotion and perceived value (Gupta & Kim, 2010). By scanning a QR code as an information retrieval approach, consumers may need a system that helps them to complete a process. So the QR code may be instrumental in obtaining hedonic experience consumption, which is valued by users, and, in turn, influences continued use. This study thus expects to find a positive impact of pleasure on perceived value of QR code.

Hypothesis 2: Pleasure has a positive effect on perceived value of QR code.

Compatibility of QR code technology is conceptualized as how well this technological service fits into consumer's daily behavioral patterns, lifestyle, or experiences. Since using mobile phones to scan QR codes could be considered an innovation on account of its newness relative to other modes of digital information retrieval, which is embedded in QR codes, compatibility is an influential indicator of how innovation fits to enhance adopters' values and needs. Kapoor, Dwivedi and Williams (2015) find that compatibility has a positive impact on intention to conduct a transaction online. Islam (2016) argues that when an electronic learning system fits well with the way students study, they are likely to use it more. Thus, consumers who find QR codes fit their lifestyle see them as more useful and would be more inclined to explore their functionality.

Hypothesis 3: Compatibility has a positive effect on perceived value of QR code.

Perceived risk relates to uncertainty that consumers might have about what will happen after scanning a QR code. As with technologies that involve exchange of personal data, QR codes may cause concerns about not having control over personal information and confidentiality provided online (Bailey, Pentina, & Mishra, 2017). Perceived risk is found to be one of the important factors influencing consumer behavioral intention to accept or reject a new technology (Tan et al., 2014; Cozzarin & Dimitrov, 2017). Further, Gupta and Kim (2010) show that perceived risk negatively affects perceived value. Chen and Dubinsky (2003) contend that perceived risk is an antecedent of perceived value. Bhatnagar and Ghose (2004) argue that

consumers using the internet for shopping are concerned more about the attributes associated with risk than about the beneficial attributes. Researchers have stated that QR codes entail high risk, so once smartphone users suspect a high chance that their private information will be leaked, the installation of a QR code application is likely to be declined (Yang, Zhang, & Lanting, 2017). Hence, this may lead to negative proclivity because consumers may not be ready to take the risk. This study establishes that perceived risk is an obstacle to QR code management.

Hypothesis 4: Perceived risk has a negative effect on perceived value of QR code.

The potential value of the QR code exists within its ability to efficiently connect smartphone users with a predetermined webpage by scanning the code (Gu et al., 2016). The concept of *perceived value* denotes the comparative evaluation made by a consumer between the costs and benefits of a product or service (Forgas-Coll et al., 2014). Recent scholars have defined perceived value focusing on the essential outcome of trust, convenience, enjoyment, quality, time, effort, and money (e.g. Kim, Lee, & Park, 2014). Previous studies on perceived value suggest a direct relationship between perceived value and behavioral intentions (e.g. Gupta & Kim, 2010; Shukla & Babin, 2013; Lin, 2016).

This study proposes that the value received is generally the final goal that fulfills both intrinsic and extrinsic needs deriving from usage of a QR code. Therefore, consumers are attracted to the aspects of QR codes that provide them with improvement in the technological experience compared to traditional print ads, so that perceived value is associated with the positive evaluation of the ability of the QR code to provide pleasing services linked to increasing intended usage. To test this assumption, the following hypothesis is posited.

Hypothesis 5: Perceived value of QR code has a positive effect on continued intention to use.

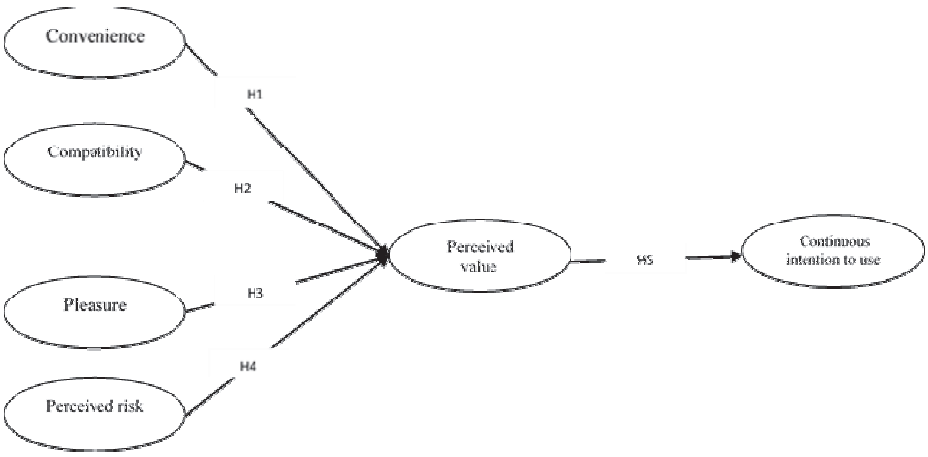

Fig. 1 Conceptual model

Method

Sample

A web-based survey was developed to collect data from consumers who have experience using QR codes. The data collection was performed in the USA and in South Korea by a third party that has a large number of panels on an online survey platform. The questionnaire was originally made in English but was translated into Korean by an expert translator and then reviewed by a marketing expert.

Table 1 Demographic characteristics

Variable	Group	U.S.		Korea	
		Frequency	Percent	Frequency	Percent
Age	10s	32	11.3	31	13.0
	20s	160	56.5	128	53.6
	30s	58	20.5	60	25.1
	40s	12	4.2	12	5.0
	50s	8	2.8	8	3.3
	60s and more	4	1.4	0	0
	Total	274	100.0	239	100.0
Gender	Male	152	55.5	121	50.6
	Female	122	44.5	118	49.4
	Total	274	100.0	239	100.0
Education	Less than 12^{th} grade	14	4.9	0	0
	High school diploma	54	19.1	23	9.6
	Vocational degree	16	5.7	0	0
	Bachelor's degree	65	23.0	189	79.1
	Master's degree and above	125	44.2	27	11.3
	Total	274	100.0	239	100.0
Income	< $2,000	128	46.7	157	65.7
	$2,001 - $3,5000	70	25.5	82	34.3
	$3,501 - $5,000	34	12.4	0	0
	$5,001 - $6,5000	10	3.6	0	0
	> $6,501	32	11.7	0	0
	Total	274	100.0	239	100.0
Occupation	Student	122	43.1	122	51.0
	Government official	4	1.4	4	1.7
	Professions	66	23.3	22	9.2
	Unemployed	10	3.5	0	0
	Office worker	44	15.5	54	22.6
	Self-employed	8	2.8	4	1.7
	Service workers	2	0.7	20	8.4
	Production and transportation	2	0.7	3	1.3
	Farmers and fishermen	0	0	2	0.8
	Other	16	5.7	8	3.3
	Total	274	100.0	239	100.0

The survey questionnaire consisted of three main parts. In the first part, respondents were presented with the introduction of this study and asked to indicate their level of agreement. They were also informed that participation was totally voluntary, and they could leave the survey anytime without penalty. To capture only those respondents who had previous QR code experience so as to gain an understanding of usage patterns of QR codes in consumer daily life, this study adopted QR code characteristics from the study of Watson, McCarthy, and Rowley (2013).

In this section the questionnaire covered actual QR code consumption in general, and respondents could select as many options as matched their experiences. The final part of the questionnaire was the main part, which included questions about the main measuring constructs. In the last part of this section respondents were asked to provide their demographic characteristics, such as age, gender, education, occupation, and monthly income level.

After the survey link had been distributed to the panel members, data screening revealed that 274 responses from the USA and 239 from South Korea had been obtained for further data analysis. The majority of the U.S. participants were in their twenties and thirties, and 55.5 percent of them were male and 44.5 percent were female. Among South Korean participants, the numbers of male and female respondents were almost equal, and the majority of participants were between the ages of 18 and 30. Table 1 provides more details on sociodemographic characteristics.

Descriptive statistics of QR code usage

Figures 2, 3, and 4 illustrate descriptive results of QR code usage by Korean and U.S. consumers. In particular, in the USA, the QR code is usually scanned to access a link to obtain additional information on a website, as depicted in Figure 2. One type of content that Korean

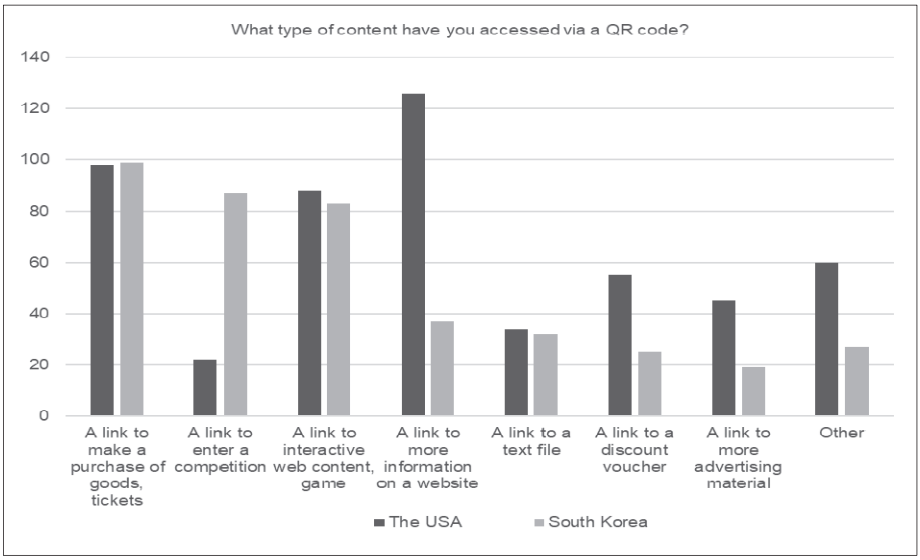

Fig. 2 Usage of QR code reported by consumers

Fig. 3 Usage of QR code reported by consumers

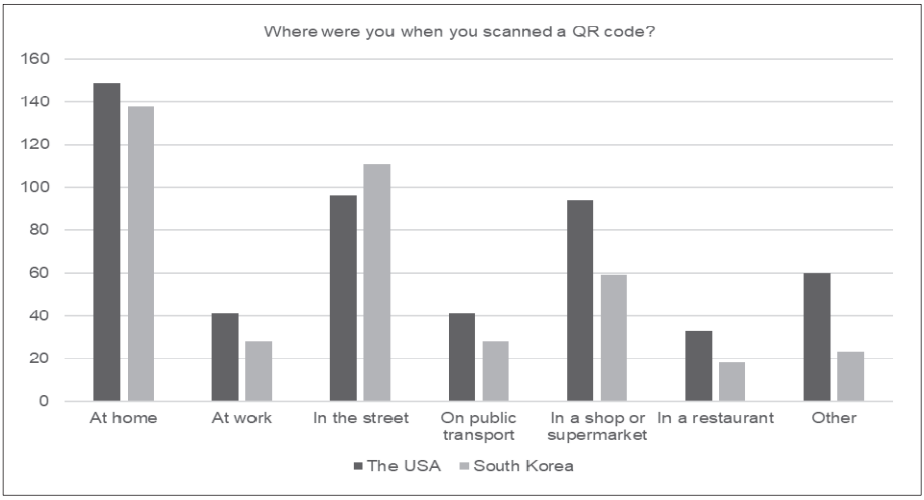

Fig. 4 Usage of QR code reported by consumers

consumers use the QR code to access more than other types is a link to purchase goods or tickets or to enter a competition or an online game. Figure 3 shows that among the items where consumers accessed the code are packaging, flyer, leaflet, website, voucher, and poster. Interestingly, consumers report that they scan a QR code when they are at home, in the street, and at a store, as shown in Figure 4.

Variables descriptive statistics

Figure 4 presents computed descriptive statistics for the construct mean scores of the Korean and U.S. samples. Overall, Korean users tend to have a higher level of perception toward QR codes than American respondents. Table 2 shows *t*-test statistics significant levels for the mean

differences in each research construct between the two samples. Of note: in the ranking of the means, for both nations the pleasure construct appeared to be the highest, followed by perceived risk. However, there is no significant difference between these samples regarding perceived risk.

Fig. 5 Variables descriptive statistics between the USA and South Korea.

Table 2 Variable differences between American and Korean samples.

Variable	U.S.		Korea		Std. Error	Mean difference
	Mean	Std.dev	Mean	Std.dev		
Perceived value	2.405	1.104	3.615	1.002	.094	-1.21***
Compatibility	2.204	1.179	3.404	1.113	.102	-1.20***
Pleasure	4.398	1.090	4.110	.891	.089	.291**
Intention to continue	3.026	1.212	3.711	1.051	.096	-.686***
Perceived risk	4.033	1.045	4.090	.850	.085	-.057

Notes: * $p < .05$. ** $p < .01$. *** $p < .001$.

Measures

All scales were adapted from previous studies to be suitable in the QR code context, and they were measured using a five-point Likert scale ranging from "1 = strongly disagree to 5 = strongly agree." The items measuring compatibility found in the study of Kapoor, Ewivedi, and William (2015) were drawn on with a modification. Convenience drew on the scales used by Ozturk et al. (2016), and Kim, Mirusmonov, and Lee (2010), and they were modified to reflect the QR code context. The perceived value scale drew on the scale used by Kim, Kim, and Wachter (2013). Continued use intention was measured by the items adapted from Venkatesh, Thong, and Xu (2012). Perceived risk items found in the study of Tan et al. (2014) were adapted. To measure pleasure, items similar to those used by Das (2017) were drawn on.

Results

Measurement model results

To ensure the appropriateness of the instruments, we first analyzed the measurement model for reliability, construct validity, and convergent validity across the two countries independently prior to the structural model testing. Exploratory factor analysis (EFA) was first performed to ensure an acceptable level of convergent validity of the variables and their loadings on respective constructs. The EFA reports acceptable measurement items with loadings ranging from 0.70 to 0.90 in both the U.S. and South Korean samples. The reliability of the items was measured using Cronbach's alpha (α) and composite reliability (CR). The Cronbach's alpha test shows that all constructs have higher values ranging from 0.70 to 0.90. CR also reports that all factors have acceptable values, implying statistical satisfactoriness for both the U.S. and South Korean samples. Further, all the constructs have an average variance extracted (AVE) ranging from 0.05 to 0.09 in the sample from each country respectively. Table 4 provides detailed information on measurement model results. Confirmatory factor analysis (CFA) was performed to analyze construct validity. The CFA (Table 5) shows the overall goodness of fit of the model indices to the data. For the U.S. sample: goodness-of-fit: $\chi^2_{98} = 2.571$, $p < 0.00$; GFI = 0.91; NFI = 0.94; CFI = 0.96; IFI = 0.96; TLI = 0.95; RMR = 0.060; RMSEA = 0.076. For the South Korean sample: goodness-of-fit: $\chi^2_{86} = 2.377$, $p < 0.00$; GFI = 0.91; NFI = 0.91; CFI = 0.95; IFI = 0.95; TLI = 0.93; RMR = 0.066; RMSEA = 0.075.

Table 4 Measurement analysis

Measurement constructs	Number of items	USA				South Korea			
		α	Loadings	CR	AVE	α	Loadings	CR	AVE
Convenience	5	0.93	0.77-0.87	0.93	0.71	0.91	0.78-0.86	0.91	0.67
Compatibility	4	0.94	0.87-0.90	0.93	0.77	0.86	0.75-0.86	0.86	0.67
Pleasure	2	0.92	0.88-0.98	0.93	0.97	0.86	0.74-0.74	0.71	0.55
Perceive risk	2	0.77	0.83-0.84	0.82	0.70	0.78	0.72-0.75	0.70	0.54
Perceived value	2	0.83	0.78-0.91	0.84	0.72	0.76	0.72-0.86	0.77	0.63
Continuous intention	2	0.75	0.74-0.81	0.75	0.60	0.63	0.55-0.84	0.66	0.51

Table 5 CFA model fit

Model fit indices	USA	South Korea
χ^2	2.571 (98)	2.377 (86)
GFI	0.91	0.91
NFI	0.94	0.91
CFI	0.96	0.95
IFI	0.96	0.95
TLI	0.95	0.93
RMR	0.060	0.066
RMSEA	0.076	0.075

Hypothesis testing results

This study tested conceptualized hypotheses using structural equation modeling in AMOS version 20. Table 6 presents hypothesized relationships among constructs and acceptable fit. For the South Korean sample: goodness-of-fit: $\chi^2_{89} = 2.527$, $p < 0.00$; GFI = 0.90; NFI = 0.90; CFI = 0.94; IFI = 0.94; TLI = 0.91; RMR = 0.073; RMSEA = 0.079. For the U.S. sample: goodness-of-fit: $\chi^2_{102} = 2.680$, $p < 0.00$; GFI = 0.90; NFI = 0.93; CFI = 0.96; IFI = 0.96; TLI = 0.94; RMR = 0.072; RMSEA=0.078. Figures 5 and 6 illustrate path analysis results for the samples from the USA and South Korea. The results revealed that all hypothesized paths from the South Korean sample were found to be significantly supported. For instance, *H1* (i.e. convenience has a positive effect on perceived value of QR code) was supported by ($\beta = .04$, $t = 2.177$, $p < .05$). *H2 (i.e.* compatibility has a positive effect on perceived value of QR code) was supported by ($\beta = .81$, $t = 5.137$, $p < .001$). *H3 (i.e.* pleasure has a positive effect on perceived value of QR code) was supported by ($\beta = .14$, $t = 1.958$, $p < .05$). *H4 (i.e.* perceived risk has a negative effect on perceived value of QR code) was supported by ($\beta = -0.30$, $t = -2.206$, $p < .05$). *H5 (i.e.* perceived value of QR code has a positive effect on continued use intention) was supported by ($\beta = .32$, $t = 3.938$, $p < .001$). For the U.S. sample, all the hypothesized

Table 6 Structural path estimates

Structural Path	USA		South Korea	
	Estimate	*t*-Value	Estimate	*t*-Value
H1: Convenience → Perceived value	0.34	3.699***	0.36	2.177*
H2: Compatibility → Perceived value	0.63	6.466***	0.81	5.137***
H3: Pleasure → Perceived value	-0.08	-1.773	0.14	1.958*
H4: Perceived risk → Perceived value	0.03	0.597	-0.30	-2.206*
H5: Perceived value → Continued intention to use	0.75	9.296***	0.32	3.938***

Notes: * p < .05. ** p < .01. *** p < .001.

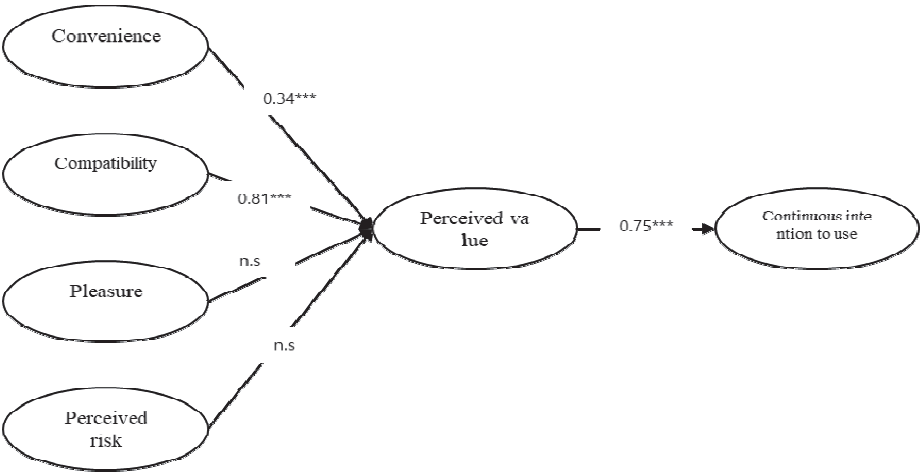

Fig. 6 Structural equation model (U.S.).

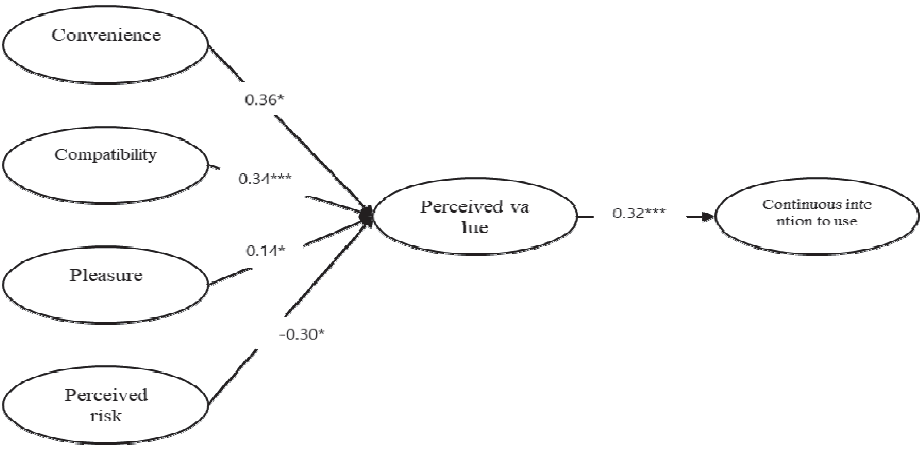

Fig. 7 Structural equation model (Korea).

paths, with the exception of those captured by *H3* and *H4,* were found to be fully supported. Thus, *H1* ($\beta = .34$, $t = 3.699$, $p < .001$), *H2* ($\beta = .63$, $t = 6.446$, $p < .001$), and *H5* ($\beta = .75$, $t = 9.296$, $p < .001$).

Discussion and conclusion

The advantages of a QR code are considered to be that it enables quick accessibility to any type of information regardless of location using a mobile device. Such advanced technology that uses the enabled wireless connection combines a multiplicity of channels and, when a QR code reader application is installed on a mobile device, allows users to receive digital information that is predetermined and embedded in the code in the form of video, link, text, or other format (Ali, Santos, & Areepattamannil, 2017). Due to the widespread consumption of digitalized content, this study conceptualizes consumer perceived QR code value and continued use intention, and a proposed model is examined using data collected from the USA and South Korea. The focus of this study is on general usage of QR codes in daily life by consumers who have previous QR code experience. Drawing on this perspective, this study proposes that experienced users provide a clearer conceptualization of QR code application. Several unique findings provide support for this proposal.

Findings for the USA

A notable result of this study is that it provides a better understanding of the U.S. QR code users pertaining to the important value aspects of this technology, which thereby determine the continued use intention. The findings of structural modeling show that usage convenience and compatibility positively influence consumers in terms of the perceived value of using such applications. This suggests that the new QR code technology provides both practical and functional attributes enhancing consumer use experience in their daily life. In other words,

retrieving information has become more convenient via scanning a QR code that is put in newspapers, magazine ads, flyers, books, product packaging, and pamphlets to access a link to more information about products and services on websites while the users are at home, on the street, or in a store while shopping. The relationship between pleasure and perceived value is found to be insignificant, possibly because pleasure deals with a person's emotions, such as sadness, happiness or unhappiness, and joy. Scanning a QR code via a mobile phone in a specific situation may not function well due to system malfunction or loss of connection. Since participants provided their responses based on their experiences with QR codes, this result may refer to these consumers who have in the past encountered such a situation and may not believe that they can feel happy every time that they use a QR code. This negative experience may also increase the perceived higher risk of a new technology. In particular, performance risk and time risk occur after scanning a QR code several times with no result. This perceived risk is important in general, but in the QR code context, in particular the U.S. consumers may not think that such a risk is important based on an overall usage experience, thus it has become insignificant. Further, this result may explain that a mobile phone that lacks the capability to handle the functionality of QR codes causes dissatisfaction when using a QR code. For instance, a small screen can make it difficult to read a text file or view more information.

Findings for South Korea

Based on the result of structural of equation modeling, the study finds that in the South Korean sample, all hypotheses are significantly supported. Convenience, compatibility, pleasure, and perceived risk significantly influence consumer perceived QR code value and, in turn, positively affect continued use intention. Among the influential determinants, Korean consumers believe that using a QR code has the highest level of compatibility, followed by convenience and pleasure. The results imply that compatibility, convenience, and pleasure are the main advantages of using a new technology. As a QR code enables possible accessibility, consumers may find it more compatible with their desires after scanning a code that appears on a website or a printed voucher with their mobile phones while at home or in a store, and they then land on a main website, which makes life easier, because they have the website at their fingertips rather than having to type the full URL. The way QR codes are used as reported by Korean consumers suggests an emerging trend of a technology market and indicates that an unconventional way of receiving information may relate to the value that consumers believe they obtain. For instance, scanning a QR code to participate in an event, receive a discount coupon, or purchase a ticket. Because consumers value their time and effort, the use of a new technology should offer them the opportunity to save time and effort. Therefore, perceived risk has a negative impact on perceived value of QR code. Consumers may be afraid of risk when they scan a QR code provided by an unknown party. Thus, perceived risk may be an indicator that discourages continued intention to use, because consumers consider the possible losses when evaluating value.

Comparative analysis between the USA and South Korea

The results of structural modeling suggest that there are differences between the U.S. and

Korean samples with regard to the hypothesized paths. Also, the results are consistent with previous research findings regarding cross-country similarities and differences in consumers' perceptions (e.g. Morgeson, Sharma, & Hult, 2015; Ashraf, Thongpapanl, & Auh, 2014). First, it is particularly important to note that the relationship between perceived risk and perceived value is insignificant for the U.S. sample, while it is significant for Korean consumers. A possible explanation is that the level of QR code engagement differs according to the content accessed via the code. For instance, the content that American consumers access via a QR code is a link to more information about products and services on websites, while Korean consumers tend to scan a QR code in order to participate in an event or a competition. In the South Korean case, participating in such an event requires a registration for which they have to provide their personal information. They may encounter some print advertising which provides unclear information, therefore scanning a QR code embedded in the advertisement can lead to uncertainty about the outcome. This result implies that disclosing private information to a third party via scanning a QR code is critically unsafe. Second, the effect of pleasure perception on perceived value of QR code appears differ between the Korean respondents and their U.S. counterparts. This may be because many American QR code users have encountered issues while scanning QR codes, so they are less interested in using the codes than are Korean QR code users. Therefore, scanning QR codes can be more pleasant without unexpected problems occurring during service consumption. Third, with an exception of H3 and H4 for the U.S. sample, the overall paths are positively significant across the samples. However, each path shows some differences between the U.S. sample and the Korean one for H1, H2, and H5. For example, American users tend to perceive higher QR code value influenced by convenience and compatibility than do Korean consumers. Using a QR code may be more convenient and compatible with needs, experience, and lifestyle in a developed country in which individualism is highly valued compared to one that has a developing market and is collectivist. The result thus highlights the importance of cultural differences resulting in distinct cognition and affection, so that tastes and preferences differ. Hence, the effect of perceived value of QR code on continued use intention is different due to such beliefs. In advanced and developed economies, people tend to accrue sophisticated technology because it is compatible with their life style. Unlike in a developing market, where the perception of benefits deriving from advanced technology is equivocal, leading to a lower rate of consumption. These observed differences support aspects of theories used as the basis for comparing developed and emerging markets, such as the theory of cognitive-affective processing system (Fleeson & Noftle, 2009).

Implications

Contribution to research

The findings of this study add to the existing literature and knowledge of QR code consumption in several ways. The objective of this current study is to understand the impact of the determinants and consequences of consumer perceived value. Based on consumer prior experience with QR codes, four factors—convenience, compatibility, pleasure, and perceived risk—have been proposed to determine perceived value of QR code. Overall, the significance of the proposed

factors of the present study is consistent with prior research (e.g. Tan et al., 2014; Kapoor, Dwivedi, & Williams, 2015; Slade et al., 2015; Lee, Park, & Kim, 2013; Schierz, Schilke, & Wirtz, 2010; Wu, Lin, & Liu, 2017; Lu et al., 2011; Gupta & Kim, 2010). The study results reveal differences between the U.S. and South Korean samples that are consistent with previous cross-cultural comparisons between American and Korean consumers in various contexts, such as technology and marketing (e.g. Choi and Lee, 2003; Choi & Geistfeld, 2004; Bang et al., 2005; Jung & Sung, 2008; Lim & Palacios-Marques, 2011; Khan, Yoon, & Park, 2014). Thus, this paper contributes to the extant literature of international marketing research, particularly in the QR code context. Fourth, both the U.S. and Korean respondents reported that they normally access QR codes when they are at home; this result is consistent with Okazaki, Li, and Hirose (2012) (Japan), and Watson, McCarthy, and Rowley (2013) (the UK). Further, Korean and U.S. consumers indicated that they access QR codes while in a store and on the street, a result that is consistent with Watson, McCarthy, and Rowley (2013).

Contributions to practice

This study responds to the call for cross-cultural study (e.g. Okazaki, Li, & Hirose, 2012). Consequently, the findings of this research highlight some concurrent consumption trends and understanding of consumer perceived value of QR code across diverse markets. The results show that due to cultural and market differences, consumers perceive the value of technology differently, and the findings clearly show how well such technology fits into the consumers' lifestyle. The perceptions of the U.S. and Korean consumers toward usage of QR codes are significantly different. Therefore their intention to continue using QR codes differs. These results convey the message that perceptions of QR codes, such as convenience, compatibility, pleasure, and perceived risk, can be linked to the content that consumers access via QR codes. Marketers can generate traffic to their websites and encourage more sales from consumers who like to scan QR codes to access more information about products and services available on websites. Businesses in the USA and South Korea that are currently operating and tend to add QR codes as a customer touchpoint to reach more consumers as a form of mobile marketing communication are informed about the factors that determine QR code value and users' intention to continue using the codes. Since consumers are looking for high-performing advanced technology to create advantages for themselves, in reviewing the results of this particular study, marketers should keep in mind that convenience, compatibility, pleasure, and perceived risk are the main factors influencing perceived value of QR code. Therefore, it may be more suitable to emphasize the aspects of QR codes via these influential determinants in order to increase the level of engagement. QR codes should be put on the items where they are most frequently scanned, such as flyers, product packaging, posters, and print vouchers, in order to create an opportunity to interact with customers so that firms can serve them better. At the same time this may serve as a driver changing users' perceptions of perceived risk.

Limitations and future research

Although this research has some useful findings which contribute to the literature and offer

new insights, it cannot be without limitations that may provide opportunities to guide future research in the field, because understanding QR code consumer behavior is still at an early stage. Thus the authors hope that the explored findings could serve as a departure point for future researchers. Despite that the USA and South Korea are good representatives of developed and emerging economies, further cross-cultural investigation may include more countries from each market. According to the objective, this research examines consumer perceived value of QR codes to generalize the concept via selected factors. This study however cannot relate QR code usage to a particular use situation to serve a specific purpose. Therefore, the interpretation of perceived QR code value should be very loose. Future research can apply this concept to extend the findings to understand QR code value in a specific business sector; for instance, the food traceability system (Kim & Woo, 2016). Furthermore, the factors incorporated in this study were derived from related research on technology and marketing to form a research model for understanding consumer behavior in the QR code context. Notwithstanding its explanatory power and fit, the framework still lacks verification due to its cross-cultural nature. The model needs to be verified further in order to assure the cross-cultural equivalence, because without such measurement invariance there may be doubt as to the extent to which responses from different countries are meaningful (Smith et al., 2013).

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