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Title: A cultural comparison study of smartphone adoption in Uzbekistan, South Korea and Turkey

Year: 2017

Version:

Please cite the original version:

A cultural comparison study of smartphone adoption in Uzbekistan, South Korea and Turkey

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Abstract

Smartphone popularity is increasing rapidly due to technological advances that mean manufacturers can make more sophisticated devices and telecommunication companies can provide better connections. Gartner (2016) reported that 403 million smartphones were sold to end users in the fourth quarter of 2015, a 9.7 % increase over the same period in 2014. It is a common perception that users tend to utilize advanced technology to increase productivity. However, there are studies indicating quite the opposite or alternatively, slow rates of adoption of advanced technology. For example, according to latest study conducted by Gartner (2016) smartphone sales growth rate in 2015 was slowest since 2008. To avoid such unpleasant outcomes, companies invest in studying consumer behavior. The current study's purpose is to examine the effects of drivers and cultural differences on smartphone acceptance in three representative groups from Uzbekistan, South Korea, and Turkey. Past cross-cultural studies suggest that the main factor differentiating the formation of intention among these groups would be cultural differences. Quantitative data from 299 respondents were analyzed to test the hypotheses. The results showed that cultural differences did indeed play an important role in intention formation. The significance of constructs affecting behavioral intention varied in each group and collectivism/individualism moderated these relationships. When obtaining unified results from UTAUT and the cultural perspective it is easier to compare group behaviors and analyze the differences. This is a good guide for managers to consider business activities for each group they target.

Keywords: technology adoption, mobile, smartphone, cross-culture, UTAUT.

1. Introduction

Owing to technological developments in both manufacture of smartphones and connection quality (3G, 4G) the modern mobile phones can perform more and more sophisticated tasks. Apart from simple voice calls, today smartphones can be used for a wide range of purposes such as simple messaging,

banking, browsing the Internet, making internet calls, watching videos, listening to music, editing Microsoft Office files, watching TV, playing mobile games, and learning.

Due to the intense competition among handset manufacturers, device prices are continuously falling and telecom operators are rolling out a wide range of mobile services, and attractive voice and data packages. And these factors have boosted the popularity of the smartphone and the adoption process is rapidly ongoing globally. Gartner (2016) reported that 403 million smartphones were sold to end users in the fourth quarter of 2015, a 9.7 % increase over the same period in 2014. In addition, the International Telecommunication Union reported that the total number of mobile subscriptions reached 7 billion (ITU 2015).

It is a common perception that new technology always has advantage(s) over its predecessor and thus that performance and productivity improves with each upgrade. Reducing the amount of time to complete a job is the main reason why organizations tend to embrace new technologies (Aiello, Kolb 1995). However, before they can enjoy the advantages of a technology, it must first be accepted by individuals and members of organizations. There are numerous studies reporting slow adoption of various technologies and services on consumer and organizational levels (Choi, Totten 2012)(Persaud, Azhar 2012). Reasons for shying away from new technologies can be intrinsic and extrinsic, and uncertainty is often the reason for reluctance in relation to a new technology (Edison, Geissler 2003).

The current research examines technology acceptance in the smartphone context because the smartphone is relatively new technology and its acceptance process is ongoing. Although the smartphone has been popular among users in many countries, the literature review carried out for this study reveals that only a few prior studies have investigated smartphone adoption (Sanakulov, Karjaluoto 2015). This study aims to explain smartphone adoption in three different groups (Uzbeks, South Koreans, and Turks); to understand the differences and similarities in their perceptions of smartphones; and to analyze cultural effects on the adoption process. The main reasons for studying

smartphone adoption in these three countries are that Uzbekistan, South Korea and Turkey have distinct cultural differences and no such cross cultural study involving these countries has been conducted in the past. Also, authors of this research have local resources needed for the project.

For this purpose, the study adopts as a base model Venkatesh et al.'s (2003) Unified Theory of Acceptance and Use of Technology (UTAUT). The main reason for choosing UTAUT is its prominence and good explanatory power in information technology studies. Also, recent literature review results by Sanakulov and Karjaluoto (2015) show that acceptance rates of paths between UTAUT constructs and intention are the highest.

In many previous studies, authors have focused on constructs relevant to that specific context such as perceived fees on the mobile Internet (Kim, Chan et al. 2007) and trust in smartphone adoption study (Jung, Hur et al. 2015). If a conventional mobile phone user wants to move to a smartphone he/she will have to make some form of sacrifice, which might be monetary or non-monetary (Baker, Parasuraman et al. 2002). In consumer behavior studies, sacrifices are viewed as a negative influence on forming an intention to use or purchase (Monroe, Krishnan 1985). Since current smartphones are considered to be complex mobile gadgets that offer various computer-like functions, new users need to learn how to use them. Moreover, smartphones are more expensive and larger with a shorter battery life than conventional mobile phones. To explore how users perceive sacrifice and its effect, in this study, perceived sacrifice will be incorporated in the main model as an additional construct.

The cultural effects in technology acceptance have been studied for a long time. Many past studies examined its importance in various cultures and contexts by applying existing theories and frameworks. Their findings contributed to understanding the importance of cultural effects. This cross-cultural study investigates users from Uzbekistan, South Korea, and Turkey and adopts Hofstede's cultural dimensions theory to determine differences in their perceptions and the factors influencing each group's smartphone adoption. Due to limited resources and research conditions, in the current study only the

individualism and collectivism dimensions are used as moderators affecting intention formation in each group. Smartphone adoption analysis of three different groups from a cultural perspective is the main contribution of this study.

The rest if the paper is organized in five sections. In section 2, the theoretical background is discussed. In section 3, the research model is explained and hypotheses developed. Methods, results, and conclusions are discussed in sections 4, 5, and 6 respectively.

2. Theoretical Background

2.1 Technology acceptance

Modern technological advancements encourage manufacturers to introduce new products from home appliances to mobile devices. The recently introduced new generation products include 3D TVs, Smart TVs, tablet PCs, and smartphones. Since they are manufactured with superior technology and materials they are believed to be of higher quality, more productive and more efficient than their predecessors. Making hi-tech products does not guarantee consumer adoption. New technology adoption may be fast, slow, or unsuccessful for various intrinsic and extrinsic reasons.

In understanding and explaining adoption, technology acceptance has been a very important area of IS study for many years. Many adoption studies have been conducted and have made theoretical and practical contributions. Furthermore, numerous theories and models have been developed to help understand and predict technology acceptance, including the Theory of Reasoned Action (TRA), the Theory of Planned Behavior (TPB), the Technology Acceptance Model (TAM), UTAUT, and Diffusion of Innovation (DOI) (Sanakulov, Karjaluoto 2015). Most of the studies conducted to date have been based on the abovementioned models and theories. Some researchers have focused on confirmatory studies (Park, Yang et al. 2007, Chen, Kuan 2012) based on existing theories and models, while others have extended TAM (Choi, Totten 2012), UTAUT (Wang, Wang 2010, Jung, Hur et al. 2015), and TTF (Shih, Chen 2013) by incorporating various context-specific constructs or integrating these models with

theories. Moreover, some studies have investigated the determinants of the main variables of well-established theories. For example, Shin (2012) reported that mobility and coverage are significant determinants of perceived ease of use (PEOU) in using VOIP and Tan et al. (2012) reported that past experience is a significant determinant of perceived usefulness (PU) in mobile learning.

Furthermore, many studies have examined the adoption of mobile devices. For example, Gayar et al. (2011) investigated students' acceptance of tablet PCs; Rouibah et al. (2011) studied the adoption of camera mobile phones. All these studies investigated determinants of adoption based on both hedonic and utilitarian purposes. The hedonic purpose of usage is focused on gaining pleasure while using technology. Therefore, factors such as entertainment and perceived enjoyment play important roles in forming consumer behavior. The utilitarian purpose of usage is performance focused, and all performance-related variables such as performance expectancy (PE), PU, and PEOU are considered key determinants of behavior.

2.2 UTAUT

Currently, many models of technology acceptance are available to help researchers address adoption questions. Most of these models offer some advantages over the others and relevant constructs in various contexts. Therefore, researchers must consider which model and constructs best suit their research. The solution to the dilemma proposed by Venkatesh et al. (2003) is UTAUT, which integrates eight existing models and theories: IDT, TRA, TPB, Social Cognitive Theory (SCT), TAM, Model of PC Utilization (MPCU), Motivational Model (MM) and Combined TAM and TPB (C-TAM-TPB). UTAUT attempts to explain user intention to use an information system and user behavior (Venkatesh, Morris et al. 2003) with four main variables: Performance Expectancy (PE), Effort Expectancy (EE), Social Influence (SI) and Facilitating Conditions (FC). These variables are based on 32 constructs of the eight abovementioned models. Behavioral intention and FC are considered the main determinants of usage behavior, while PE, EE, and SI are the main determinants of Behavioral Intention (BI). Similar to TAM,

UTAUT emphasizes the utilitarian value of technology use, and PE is the strongest predictor of behavioral intention (Venkatesh, Morris et al. 2003). The definitions of main UTAUT constructs are provided in Table 1. The four variables are affected by gender, age, experience and voluntariness of use (Figure 1). UTAUT reached a prediction efficiency score of 70% (Venkatesh, Morris et al. 2003), which is considered a major improvement in acceptance prediction.

Although it has not been used as widely as TAM, UTAUT has continually gained researchers' attention. Since its introduction, UTAUT has been tested and utilized to study technology acceptance in various contexts such as mobile Internet (Wang, Wang 2010), mobile online gaming (Chen, Kuan 2012), and rural tourism (San Martín, Herrero 2012). A review of past studies based on UTAUT reveals that few studies have extended it (Wang, Wang 2010) or applied it cross-culturally (Im, Hong et al. 2011).
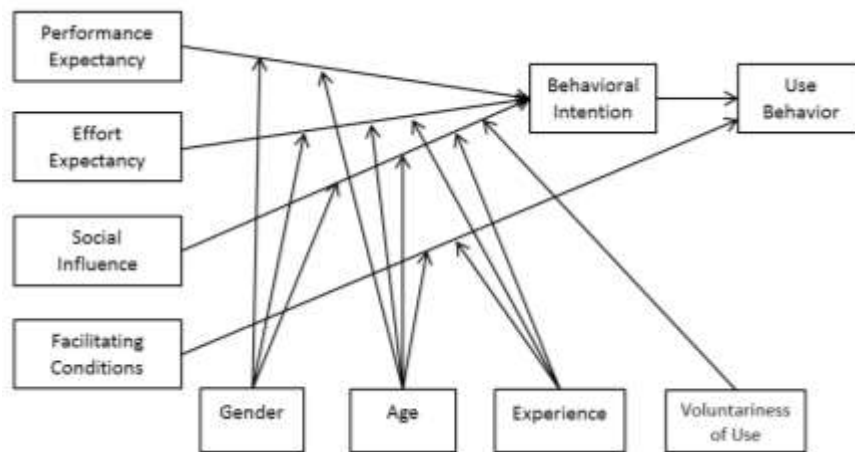
Figure 1. UTAUT model

Construct	Definition
Performance expectancy	Degree to which an individual believes that using the system will help him or her attain gains in job performance.
Effort expectancy	The degree of ease associated with the use of the system.
Social influence	The degree to which an individual perceives that important others believe that he or she should use the new system.
Facilitating conditions	The degree to which an individual believes that an organizational and technical infrastructure exists to support use of the system.

Table 1. UTAUT construct definitions (Venkatesh, Morris et al. 2003)

2.3 Role of culture in technology acceptance

The importance of culture and country in technology acceptance has been established for some time (Straub 1994, Veiga, Floyd et al. 2001). Cultural values are an important guiding principle in people's lives and affect the formation of behavior and attitudes (Homer, Kahle 1988) toward events surrounding objects, events, and people. Straub (1994) studied the cultural effects on adoption behaviors in a sample of employees of American and Japanese firms. He reported that the adoption of fax technology was faster than that of e-mail in Japan, while the opposite result was observed in the USA. This finding was explained by cultural differences between Japan and the USA. Specifically, Japanese people tend to prefer more socially-present and information rich channel. Some other cross-country studies were conducted in various contexts such as mobile commerce (Dai, Palvi 2009), mobile TV (Choi, Totten 2012), smartphones (Jung, Hur et al. 2015). The results of those studies indicated that culture affects the adoption process. For example, in a study of mobile commerce adoption, Dai and Palvia (2009) reported that PEOU, subjective norms, perceived value, and perceived cost did not have a significant effect on the intentions of American university students, while these paths were significant for Chinese students. Many past studies have focused on establishing a methodology to understand cultural importance and to distinguish cultural values. Such studies have practical importance for managers in terms of helping them understand the various cultures they operate in. Most of these proposed methodologies and frameworks have many similarities in terms of classification, measurements, and explanations. However, the most popular and widely used framework is Hofstede's work (1984), which defines cultures. It is considered the most important contribution to the understanding of cultural effects in technology adoption. According to Hofstede, an individual is influenced by three types of cultures: national, occupational, and corporate. Hofstede defined national culture as a mental program that exists in a country and causes its inhabitants to behave differently from those in other countries. Nationality is the only factor that differentiates members of large homogeneous populations consisting of many

nationals, such as the IBM employees that informed Hofstede's study (1991). In other words, he introduced culture groups and defined culture as a set of shared assumptions that result in a common frame of reference within a society and distinguishes members of one group from those of another group (Hofstede 1984). He studied a large number of IBM employees and initially developed four dimensions of cultural variation: Power Distance (PD), Uncertainty Avoidance (UA), Individualism versus collectivism (IC), and Masculinity versus femininity (MF). He later added the dimension of long-term versus short-term orientation (LSO), which reflects the influence of time on cultures (Hofstede 1993). The cultural dimensions and definitions are provided in Table 2.

Dimension	Definition
Power Distance (PD)	This dimension expresses the degree to which the less powerful members of a society accept and expect that power is distributed unequally. The fundamental issue here is how a society handles inequalities among people. People in societies exhibiting a large degree of power distance accept a hierarchical order in which everybody has a place and which needs no further justification. In societies with low power distance, people strive to equalize the distribution of power and demand justification for inequalities of power.
Individualism vs. collectivism (IC)	Individualism can be defined as a preference for a loosely-knit social framework in which individuals are expected to take care of themselves and their immediate families only. Its opposite, Collectivism, represents a preference for a tightly-knit framework in society in which individuals can expect their relatives or members of a particular in-group to look after them in exchange for unquestioning loyalty. A society's position on this dimension is reflected in whether people's self-image is defined in terms of "I" or "we."
Masculinity vs. femininity (MF)	The masculinity side of this dimension represents a preference in society for achievement, heroism, assertiveness, and material reward for success. Society at large is more competitive. Its opposite, femininity, stands for a preference for cooperation, modesty, caring for the weak, and quality of life. Society at large is more consensus-oriented.
Uncertainty avoidance (UA)	The uncertainty avoidance dimension expresses the degree to which the members of a society feel uncomfortable with uncertainty and ambiguity. The fundamental issue here is how a society deals with the fact that the future can never be known: should we try to control the future or just let it happen? Countries exhibiting strong UAI maintain rigid codes of belief and behavior and are intolerant of unorthodox behavior and ideas. Weak UAI societies maintain a more relaxed attitude in which practice counts more than principles.
Long-term vs. short-term orientation (LSO)	The long-term orientation dimension can be interpreted as dealing with society's search for virtue. Societies with a short-term orientation generally have a strong concern with establishing the absolute Truth. They are normative in their thinking. They exhibit great respect for traditions, a relatively small propensity to save for the future, and a focus on achieving quick results. In societies with a long-term orientation, people believe that truth depends very much on situation, context and time. They show an ability to adapt traditions to changed conditions, a strong propensity to save and invest, thriftiness, and perseverance in achieving results.

Table 2.Hofstede's cultural dimensions and definitions (www.geert-hofstede.com)

Since its introduction, it has become the most widely recognized measurement of cultural dimensions and has been used for both academic and practical purposes. In this study, cultural effects on technology adoption from the individualism and collectivism perspective (IC) will be examined because among Hofstede's cultural dimensions, IC is the main dimension used to easily differentiate cultures. According to the theory, higher IC scores indicate a more individualistic culture. In individualistic

cultures, individual goals are prioritized over collective goals, whereas in collective cultures, goals are established to benefit the group (Triandis 1988). This difference is also portrayed in social characteristics. For example, in collectivistic cultures, social ties among members tend to be strong and group oriented, while in individualistic cultures, social ties are very loose (Triandis 1988). Another reason to use only the IC dimension is that when Korea and Turkey are compared, the greatest difference is found for this dimension (Figure 2), while PD and MA yield a six-point difference and UA shows no difference. The comparison could not be extended to include Uzbekistan because Hofstede's cultural dimension scores are not available for that country.
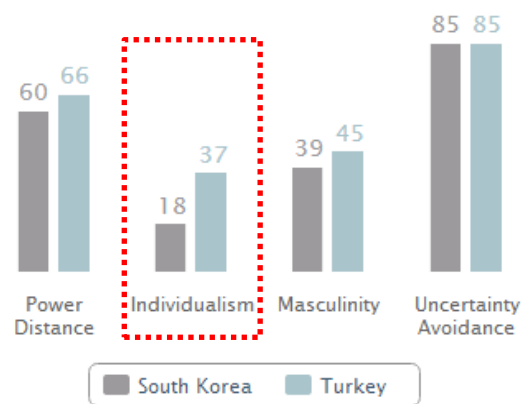

Figure 2. Comparison of cultural dimensions between South Korea and Turkey (Geert Hofstede 2016)

3. Hypothesis Development

Based on the arguments made in section 2, we proposed a model based on UTAUT to study consumers' intentions to use smartphones for several reasons. First, since its introduction, UTAUT has exhibited very good explanatory power, explaining 70% of the variance, which is much higher than any other existing well-established theory. Second, our literature review showed that even though UTAUT has good explanatory power, it has not been widely used, and only a few studies using UTAUT have focused on smartphones. Third, it has not been widely used in cross-cultural studies. A theory must be tested and consolidated in various contexts and submitted to cross-cultural comparisons. From the original model, only PE, EE, SI and gender (moderator) were retained in the study. The voluntariness of use construct was removed because our study focuses on determining the factors that influence voluntary use of

smartphones. Of note, this study focuses on relationship paths between independent variables and behavioral intention, including the moderators' effects. Therefore, the path between behavioral intention and use behavior was dropped. Figure 3 illustrates the study's research model.
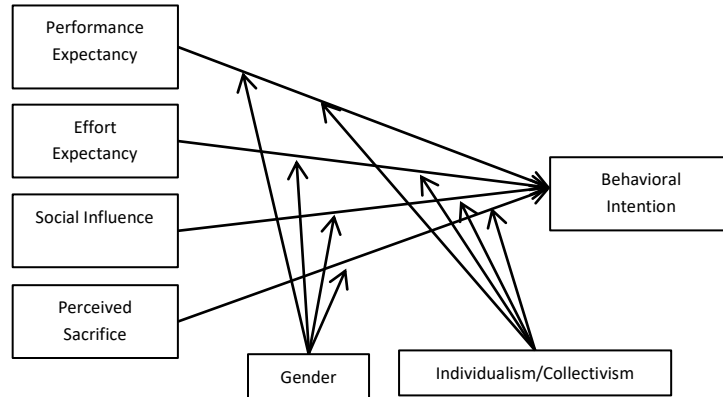

Figure 3. Research model

The current research model is unique in that it was customized for the cross-cultural smartphone adoption study. Unlike the original UTUAT model, it includes the construct of perceived sacrifice (PS). This construct is relevant to smartphone adoption mainly because smartphones are sophisticated communication devices and their use requires various sacrifices (monetary, time or effort).

3.1 Performance expectancy

PE is the degree to which an individual believes that using the system will help him or her make gains in job performance (Venkatesh, Morris et al. 2003) and was derived from TAM's PU construct. According to Venkatesh et al. (2003) and consistent with prior studies, PE is the strongest predictor of behavioral intention in information technology adoption and remains significant in all settings. In addition, our extensive review of past studies revealed that 28 (76%) of 37 cases that tested the path relationship between PU and BI reported a significant relationship, while all studies that tested paths between PE and BI (9 cases) found that the relationship was significant (Sanakulov, Karjaluoto 2015). Based on findings of past studies and the literature review, the following hypothesis is proposed:

H1. PE has a positive effect on BI to use smartphones.

3.2 Effort expectancy

EE is defined as a degree of ease associated with the use of the system and is derived from the TAM's PEOU (Venkatesh, Morris et al. 2003). According to Davis (1989), a system that is perceived to be easy to use is more likely to be accepted. When EE and PE were compared, EE was a weaker predictor than PE. When EE was analyzed separately for men and women, the influence of EE was most salient for older women with little experience (Venkatesh, Morris 2000). Our literature review results show that in 5 (of 8) cases, paths between PE and BI were statistically significant (Sanakulov, Karjaluoto 2015). Based on these arguments, the following hypothesis is proposed:

H2. EE has a positive effect on BI to use smartphones.

3.3 Social influence

SI, also known as subjective norm (Fishbein, Ajzen 1975), is the degree to which an individual perceives that important others believe he or she should use the new system (Venkatesh, Morris et al. 2003). Past studies have demonstrated that SI is important in forming behavioral intention to use new technology (Venkatesh, Morris 2000) and that individuals rely more on others' opinions when their own opinion is not well formed (Venkatesh, Morris 2000). Various past studies have shown that SI affects individuals' BI to use system (Sanakulov, Karjaluoto 2015). However, the path between SI and BI was nonsignificant in some studies on adoption, such as those on the adoption of mobile commerce (Dai, Palvi 2009) and mobile learning (Iqbal, Qureshi 2012). Our literature review of past studies showed that in 13 cases (out of 15; 87%), this relationship was statistically significant (Sanakulov, Karjaluoto 2015). Therefore, the following hypothesis is formulated:

H3. SI has a positive effect on BI to use smartphones.

3.4 Perceived sacrifice

When UTAUT was proposed, Venkatesh et al. (2003) suggested that more research on new constructs needed to be conducted to determine the constructs that ultimately influence technology acceptance. Moreover, researchers have suggested testing variables that have an important impact on technology acceptance. Our literature review indicated that a number of studies have integrated original well-established models with additional constructs specifically related to the context under study. For example, perceived playfulness in a study on the mobile Internet (Wang, Wang 2010) perceived credibility; trust in smartphone adoption study (Jung, Hur et al. 2015); and financial cost in a mobile banking study (Yu 2012) were tested. In the current study, PS is tested as an additional variable in UTAUT. PS is the degree to which a user perceives that a certain sacrifice is required to use the system or service. In marketing and consumer behavior studies, perceived sacrifice is considered to have a negative effect on behavior, and such sacrifice can be monetary or non-monetary (Baker, Parasuraman et al. 2002). Because smartphones are more sophisticated communication devices than conventional mobile phones and offer computer-like functions, the user is required to pay a certain cost, such as time or effort. The next hypothesis is proposed to test the relationship between perceived sacrifice and BI.

H4. PS has a negative effect on BI to use smartphones.

3.5 Gender

Gender, age, experience and voluntariness moderate relationships in UTAUT (Venkatesh, Morris et al. 2003) because they are assumed to be too weak to be direct determinants. According to Venkatesh et al. (2003), gender plays an important role as a moderator of the relationship between the main UTAUT constructs (PE, EE, SI) and behavioral intention. Males tend to be more performance oriented; therefore, their acceptance is mainly based on PE, while women's technology acceptance is mainly based on EE. Furthermore, for women, SI plays an important role in the formation of their attitude toward technology because UTAUT's gender moderating effect is based on the Gender Scheme theory, which proposes that women are concerned about others' opinions and that their attitude may be

formed based on social influence. Various past studies (Venkatesh, Thong et al. 2012, Venkatesh, Morris 2000) have investigated gender effects on technology adoption and have confirmed the significance of these effects. However, some studies have asserted that the statistical evidence is insufficient to confirm gender effects (Wang, Wang 2010). In addition to examining the constructs of UTAUT, we test the moderating effects of gender on the relationship between PS and intention. The negative effect of PS is expected to be stronger for women because women's acceptance behavior is based on EE, which can be considered the opposite of sacrifice. Therefore, this study examines whether gender moderates paths between PS and BI.

H4a.The effect of PE on BI is moderated by gender such that it is stronger for men.

H4b. The effect of EE on BI is moderated by gender such that it is stronger for women.

H4c. The effect of SI on BI is moderated by gender such that it is stronger for women.

H4d. The effect of PS on BI is moderated by gender such that it is stronger for women.

3.6 Individualism versus Collectivism (IC)

It is believed that cultural behaviors are reflected in the use of technology because cultures cannot be separated from individuals (Hofstede 1984). This belief was supported by prior research on the importance of culture in information management and IT product adoption (Dai, Palvi 2009, Choi, Totten 2012). In the current study, the effects of IC on individuals' perceptions across the UTAUT constructs are investigated. We assume that IC plays an important role in how an individual perceives PE, EE, SI and PS in smartphone adoption.

Collectivistic users are assumed to prefer rich media such as face-to-face meetings that transmit social cues better than forms such as e-mail (Straub, Keil et al. 1997). Their decisions are based on the potential benefits to a group rather than to an individual, whereas in individualistic societies, the decisions are based on benefits to individual work performance (Veiga, Floyd et al. 2001). In addition,

decisions in collectivistic cultures are mainly influenced by others' views, opinions, and expectations. After considering IC scores from South Korea and Turkey, one would expect differences in attitudes toward using technology. Because Korea is a more collectivistic society, with an Individualism score of 18 (Geert Hofstede 2016), Koreans might feel relatively more comfortable with rich media than Turks (Individualism score: 37) (Geert Hofstede 2016). In this study, we assume that IC positively affects users' perceptions about performance expectancy for smartphones. The main reason for this assumption is that smartphones offer more communication options than traditional phones such as video calls, voice messages, video messaging, live streaming and Internet calls.

H5a. Collectivism being the stronger moderator, IC positively influences the path between PE and BI.

IC does not have any influence on the formation of assumptions regarding EE because EE is highly dependent on an individual's skills and experience in using the technology or service. However, members of collectivistic groups might be motivated to attempt to use a system as a result of social influence, especially when the members of a group show a trend in using a certain technology or service.

H5b. Collectivism being the stronger moderator, IC positively influences the path between EE and BI.

Social influence is the degree to which an individual perceives that important others believe that he or she should use the new system (Venkatesh, Morris et al. 2003), and friends, relatives, and seniors around that individual will influence the individual's decision-making process on usage. This is more practiced in groups that score low on IC. In collectivistic groups, members consider others' opinions, usage behavior, and suggestions while forming behavioral intentions. The opposite practice is applicable for individualistic groups, which prioritize individual outcomes and goals. Such groups are more concerned with personal achievements than whole groups. Therefore, we assume that the relationship between social influence and BI is stronger for collectivistic groups.

H5c. Collectivism being the stronger moderator, IC positively influences the path between SI and BI.

Each individual must make a sacrifice to use a system. This sacrifice cannot be generalized based on levels of individualism and collectivism, and it has not been tested with cultural factors. However, we assume that in collectivistic groups, social influence may be so strong that the negative effect of perceived sacrifice becomes less important.

H5d. Collectivism being the stronger moderator, IC positively influences the path between PS and BI.

4. Method

4.1 Questionnaire development

To validate the above hypotheses, we conducted an online survey that included the most reliable, tested, and academically accepted measurements to ensure that the respondents could understand the questionnaire regardless of their nationality or level of literacy. Essentially, the study questionnaire contained screener, UTAUT, IC, and demographics question sets. The screener part consisted of questions about ownership of a smartphone, gender, age, and country of origin. The second section covered UTAUT questions developed by converting the original questions into equivalent questions for the smartphone domain; for instance, the word *system* was changed to *smartphone*. All the statements in the UTAUT section were measured on a 7-point Likert scale and derived from Venkatesh et al.'s (2003) items. The full list of items used in the survey is provided in Appendix A. To determine the individualism and collectivism characteristics of the respondents, Hofstede's original measurements with 7-point Likert scales were used. Before each pair of questions about a specific variable was asked, a short description was provided to aid the respondents' understanding. For example, "Performance means a smartphone is useful for your job/studies, enables you to accomplish tasks more quickly, increases productivity and can increase the chances of getting a raise/good grade." The wording of the descriptions was adopted from existing literature.

The questionnaire was translated into three languages: Uzbek, Turkish, and Korean. The Turkish version of the questionnaire was translated by a Turkish national who is a PhD student and fluent in English. The Korean version was translated by a Korean national who is fluent in English and was checked by a marketing professor. Because the main questionnaire was developed using measurements written in English, we followed the recommendation of Brislin (1970) and checked all versions through back translation to ensure that the meanings of questions remained unchanged by the translation process.

4.2 Data collection procedure

After minor revisions, the online questionnaire was created, and the links to all versions were emailed to friends, classmates, and colleagues and posted on popular general online forums. All recipients were asked to share the links with their contacts. The sample population ranged from students to professionals and from smartphone users to non-users.

5. Results

The survey produced 299 usable responses from 321 initially submitted responses. The 22 excluded responses contained random and incomplete answers. The demographic background of the respondents is recorded in Table 3. The majority of the respondents were students and aged between 21 and 30 years (72%). Only 26% of the respondents were 31–60+ years old. In terms of gender, 59% of respondents were male and 41% were female. Of the respondents, 90% had experience in using smartphones and 83% owned smartphones.

Description		Frequency	%
Gender	Males	177	59%
	Females	122	41%
Experience	Yes	269	90%
	No	30	10%
Ownership	Yes	249	83%
	No	50	17%
Age	16-25	122	41%
	26-35	145	49%
	36-45	30	19
	46-55	2	1
Country	Uzbekistan	94	31%

	Korea	113	38%
	Turkey	92	31%

Table 3. Frequency figures

Each item of every construct was checked for reliability using confirmatory analysis. Those that scored greater than 0.7 are considered to be highly reliable because a Cronbach's α greater than 0.6 is acceptable (Nunnally 1978). A social influence (SI) item was removed from further analysis due to low loadings, ensuring good reliability. Table 4 shows that each construct's Cronbach's alpha value is higher than 0.6.

For further analysis, a linear regression analysis was conducted to test the proposed hypotheses and research model. The research model was tested according to the significance of the path coefficient, which indicates the relationship between the dependent (performance expectancy (PE), effort expectancy (EE), social influence (SI) and perceived sacrifice (PS)) and independent variables (behavioral intention (BI)), and the R^2 value, which represents the amount of variance explained.

Constructs	Cronbach's α
Performance Expectancy	.672
Effort Expectancy	.628
Social Influence	.751
Perceived Sacrifice	.672
Behavioral Intention	.862

Table 4. Construct reliability test

H1 stated that PE positively affects BI. The hypothesis was not supported for the total population or the individual countries, contradicting many past studies that reported a significant relationship. H2 stated that EE positively affects BI, and this was supported only for the total sample and for Uzbek users. The path coefficient for the total sample was β= .202***, t= 3.368. H3 stated that SI positively affects BI to use a smartphone. This path proved statistically significant for the total sample and for Koreans (β= .236*, t= 2.232). Hypothesis 4 predicted that PS negatively affects BI to use smartphones. This was not supported for the total population, β=-.037, t= -.657. However, it was supported for Turkish users, β= -.219* and t= -2.135 (Table 5).

Path	Total Sample		Uzbekistan		Korea		Turkey	
	Path Coef	t-value	Path Coef	t-value	Path Coef	t-value	Path Coef	t-value
PE->BI	-.003	-.049	.162	1.490	.049	0.518	.049	.447
EE>BI	.202***	3.368	.217*	1.931	.095	0.895	.193*	1.850
SI>BI	.180***	3.089	.191	1.895	.236*	2.232	-.107	-.990
PS>BI	-.037	-.657	.045	0.460	.109	-1.144	-.219*	-2.135

***p≤.001 **p≤.01   *p≤.05

Table 5. Verification of research hypotheses

H4a–d stated that gender moderates the effects of PE, EE, SI and PS on BI. To test the moderating effects, we divided the data into male and female groups, and path coefficients for each group and variables were obtained by linear regression. The beta difference was inserted into the *t*-test formula below (Figure 6) to check the path relation between males and females.

$$t = \frac{\beta_1 - \beta_2}{\sqrt{\frac{\sum(Y_1 - \hat{Y}_1)^2 + \sum(Y_2 - \hat{Y}_2)^2}{n_1 + n_2 - 4} \times \frac{\sum X_1^2 + \sum X_2^2}{\sum X_1^2 \times \sum X_2^2}}}$$

Figure 6. *T*-test formula for calculating gender moderation

The results presented in Table 6 indicate that gender affects the relationship between PE, EE, SI, PS and BI.

Paths	Males	Females	B1-β2	t
PE->BI	.007	.122	0.115	1.469
EE->BI	.195	.163	0.032	0.403
SI->BI	.140	.280	0.140	1.756
PS->BI	-.112	.134	0.246	3.055

Table 6. Significance of gender in technology acceptance

H5a–d stated that IC moderates the paths between PE, EE, SI, PS and BI. The moderating effects of IC were calculated by comparing the direct paths (between PE, EE, SI, PS, and BI) and the moderated paths (constructs multiplied with IC to BI). The results show mixed significance of IC on the paths between the constructs and BI. For Uzbek users, individualism proved a stronger moderator in the paths between PE,

EE, SI, PS and BI. For Koreans, collectivism was a stronger moderator and amplified the paths between EE, SI and BI. For Turkish users, no significant effect of IC was observed. Interestingly, in all cases, the effect of perceived sacrifice on behavior was influenced by moderators (Table 7).

Path	Uzbekistan		Korea		Turkey	
	β	T-value	β	T-value	β	T-value
PE → BI	.161	1.492	.049	.518	.049	.447
PE x Collectivism → BI	.243*	2.175	.076	.788	.062	.519
PE x Individualism → BI	**.250***	**2.459**	.080	.801	.038	.302
EE → BI	.220*	1.982	.095	.895	.193	1.850
EE x Collectivism → BI	.305**	2.823	**.207***	**2.194**	.183	1.411
EE x Individualism → BI	**.399****	**3.784**	.141	1.438	.192	1.683
SI → BI	.190*	1.902	.236*	2.232	-.107	-.990
SI x Collectivism → BI	.287**	2.701	**.268***	**2.919**	.162	1.136
SI x Individualism → BI	**.339****	**3.184**	.269**	2.674	.066	.516
PS → BI	.045	.460	.109	1.144	**-.219***	**-2.135**
PS x Collectivism → BI	.072	.654	.037	.395	-.200	-1.424
PS x Individualism → BI	.160	1.486	-.031	-.303	-.205	-1.780

Table 7. Path coefficients between constructs and moderators for each country

6. Discussion, contributions and conclusion

The amount of general empirical research conducted in the area of technology acceptance, including mobile phone technology acceptance, has been increasing. However, despite the growth in research, few studies have addressed the mobile phone acceptance process in light of cultural effects on the whole process (Sanakulov, Karjaluoto 2015). Furthermore, research has not compared technology acceptance in Korea, Turkey, and Uzbekistan. The current research attempts to explore individual differences and their role in technology acceptance. UTAUT, a strong technology acceptance model, was used to study smartphone adoption. The original UTUAT was modified by replacing facilitating conditions with the perceived sacrifice (PS) construct to address potential user sacrifices such as monetary costs, privacy, time and effort to learn how to use smartphones. The results obtained for the total population were slightly different than those originally proposed by Venkatesh et al. (2003). The current research also reveals that UTAUT constructs have a different effect on technology acceptance in

different countries. Venkatesh et al. (2003) proposed that PE and EE are the strongest predictors; however, their proposal is only partially supported by the findings of the current research. PE did not have significant predictive power either in the total population or in the individual groups, while EE positively influenced the BI of the total sample and Uzbek users. This can be explained considering the original UTAUT study performed by Venkatesh et al. (2003). Their study was conducted in an organizational context in which performance expectancy is the most important driver of technology acceptance, which differs from the consumer context. The path between SI and BI was statistically significant for the total sample and Koreans, while PS was a negative predictor only in the Turkish group.

In addition, this study sought to determine cultural effects on the adoption process by employing Hofstede's individualism and collectivism dimension. The results were in line with previous results and Hofstede's cultural dimensions scale. The results of this study are in accordance with most prior adoption studies.

6.1 Theoretical contribution

The main contributions of current study are that it modified the original UTAUT by including an additional construct (perceived sacrifice) and tested it in the consumer smartphone acceptance context in a cross-cultural setting. In addition, the current study reveals interesting results that further our understanding of consumer technology acceptance and the moderating effects of cultural factors and gender.

The perceived sacrifice construct was integrated into the UTAUT model to address the possible sacrifices related to using smartphones in a consumer setting. According to Baker and Parasuraman (2002), a sacrifice can be monetary or non-monetary. This is also applicable for smartphone usage because smartphones are more expensive than conventional phones and learning to use them requires time and effort. In contrast to employees' experience with workplace technologies, consumers have to bear the costs associated with the devices and services (Venkatesh, Thong et al. 2012) and do not receive

training. Although the results supported the hypothesis only partially, we believe that the advancement of smartphone technology, the increasing number of sophisticated services offered by third parties, and users' growing privacy concerns will lead to a prioritization of the issue of sacrifice.

Overall, UTAUT's predictive power is relatively higher than that of other technology adoption models. However, a review of past studies reveals some inconsistency in the individual constructs' ability to predict adoption (Sanakulov, Karjaluoto 2015), and the current study confirmed that inconsistency. When the data were analyzed, only EE and SI were statistically significant constructs, while PE did not correlate with BI. For Uzbek users, all UTAUT constructs (PE, EE, and SI) significantly affected BI. In contrast, only SI had a significant effect among Koreans, and only EE was significant among Turks. For Uzbeks, PE and EE were the strongest factors affecting BI, while for Koreans, these factors were not statistically significant. This can be explained by reference to the relative level of technological advances and standards of living. Because smartphones are expensive devices, only a small proportion of users can frequently obtain an upgrade when a newer version is released. Therefore, for Uzbek users, SI is less important.

As expected, the results obtained differed across the groups, confirming that the adoption process cannot be generalized. Each country and society may have specific priorities in regard to technology acceptance. In addition, gender and IC were studied as moderators affecting the relationships between the PE, EE, and SI constructs and BI. Overall, both factors were confirmed to be moderators of the paths. However, some variance across groups and paths was found. For Koreans, individualism proved to be a positive moderator of the EE / BI path, while it had a negative effect on SI / BI. For Turks, SI did not significantly influence BI. However, when individualism moderated this relationship, the SI / BI path was significant. Again, these results confirm the differences in technology acceptance between various groups.

6.2 Managerial implications

Current research offers important managerial implications for decision makers, product and software developers, and marketing managers. The main practical implication is that when implementing managerial decisions, country-specific factors and cultural backgrounds should be considered. The current results found that factors influencing technology acceptance varied in strength across the groups. For example, social influence was the strongest predictor of behavioral intention to use a smartphone among South Korean participants. South Korea is considered to be a highly collectivistic society, with an Individualism score of 18 (Geert Hofstede 2016), where others' views, opinions, and expectations influence decision making. When results are examined from a cultural perspective, the two results support each other because cultural behaviors are reflected in individuals' activities. Based on this knowledge, appropriate marketing communication that emphasizes the social aspects of using smartphones should be formulated. Social influence does not correlate with behavior intention in the Turkish group, and this result is supported by cultural factors. Turkey's individualism score is 37 (Geert Hofstede 2016), indicating that social influence should be less important. This implication can be applied to other countries based on individualism-collectivism levels.

Furthermore, our empirical findings indicate that behavioral intention is most influenced by effort expectancy, indicating consumers want devices and software that require less effort to use. Product and software developers should focus on making easy-to-use devices and software, and consumers' perception of effortless products should be increased through marketing communication.

6.3 Limitations and future research direction

This study has some limitations. First, data were collected only from individuals with Internet access. This was the main obstacle that prevented us from reaching random respondents, and in some sense, this limitation may have resulted in a homogeneous sample. For example, the Internet penetration rate in Uzbekistan is very low, and only those who consider it important to remain aware of technological advances or who are financially comfortable have the Internet. Furthermore, when the data were

analyzed, it became clear that most of the participants were young adults, particularly students or people working in an office. Therefore, the general profile of the respondent was a young student or employee, which precludes the generalization of the results. The second limitation is the size of the data set (n=299), which is considered low for three different groups, and most of studies based on survey instruments advocate a larger sample size to improve quality. Third, the three groups studied in this research are known to have similar traditional and cultural principles such as respect for elders, a collectivist style of living, and low power distance preferences. Therefore, the results did not show any great differences between the groups.

Future research with similar characteristics should consider the limitations mentioned above to improve the research methodology and the quality of the results. Furthermore, technological advances occur very rapidly and are becoming part of our daily lives, which is changing our perceptions of technologies. Therefore, to investigate the changes, timelines of changes, and reasons for and drivers of changes, researchers should conduct longitudinal research. Moreover, a longitudinal approach would provide an opportunity to study post-adoption behavior.

References:

AIELLO, J.R. and KOLB, K.J., 1995. Electronic Performance monitoring and social context: Impact on productivity and stress. *Journal of Applied Psychology,* **80**(3), pp. 339-353.

BAKER, J., PARASURAMAN, A., GREWAL, D. and VOSS, G.B., 2002. The influence of multiple store environment cues on perceived merchandise value and patronage intentions. *Journal of Marketing,* **66**(2), pp. 120-141.

BRISLIN, R.W., 1970. Back-translation for cross-cultural research. *Journal of cross-cultural psychology,* **1**(3), pp. 185-216.

CHEN, L.S. and KUAN, C.J., 2012. Customer acceptance of playing online game on mobile phones. *International Journal of Mobile Communications,* **10**(6), pp. 598-616.

CHOI, Y.K. and TOTTEN, J.W., 2012. Self-construal's role in mobile TV acceptance: Extension of TAM across cultures. *Journal of Business Research,* **65**(11), pp. 1525-1533.

DAI, H. and PALVI, P.C., 2009. Mobile commerce adoption in China and the United States: a cross-cultural study. *ACM SIGMIS Database,* **40**(4), pp. 43-61.

DAVIS, F.D., 1989. Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS quarterly,* , pp. 319-340.

EDISON, S.W. and GEISSLER, G.L., 2003. Measuring attitudes towards general technology: Antecedents, hypotheses and scale development. *Journal of targeting, Measurement and Analysis for Marketing,* **12**(2), pp. 137-156.

EL-GAYAR, O.F., MORAN, M. and HAWKES, M., 2011. Students' Acceptance of Tablet PCs and Implications for Educational Institutions. *Educational Technology & Society,* **14**(2), pp. 58-70.

FISHBEIN, M. and AJZEN, I., 1975. *Belief, attitude, intention and behavior: An introduction to theory and research.* Reading edn. MA: Addison-Wesley.

GARTNER, 2016-last update, **Gartner Says Worldwide Smartphone Sales Grew 9.7 Percent in Fourth Quarter of 2015**. Available: http://www.gartner.com/newsroom/id/3215217.

GEERT HOFSTEDE, 2016-last update, Cultural dimension scores. Available: http://geert-hofstede.com/countries.html.

HOFSTEDE, G., 1993. Cultural constraints in management theories. *The Academy of Management Executive,* **7**(1), pp. 81-94.

HOFSTEDE, G., 1984. *Culture's consequences: International differences in work-related values.* sage.

HOFSTEDE, G., HOFSTEDE, G.J. and MINKOV, M., 1991. *Cultures and organizations: Software of the mind.* Citeseer.

HOMER, P.M. and KAHLE, L.R., 1988. A structural equation test of the value-attitude-behaviour hierarchy. *Journal of personality and social psychology,* **54**, pp. 638-646.

IM, I., HONG, S. and KANG, M.S., 2011. An international comparison of technology adoption: Testing the UTAUT model. *Information & Management,* **48**(1), pp. 1-8.

IQBAL, S. and QURESHI, I.A., 2012. M-learning adoption: A perspective from a developing country. *The International Review of Research in Open and Distance Learning,* **13**(3), pp. 147-164.

ITU, 2015-last update, ICT Facts and Figures. Available: http://www.itu.int/en/ITU-D/Statistics/Documents/facts/ICTFactsFigures2015.pdf.

JUNG, C.M., HUR, W. and KIM, Y., 2015. A comparison study of smartphone acceptance between Korea and the USA. *International Journal of Mobile Communications,* **13**(4), pp. 433-453.

KIM, H., CHAN, H.C. and GUPTA, S., 2007. Value-based adoption of mobile internet: an empirical investigation. *Decision Support Systems,* **43**(1), pp. 111-126.

MONROE, K.B. and KRISHNAN, R., 1985. The effect of price on subjective product evaluations. *Perceived quality: How consumers view stores and merchandise,* , pp. 209-232.

NUNNALLY, J.C., 1978. Psychometric theory.

PARK, J., YANG, S. and LEHTO, X., 2007. Adoption of mobile technologies for Chinese consumers. *Journal of Electronic Commerce Research,* **8**(3), pp. 196-206.

PERSAUD, A. and AZHAR, I., 2012. Innovative mobile marketing via smartphones: Are consumers ready? *Marketing Intelligence & Planning,* **30**(4), pp. 418-443.

ROUIBAH, K., ABBAS, H. and ROUIBAH, S., 2011. Factors affecting camera mobile phone adoption before e-shopping in the Arab world. *Technology in Society,* **33**(3), pp. 271-283.

SAN MARTÍN, H. and HERRERO, Á, 2012. Influence of the user's psychological factors on the online purchase intention in rural tourism: Integrating innovativeness to the UTAUT framework. *Tourism Management,* **33**(2), pp. 341-350.

SANAKULOV, N. and KARJALUOTO, H., 2015. Consumer adoption of mobile technologies: a literature review. *International Journal of Mobile Communications,* **13**(3), pp. 244-275.

SHIH, Y. and CHEN, C., 2013. The study of behavioral intention for mobile commerce: via integrated model of TAM and TTF. *Quality & Quantity,* **47**(2), pp. 1009-1020.

SHIN, D., 2012. What makes consumers use VoIP over mobile phones? Free riding or consumerization of new service. *Telecommunications Policy,* **36**(4), pp. 311-323.

STRAUB, D.W., 1994. The Effect of Culture on IT Diffusion: E-Mail and FAX in Japan and the US. *Information Systems Research,* **5**(1), pp. 23-47.

STRAUB, D., KEIL, M. and BRENNER, W., 1997. Testing the technology acceptance model across cultures: A three country study. *Information & Management,* **33**(1), pp. 1-11.

TAN, G.W., OOI, K., SIM, J. and PHUSAVAT, K., 2012. DETERMINANTS OF MOBILE LEARNING ADOPTION: AN EMPIRICAL ANALYSIS. *The Journal of Computer Information Systems,* **52**(3), pp. 82-91.

TRIANDIS, H.C., 1988. Collectivism vs. individualism: A reconceptualization of a basic concept in cross-cultural psychology. *Cross-cultural studies of personality, attitudes, and cognition,* , pp. 60-95.

VEIGA, J.F., FLOYD, S. and DECHANT, K., 2001. Towards modelling the effects of national culture on IT implementation and acceptance. *Journal of Information Technology (Routledge, Ltd.),* **16**(3), pp. 145-158.

VENKATESH, V. and MORRIS, M.G., 2000. Why don't men ever stop to ask for directions? Gender, social influence, and their role in technology acceptance and usage behavior. *MIS quarterly,* , pp. 115-139.

VENKATESH, V., MORRIS, M.G., DAVIS, G.B. and DAVIS, F.D., 2003. User acceptance of information technology: Toward a unified view. *MIS quarterly,* , pp. 425-478.

VENKATESH, V., THONG, J. and XU, X., 2012. Consumer acceptance and use of information technology: Extending the unified theory of acceptance and use of technology. *MIS quarterly,* **36**(1), pp. 157-178.

WANG, H. and WANG, S., 2010. User acceptance of mobile internet based on the Unified Theory of Acceptance and Use of Technology: investigating the determinants and gender differences. *Social Behavior and Personality: an international journal,* **38**(3), pp. 415-426.

YU, C., 2012. Factors Affecting Individuals to Adopt Mobile Banking: Empirical Evidence from the UTAUT Model. *Journal of Electronic Commerce Research,* **13**(2), pp. 104-121.