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A generalized model for smartphone adoption and use in an Arab context:

A cross-country comparison

Abstract

The main aim of this research is to propose a conceptual model that explains the factors that can predict behavioral intention to use smartphones and the actual use of smartphones by young Arab consumers in three Arab countries: Iraq, Jordan, and the United Arab Emirates (U.A.E.). The findings indicate that the proposed extended model fits well in the three countries. The research provides information that can help policymakers and mobile companies.

Keywords – Smartphone adoption; technology adoption; young Arab customer behavior; UTAUT2

Introduction

Since the first smartphone was introduced in 2007, mobile devices have incorporated a substantial number of services beyond the calling function, all integrated within the device (Phan & Daim, 2011). Shiraishi, Ishikawa, Sano, and Sakurai (2011) define a smartphone as "a mobile phone or PHS [personal handy-phone system] that incorporates a public general-purpose operating system, to which users can freely add applications, extend functionality, or customize." These mobile services (additional applications) have been found to be significant for mobile-phone use (Gazley, Hunt, & McLaren, 2015).

According to the Group Special Mobile Association (GSMA), there is great potential for smartphone adoption in the Arab region (GSMA, 2015b). In Arab countries, the number of smartphone users is lower than the total number of mobile-phone users, as these countries are

still in a period of transition from the previous generation of mobile phones to smartphones. Smartphones have extended the functionality of mobile phones by offering various types of mobile applications (e.g., gaming, m-commerce, m-health, and mobile social media). Smartphone use has extended into various fields (e.g., education, health, and government services), providing benefits to service users while increasing the efficiency of the services provided in these sectors. The smartphone is considered as a single platform which incorporates different types of mobile applications for example, m-government, m-commerce, m-banking and m-learning. Thus, it enables its users to access various services through a single device. In fact, there are benefits of smartphones on a national level, as smartphones provide a good source of income (Abbasi, 2011). Hence, the use of the new generation of mobile phones by actual customers will provide a range of benefits to not only customers but also telecommunications companies and a range of other sectors in the Arab region. As the number of subscribers to mobile phones increases, mobile companies in the Arab region have less room for growth. In addition, these companies have experienced a drop in revenue over the past few years. As a consequence, mobile-phone companies in the region are striving to provide innovative solutions and applications, and find new ways to increase customer satisfaction. Therefore, it is important to study smartphone adoption in this region.

From a theoretical perspective, a few recent cross-cultural and national studies have been conducted to understand the differences in consumer behavior with regard to adopting various technologies in countries outside the Arab region (e.g., Carter, Weerakkody, Philips, & Dwivedi, 2016; Shareef, Dwivedi, Laumer, & Archer, 2016). Some significant differences have been found. However, models of technology adoption that were originally developed in western countries should be applied in non-western countries and non-western cultures with caution (McCoy, Galletta & King, 2007; Straub, Keil & Bernner, 1997). This is due to differences in political, social, economic, and technological characteristics between western

and non-western counties which can make the results be different. In addition, previous research has shown that there are significant cultural differences between Arab and non-Arab countries (Rose & Straub, 1998). Other studies on the adoption of information and communication technology (ICT) in Arab countries, although not investigating smartphones specifically, have emphasized the significance of culture as an influential factor (Loch, Straub, & Kamel, 2003; Rose & Straub, 1998). However, these studies did not examine and empirically test the specific cultural attributes related to the specific technology under investigation in the Arab region. For example, the effects of technological culturation and culture-specific beliefs and values on behavioral intention towards the use of smartphones in this region. Arab culture can be both a hindering and a supporting factor in technological adoption (Loch et al., 2003; Straub, Loch & Hill, 2001). Rose and Straub (1998) recommended that the complexity of the culture needs to be taken into account when attempting to understand ICT adoption in the Arab region. All this makes understanding the differences between Arab countries and other countries important in the application of the extended unified theory of acceptance and use of technology (UTAUT2) in the Arab region.

Baabdullah, Dwivedi, and Williams (2013) explain that there is a lack of research that extends or even tests the UTAUT2 (Venkatesh, Thong, & Xu, 2012) in Arab countries. This is in spite of the importance of this theory, which has been widely acknowledged in the literature (Dwivedi, Rana, Chen, & Williams, 2011; Williams, Rana, & Dwivedi, 2015). In addition, previous studies have identified the need to conduct cross-cultural research into different countries, groups, and individuals within the Middle East (Halaweh, 2015). Studying the adoption of technology within the Arab region is important because the region has a large population and young people form the biggest segment (GSMA, 2013). This makes the region a huge market with great potential. Baabdullah et al. (2013) argued that a generalized model is needed, which can be used within the context of the Middle East. Indeed, the inclusion of a

single culture, a single country, a single type of participant, or a single task in studies that have applied the original unified theory of acceptance and use of technology (UTAUT) (Venkatesh, Morris, Davis, & Davis, 2003) is seen as a major limitation in the literature (Baabdullah et al., 2013; Williams et al., 2015).

Venkatesh, Thong and Xu (2016) evaluated how the UTAUT was extended by studies conducted between September 2003 and December 2014. The authors identified two main gaps in terms of the extension and application of the theory. First, most of the studies evaluated focused on specifying changes to the theory, rather than extending it. Second, while previous research studied the moderating effects of national culture within the UTAUT, they did not examine other location attributes when extending the theory. The authors recommended investigating location attributes as higher-level contextual factors in order to extend the UTAUT. Venkatesh et al. (2016) proposed examples of location attributes, including national culture, regional economic status, and industry competition. They explained that this could be carried out by using multi-sample and multi-study research to theorize the influence of location in the model. The research presented in this paper aims to fill these two knowledge gaps in relation to the UTAUT by examining samples from three countries — with different economic, social, cultural, and technological development levels — in one region. It extends the theory by including a factor related to national IT development (in which industry conditions are also taken into consideration) and two factors related to culture. The extended model is applied to the context of smartphone adoption and use in three different Arab countries: Iraq, Jordan, and the United Arab Emirates (U.A.E.).

The main aim of this research is to enhance the knowledge of technology acceptance by proposing and examining a conceptual model to explain the factors that can predict young Arab customers' behavioral intention to use smartphones and their actual use of smartphones. The results of this research will benefit individual young users, mobile-application developers,

policymakers, and mobile companies in the three countries under study. This research studies behavioral intention to use smartphones and the actual use of smartphones (and their mobile applications) in order to gain a full understanding of this phenomenon. However, mobile applications are developed for many different purposes, and consumers adopt and use these applications in different ways. This research investigates the adoption of mobile applications in the context of smartphones only. Nevertheless, the practical contributions of this research are not limited to increasing the penetration of smartphones; they also contribute to the efficient use and better exploitation of the mobile applications and services that are available through smartphones. In other words, this research contributes to enhancing the depth of smartphone use. In addition, one of the main practical contributions of this research is to deepen the understanding of young customers' preferences and behavior when using smartphones. In turn, this contributes to the development of techniques for more specific targeting and increasing customer satisfaction.

Smartphone adoption and use in Arab countries

In 2011, 18% of all mobile devices sold in the Middle East and Africa were smartphones (International Telecommunication Union, 2013). In 2013, the number of smartphone users constituted one-fifth of the Arab population and one-third of the population in the Gulf Corporation Council countries (International Telecommunication Union, 2013). The 2014 GSMA report stated that half of the Arab population is under the age of 25 (GSMA, 2014). Young people are early adopters of new technology, which explains the increase in the penetration rate and justifies expectations for further penetration in future (GSMA, 2014).

This research studies smartphone adoption within the context of Arab countries: Iraq, Jordan, and the U.A.E. These three Arab countries are chosen for two main reasons. First, they vary in terms of the level of technology adoption. For example, in Iraq, the level of technology

adoption and the ICT infrastructure have started to increase rapidly, but still at significantly lower rates than in other Arab countries. The U.A.E. (Dubai) is strongest in terms of smartphone adoption and penetration. This helps to understand the variations when comparing how the model fits in the three countries. Second, each of the three countries has characteristics that make it suitable to be included in this research. The main characteristics of each country included in the study and the reasons for selecting it are as follows.

Iraq forms the third-largest mobile market in the Arab region (GSMA, 2014). It is a lower-middle-income country within which the majority of people are on a low income (Rohwerder, 2015). Iraq is considered to be less technologically developed than other Arab countries (GSMA, 2015a). There is a lack of research on the adoption of technology in general, and smartphones in particular, in this country. Furthermore, mobile companies in Iraq experienced the highest drop in revenue in the Arab region in 2015 (GSMA, 2015b). The smartphone adoption rate in Iraq was 17% in 2015 (GSMA, 2015b).

The second country, Jordan, has an average level of technology adoption in comparison with other Arab countries. Although the country suffers from a high level of unemployment among young people, mobile-phone adoption is considered to be high compared with other Levant countries. However, mobile operators in Jordan have experienced a drop in revenue over the past few years (GSMA, 2015a). The tax burden on mobile services is high in Jordan, and it rose by an average of 7.7% a year between 2008 and 2012 (GSMA, 2014). In fact, taxes on mobile phones and mobile services in Jordan are among the highest in the world (GSMA, 2015b). Jordan's technological infrastructure is more developed than that of Iraq but less developed than that of the U.A.E. Smartphones account for just under one-third of all mobile connections in Jordan (GSMA, 2015b).

The U.A.E., which is the third country included in this study, is the most advanced Arab country in terms of mobile-phone adoption and penetration. The U.A.E. has the highest smartphone adoption level in the world, at 83% (GSMA, 2015b). Although the U.A.E.'s ICT infrastructure has extended over the past few years, it is still less extensive than those of other developed countries (Alfaki & Ahmed, 2013).

Although Arab countries share similar cultural characteristics, Hofstede (2001) explains that cultural differences do exist between these countries. The three countries included in this study score differently in terms of Hofstede's cultural dimensions (Geert-Hofstede, 2014). In terms of culture, with reference to Hofstede's cultural dimensions, Iraq scores 95 in power distance, 30 in individualism, 70 in masculinity, 85 in uncertainty avoidance, 25 in pragmatism (long-term orientation), and 17 in indulgence (Geert-Hofstede, 2014). These scores indicate that Iraq is high in power distance and uncertainty avoidance, and that it is a collectivistic, masculine, normative, and restrained society. Jordan scores 70 in power distance, 30 in individualism, 45 in masculinity, 65 in uncertainty avoidance, 16 in pragmatism (long-term orientation), and 43 in indulgence. These scores indicate that Jordan is high in power distance (Geert-Hofstede, 2014). The society in Jordan is collectivistic, feminine, normative, and restrained. The country is intermediate in uncertainty avoidance (scoring lower than the other countries included in the study). The U.A.E. scores 90 in power distance, 25 in individualism, 50 in masculinity and femininity, and 80 in uncertainty avoidance (Geert-Hofstede, 2014). No scores were provided for either pragmatism (long-term orientation) or indulgence. These scores indicate that the U.A.E. is high in power distance and uncertainty avoidance. The society is collectivistic and neither masculine nor feminine. Brach (2010) grouped users in countries in the Middle East and North Africa into the following categories: "consumers," "integrated users," and "isolated users." With reference to the three countries in this study, while "consumers" in the Arab Gulf countries (i.e., the U.A.E., within the context

of this research) are open to the latest technologies available globally, “integrated users” (located in Jordan) are significantly less open to them. The third category is “isolated” users, who are based in Arab countries that have suffered extreme political situations and war (i.e., Iraq, within the context of this research) over the past decade.

The inclusion of Iraq, Jordan, and the U.A.E. enabled us to compare how the model fits in different countries with different characteristics within the same region. In turn, this provided a clear understanding of how the proposed model fitted within the least developed and most developed Arab countries. Other Arab countries were not included. Many studies have tested the UTAUT in Qatar and in Saudi Arabia, which made conducting another study in these countries less important than it was to conduct a study in Jordan, Iraq, and the U.A.E. This research took place in urban areas (major cities) in these three countries. A large proportion of the population in these countries lives in urban areas. In addition, in general, urban areas have a higher smartphone adoption rate than rural areas, which makes investigating smartphone adoption and use in these areas more feasible.

Conceptual framework

The first version of the UTAUT was developed by Venkatesh et al. (2003). The model was developed from an organizational perspective using organizational settings. Eight main models related to the use of technology were gathered and tested within the UTAUT: the theory of reasoned action (TRA) (Ajzen & Fishbein, 1980); the technology acceptance model (TAM) (Davis, 1989); the motivational model (MM) (Davis, Bagozzi, & Warshaw, 1989; the theory of planned behavior (TPB) (Ajzen, 1991); the combined TAM and TPB (A-TAM) (Taylor & Todd, 1995a); the model of PC utilization (MPCU) (Thompson, Higgins, & Howell, 1994); the diffusion of innovation theory (DoI) (Rogers, 2003); and the social cognitive theory (SCT) (Bandura, 1986). Later, Venkatesh, Thong and Xu (2012) extended the UTAUT for use in the

context of consumer adoption. The main constructs included performance expectancy, effort expectancy, social influence, facilitating conditions, hedonic motivation, price value, and habit. The moderators were age, gender, and experience. However, voluntariness of use was illuminated.

The UTAUT2 developed by Venkatesh et al. (2012) is largely applicable to the studied case if modifications are made and constructs added in order to address the individual consumer's adoption of smartphones in an Arab country. There are many reasons for choosing the UTAUT2 as the basis of the conceptual framework in this research. First, the UTAUT2 is an extension of the UTAUT (Venkatesh et al., 2003), which was based on comparing, combining, and analyzing eight theories of technology acceptance (and their extensions) that were widely acknowledged in the existing body of literature. The UTAUT combines concepts in theories that used different labels but overlapped thematically. Second, the framework created by Venkatesh et al. (2012) was tested using the mobile Internet, which is not altogether different from the context of the adoption of smartphones. Furthermore, it was tested on actual users (in other words, from the customer perspective). For these reasons, the UTAUT2 was selected to form the basis of the framework developed in this study.

Within the context of technology adoption in Arab countries, Straub et al. (2001) found that technological culturation and culture-specific beliefs and values both have a significant effect on system outcomes. The constructs of national IT policies and technological infrastructure were also included in Straub et al.'s (2001) study, but they were not tested. Straub et al.'s (2001) construct of culture-specific beliefs and values was substituted by that of social norms in Loch et al.'s (2003) study, as social norms represent a more general view of culture. Although this model was not tested using mobile-phone technology, it is closely related to the influence of the Arab culture on technology adoption and use, which can still be applied to smartphone adoption and use.

The existing technology adoption theories analyzed in the UTAUT, and the UTAUT itself, do not include factors that are related to cultural attributes with regard to the adoption and use of technology. Furthermore, they do not include factors related to national IT development, which mainly apply to developing countries, specifically Arab countries. The UTAUT2 also lacks the inclusion of these factors. Accordingly, new constructs were adopted from the cultural influence model for information technology transfer, which was developed by Straub et al. (2001) specifically for technology transfer to Arab countries. These new constructs included national IT development, technological culturation, and culture-specific beliefs and values. Incorporating these three factors strengthens support for the UTAUT2 within the context of smartphone adoption in Arab countries. There were several reasons for combining the cultural influence model for information technology transfer with the UTAUT2 in this research. First, the model was created for use in developing countries, specifically Arab countries. Second, it acknowledges the complex nature of the Arab culture and its effect on technology transfer. Third, it acknowledges national IT development as a construct.

Research model and proposed hypotheses

Behavioral intention to use smartphones

Behavioral intention has been found to be significant in many theories related to technology acceptance, including the TRA (Ajzen & Fishbein, 1980), the TAM (Davis, 1989), the TPB (Ajzen, 1991), the MM (Davis et al., 1992), the decomposed theory of planned behavior (DTPB) (Taylor & Todd, 1995b), the TAM2 (Venkatesh & Davis, 2000), the UTAUT (Venkatesh et al., 2003) and the UTAUT2 (Venkatesh et al., 2012). Based on Ajzen's (1991) definition, behavioral intention can be defined as a consumer's intention to use (or intention to continue to use) and make use of smartphones in the future. Therefore, it was hypothesized that behavioral intention would have a significant effect on actual use as follows.

H1. Behavioral intention to use smartphones has a positive, significant, and direct effect on the actual use of smartphones.

Perceived relative advantage (usefulness)

Rogers (2003) defined relative advantage as "the degree to which an innovation is perceived as being better than the idea it supersedes." Moore and Benbasat (1991) suggested that the term relative advantage is more detailed and perceptive to the user than the term perceived usefulness. Based on this suggestion, Igbal and El-Gohary (2014) used the term perceived relative advantage (usefulness). Following their approach, in this research, the term perceived relative advantage was used to represent the term performance expectancy in the UTAUT2 (Venkatesh et al., 2012). In this research, the term perceived relative advantage was used to represent the term *performance expectancy* in the UTAUT2 (Venkatesh et al., 2012). In 2011, Silva, Ratnadiwakara and Zainudeen (2011) carried out a study based on the model developed by Van Biljon and Kotze (2008). They found that in developing countries with lower income levels, the advantages of using mobile phones extend beyond social advantages, supporting the individual's economic status (Silva et al., 2011). Accordingly, it was hypothesized that:

H2. Perceived relative advantage (usefulness) has a positive and significant effect on behavioral intention to use smartphones.

Effort expectancy

Effort expectancy is defined as "the degree of ease associated with consumers' use of technology" (Venkatesh et al., 2012). It has been found to be significant in the UTAUT2 (Venkatesh et al., 2012) and in many other studies (e.g., Davis, 1989; Davis, Bagozzi & Warshaw, 1992; Taylor & Todd, 1995b; Taylor & Todd, 1995c; Venkatesh & Davis, 2000). It was anticipated that effort expectancy would also be important within the context of this

research. Taking into consideration the low level of education and technological awareness in general in the majority of Arab countries, effort expectancy was expected to be a significant factor influencing individual users' current and future behavior towards smartphones. It was hypothesized that:

> H3. Effort expectancy has a positive and significant effect on behavioral intention to use smartphones.

Social influence

Social influence has been defined as "the extent to which consumers perceive that important others (e.g., family and friends) believe they should use a particular technology" (Venkatesh et al., 2012). It is found in many existing theories related to technology adoption, including the TRA (Ajzen & Fishbein, 1980), the SCT (Bandura, 1986; Compeau & Higgins, 1995), the TPB (Ajzen, 1991); the MPCU (Thompson et al., 1994), the DoI (Rogers, 2003), the UTAUT (Venkatesh et al., 2003), and the UTAUT2 (Venkatesh et al., 2012). Within the context of this research, the strong effect of the Arab culture (being collectivistic and high in power distance and uncertainty avoidance) must be considered when analyzing the effect of social influence in voluntary settings. Due to the collectivistic nature and high power distance of the culture in Arab countries (Hofstede, 2001), the effect of social influence was expected to be high. It should be noted that all three Arab countries included in the study have collectivistic societies. Because social influence is a factor that can determine behavioral intention, it was hypothesized that:

> H4. Social influence has a positive and significant effect on behavioral intention to use smartphones.

Facilitating conditions

Facilitating conditions have been defined as "consumers' perceptions of the resources and support available to perform a behavior" (Venkatesh et al., 2012). The construct of facilitating conditions was found in the MPCU (Thompson et al., 1994), the DTPB (Taylor & Todd, 1995b), the UTAUT (Venkatesh et al., 2003), and the UTAUT2 (Venkatesh et al., 2012). Previous studies concerned with technology adoption in Arab countries found that facilitating conditions have a significant influence on actual use and behavior intention (e.g., Akour & Dwairi, 2011; Alwahaishi & Snášel, 2013). Therefore, it can be assumed that the presence of training and support for the use of smartphones and mobile applications is important. However, this varies among the Arab countries under study. For example, in Iraq, there is a lack of support and training provided to individual customers (GSMA, 2014). On the other hand, the level of support and training provided by mobile companies and mobile-application developers provided in Jordan and the U.A.E. is high in comparison with other Arab countries (GSMA, 2015a; 2015b). For the purpose of this research and in order to ensure that all the possibilities are included, the effects of facilitating conditions on behavioral intention and actual use were tested. Thus, two hypotheses were developed:

H5. Facilitating conditions have a positive and significant effect on behavioral intention to use smartphones.

H6. Facilitating conditions have a positive, significant, and direct effect on the actual use of smartphones.

Enjoyment

Hedonic motivation has been defined by Venkatesh et al. (2012) as "the fun or pleasure derived from using a technology." The authors have stated that "it has been shown to play an important role in determining technology acceptance and use" (Venkatesh et al., 2012). Enjoyment was expected to be an important factor in behavioral intention to use smartphones because of the

large number of mobile applications developed for gaming and entertainment. Previous studies have found enjoyment to be significant (e.g., Alalwan, Dwivedi, & Williams, 2016; Kamel & Farid, 2007; Venkatesh et al., 2012). However, Igbaria, Parasuraman and Baroudi (1996) and Teo, Lim and Lai (1999) found that usefulness is more important than enjoyment. With reference to Hofstede's (2001) cultural dimensions, the cultures in both Jordan and Iraq were found to act as a restraint, as people may not allocate a considerable time for enjoyment (especially in Iraq). This suggested that enjoyment might not have as significant an effect as perceived relative advantage (usefulness) on behavioral intention in these two countries. No information with regard to this dimension for the U.A.E. was available. However, based on the high level of adoption and the extensive use of smartphones in the U.A.E., in addition to the high GDP per capita, it can be assumed that enjoyment is more significant in this part of the Arab region. It was hypothesized that:

> H7. Enjoyment has a positive and significant effect on behavioral intention to use smartphones.

Price value

Price value has been defined as "consumers' cognitive trade-off between the perceived benefits of the applications and the monetary cost for using them" (Venkatesh et al., 2012). It was found to have an important effect on behavioral intention in the UTAUT2 (Venkatesh et al., 2012). Price value was expected to be a significant factor in the case of smartphone users in Arab countries. This is due to the high unemployment level and low economic status in comparison with developed countries. The price factor is not restricted to the price of the mobile handset but also includes the price of mobile services and an Internet connection. The price factor has been highlighted in previous studies (e.g., Hakim & Neaime, 2014; International

Telecommunication Union, 2013). Users compare the costs and benefits of using smartphones and their applications. Therefore, it was hypothesized that:

H8. Price value has a positive and significant effect on behavioral intention to use smartphones.

Habit

Based on Limayem, Hirt, and Cheung's (2007) findings, habit was defined in Venkatesh et al.'s (2012) study as "the extent to which people tend to perform behaviors automatically because of learning." Habit was found to be important in the UTAUT2 (Venkatesh et al., 2012). The direct effect of habit on actual use without the mediation of behavioral intention is also discussed in Limayem et al.'s (2007) study; that is, when a habit is formed (by the frequent use of technology over a certain period of time in a stable environment), it becomes a key driver of actual use, which can override the effect of behavioral intention. According to Sarwar and Soomro (2013), habit can compel people to use and check their smartphones without any specific purpose in mind other than a habit they have developed. Hashem and Smith (2010) found that there is a high level of addiction to ICT products among people in the U.A.E. Due to the fact that people in the U.A.E. have a higher level of income and a higher level of smartphone use than is the case in Iraq or Jordan, it is possible that the level of addiction to smartphone use (habit) is higher among users in the U.A.E. than among users in Iraq and Jordan. Therefore, the following hypotheses were formed:

H9. Habit has a positive and significant effect on behavioral intention to use smartphones.

H10. Habit has a positive and significant direct effect on the actual use of smartphones.

Technological culturation

Technological culturation has been defined as “influential experiences that individuals have had with technologically advanced cultures” (Straub et al., 2001). The construct was found to be significant in Straub et al.’s (2001) model. In fact, the authors found that technological culturation had a significant effect on system outcomes and information technology transfer. Technological culturation has been found to be significant in previous studies, including those by Hill, Loch, Straub, and El-Sheshai (1998). The extent to which individuals are exposed to advanced technologies in foreign, developed countries has proved to have a significant effect on the use of technology. With reference to Straub et al.’s (2001) categorization of technological culturation, this research included informal technological culturation, which is related to the individual consumer rather than to employees in the workplace. The items included in this construct were adopted from Straub et al.’s (2001) study. This research studied the effect of technological culturation on behavioral intention. It was hypothesized that:

> H11. Technological culturation has a positive and significant effect on behavioral intention to use smartphones.

Culture-specific beliefs and values

Straub et al. (2001) defined culture-specific beliefs and values as “those specific beliefs, values and meanings that are thought to have a downstream effect on the use of information systems.” However, the culture-specific belief ‘time for planning’ may not apply to smartphone adoption, as there is no time required for planning by the individual user. Culture-specific beliefs and values were found to be important in the studies conducted by Hill et al. (1998), Loch et al. (2003), and Straub et al. (2001). This construct was expected to be significant for Arab users due to the nature and characteristics of Arab culture; therefore, it was included in this research. Straub et al. (2001) used the “Arab sense of time” as the basis for culture-specific beliefs and values; however, they state that other aspects of culture related to technology adoption can also

be applied and studied. Straub et al. (2001) found that culture-specific beliefs and values have an effect on IT system outcomes, which the authors refer to as the actual use or intention to use a technology system. Direct and face-to-face meetings are a priority in Arab culture (Rose & Straub, 1998). However, a high number of respondents in a more recent survey conducted in Arab countries by Alshaer and Salem (2013) reported that online communication has replaced traditional communication. This shows that the use of technology in the region has brought about some changes to Arab culture. Technology may already be changing some aspects of Arab people's social lives and many different market sectors (Sabbagh, Mourad, Kabbara, Shehadi, & Samman, 2012). Therefore, it can be argued that people in Arab countries may not object to technology (mobile)-mediated meetings. In the present research, the measure for culture-specific beliefs and values took the form of a preference for either face-to-face or technology-mediated meetings, as this preference was expected to be related to behavioral intention to use smartphones and could be tested at the level of the individual user. It was hypothesized that:

> H12. Culture-specific beliefs and values have a positive and significant effect on behavioral intention to use smartphones.

National IT development

The present framework included a new construct: national IT development. This construct has been defined by Straub et al. (2001) as follows: "specific technology policies that guide the development of information systems in a specific country together with the existing structure of computing and communication capabilities and the ability of the population to operate and utilize these capabilities. The overall construct reflects the level of support for technological development within a given nation." Although this construct was not tested in Straub et al.'s (2001) study, it may well apply to the case of Arab people's use of smartphones. The construct

refers to national IT policies and technological infrastructure. It includes an analysis of the effect of the development of ICT systems and policies in Arab countries on consumers' behavioral intention towards use.

We investigated young Arabs' opinions on tariffs, restrictions, taxations, privatization, and competition in IT industries. We also explored their perceptions of current supply and demand for IT. Understanding young consumers' perspectives on how national IT development and policies affect their behavioral intention to use smartphones and actual use of smartphones is important, because their views allow mobile-phone companies and policymakers to make the necessary changes to enable a better exploitation of the possibilities available through smartphones. The level of IT development, policy, and infrastructure varies among Jordan, Iraq, and the U.A.E. Therefore, it was expected that these variations and their effect on behavioral intention to use smartphones and the actual use of smartphones would be revealed in more depth from young people's perspective. Compared with more developed countries, in the countries studied national IT development is different in terms of privatization, competition, taxation, supply, and demand (GSMA, 2014). The effect of this construct on actual use was also tested in this research, because this construct was expected to affect how young people use their smartphones. For example, mobile tariffs and restrictions may affect the frequency of use or the use of different mobile applications. The measures related to this construct were adopted from Loch et al.'s (2003) study. It was hypothesized that:

> H13. National IT development has a positive and significant effect on behavioral intention to use smartphones.
>
> H14. National IT development has a positive and significant direct effect on the actual use of smartphones.

The final proposed model is shown in Figure 1.

<Figure 1.>

Method and results

Survey development and administration

Quantitative data were collected from participants in the three countries at one point in time. An examination of the relationships between the variables in the conceptual framework was then conducted. The survey method has been widely used to study the adoption of various technologies (e.g., Hernandez, Jimenez, & Martín, 2009; Kim & Forsythe, 2009). The questionnaire was originally written in English; therefore, it was translated into Arabic by a professional.

The first section of the questionnaire included questions on demographics in order to obtain personal information, including age and gender. The purpose of the second section of the questionnaire was to ascertain whether the respondents used smartphones and how often they used various mobile services. This was assessed using the 7-point Likert scale for frequency of use adopted by Venkatesh et al. (2012). The third section included statements relating to the constructs (the items for each construct) that were included in the research model. This aimed to provide an understanding of young people's behavioral intention to use smartphones and to enable us to make predictions about future use. The statements in this section were related to the use of smartphones and applications. Following Venkatesh et al.'s (2012) study, this section also included statements using a 7-point Likert scale (1 = strongly disagree; 7 = strongly agree). The items used to measure each construct can be found in Appendix A.

A pilot study using 47 questionnaires was carried out in Iraq to ensure the validity of the instrument and, more precisely, the content. Pilot testing was also important for checking

the translated Arabic version of the questionnaire. After conducting the pilot study, the order of some of the constructs in the questionnaire was changed and the wording of some of the questions and statements (the items of the constructs) in the questionnaire was amended in order to help the respondents to answer the questions easily.

Sampling

The 2014 GSMA report states that one in five people in the region is aged 15–24 and over 60% of the population is under 30 years old (GSMA, 2014). This study included participants aged 18–29 who were residents in the Arab countries studied. This age group represents the early adopters of any new smartphone on the market and includes users with high potential in terms of use.

Multi-stage cluster sampling is common in research carried out in developing countries (Yansaneh, 2005). Area sampling is one type of multi-stage cluster sampling (Sekaran, 2003). This sampling technique is appropriate when no list of target units is available. It was particularly useful for this research, which covered a large geographical area. The questionnaires were distributed face to face in the following major cities in each country: Amman (Jordan), Dubai (U.A.E.), and Erbil (Iraq). When a household had more than one individual within the target age group, only one individual was selected. This helped to ensure that the respondents had different characteristics and that bias was reduced, as individuals living in the same household may have provided similar responses.

There were three target districts in each city: Amman Qasabat, Marka, and Wadi Essier (Amman); Al-Twar, Jumeirah, and Al-Barshaa (Dubai); and Shaqlawa, Erbil City, and Koya (Erbil). The questionnaires were distributed to individuals aged 18–29 in all communities in these selected districts. Based on Yamane's (1967) formula, the sample size in each country was 400 plus 25%: 533 in total. The number of completed questionnaires was 398 in Iraq, 429

in Jordan, and 437 in the U.A.E. As the required sample size must be reached, when a household did not include participants with the target age range, the researcher approached another household. As discussed earlier in this section, another potential problem with the sample of a household survey is the possibility of having households with more than one person aged 18–29 years. Where this was the case, only one person from the household was selected.

We ensured that all data obtained from the questionnaires were kept anonymous and destroyed after use. No names or other core personal details of the participants were obtained.

Sample characteristics

All the respondents were between 18 and 29 years old. In Iraq, 46.7% of the respondents were aged 18–22 and 53.3% were aged 23–29. The Iraqi sample was balanced in terms of gender (male, 51%; female, 49%). In Jordan, 38.9% were aged 18–22 and 61.1% were aged 23–29. In terms of gender, 46.9% were male and 53.1% were female. In the U.A.E., the sample was distributed almost evenly between the two age groups: 51.7% were aged 18–22 and 48.3% were aged 23–29. In terms of gender, 52.9% were male and 47.1% were female. All the participants from Iraq, Jordan, and the U.A.E. owned a smartphone.

Partial least squares – structural equation modeling

The data collected from each country were analyzed separately to test the model in each country. This enabled us to examine whether it is possible to use a single model to explain and predict smartphone adoption and use in the three countries studied and understand the differences in how the model fits in each country.

Unlike reflective measures, formative measures are not assessed using reliability and construct validity (convergent and discriminant validity) (Hair, Hult, Ringle, & Sarstedt, 2014). They are assessed based on their weights rather than their loadings. There were ten independent

variables in the research model. With reference to Jarvis, MacKenzie, and Podsakoff's (2003) criteria, performance expectancy, effort expectancy, social influence, habit, facilitating conditions, price value, culture-specific beliefs and values, and enjoyment are reflective constructs, while national IT development and technological culturation are formative constructs. Technological culturation was acknowledged as a formative construct in Loch et al.'s (2003) study. There were also two dependent variables: behavioral intention (which is a reflective construct) and actual use (which is a formative construct), as acknowledged by Venkatesh et al. (2012).

The model in each country was assessed using partial least squares – structural equation modeling (PLS-SEM). This was done in two main stages. The first stage involved assessing the measurement model of the reflective constructs by using convergent validity, discriminant validity, and reliability (Hair et al., 2014). The formative measurement model was assessed using collinearity tests and significance and relevance. The second stage involved the assessment of the structural model. This included evaluating the path coefficients, the effect size (f^2), and the predictive relevance (Q^2).

Partial least squares – multi-group analysis (PLS-MGA) was also used to analyze the differences in how the model fitted in the three countries included in the study. The PLS-MGA is a non-parametric approach that was introduced by Henseler (2007) and Henseler, Ringle and Sinkovics (2009). It was adopted in this research using the partial least squares (PLS) path analysis for each subsample (group). The data collected from the three countries in this research were not normally distributed. The PLS-MGA results (bootstrapping procedure for 500 samples) were obtained from SmartPLS.

Results of the reflective measurement model

The measurement model for the reflective constructs in this research was assessed using validity and reliability tests (Hair et al., 2014). The collected data were analyzed using PLS and saved in comma separated value format for compatibility with the requirements of SmartPLS software. The sample size was inputted to the PLS algorithm settings.

Convergent validity was assessed using average variance extracted (AVE), Cronbach's alpha, and composite reliability for each reflective construct. The AVE values should exceed the minimum threshold of 0.50 (Hair et al., 2014). In this research, the AVE for all reflective constructs exceeded 0.50. Cronbach's alpha exceeded the minimum threshold of 0.70 for all reflective constructs in all samples, and the composite reliability for each of the reflective constructs was well above 0.70. In addition, factor loadings were assessed. The loadings should be 0.70 or above (Hair et al., 2014). In this research, all reflective measurement items with loadings greater than 0.70 were retained. In the Iraqi sample, only three items were deleted: for facilitating conditions (FC) FC6 (0.635), for price value (PV) PV1 (0.671), and PV6 (0.679). All the remaining items loaded significantly (from 0.761 to 0.904). In the Jordanian sample, three items were below the threshold value of 0.70: PV5 (0.524), PV6 (0.546), and FC6 (0.619). These were removed. The remaining items had high loadings (from 0.761 to 0.904) and were retained. In the U.A.E. sample, the results showed that some indicators had loadings lower than 0.70: for enjoyment (Enj) Enj1 (0.190), PV5 (0.416), PV6 (0.541), FC6 (0.486), and for perceived relative advantage (PRA) PRA4 (0.583). These were deleted. All other items loaded significantly (from 0.761 to 0.961).

The second criterion for evaluating discriminant validity was the Fornell–Larcker criterion. In this assessment, a construct should share more variance with its own indicators than it shares with the other constructs. The square root of each construct's AVE was greater than its highest correlation with any other constructs among all three samples.

Results of the formative measurement model

To ensure that there were no collinearity issues in the formative constructs, the variance inflation factor (VIF) was assessed. VIF measures the degree of collinearity between latent variables. The VIF was calculated for the formative constructs in this research, which were actual use, national IT development, and technological culturation. The VIF value should be below 5 and the tolerance value should be higher than 0.20 (Hair et al., 2014). Collinearity was assessed in statistical package for the social sciences (SPSS) software. The collinearity diagnosis was conducted using behavioral intention as a dependent variable in linear regression. The VIF values of the formative indicators were all below 5. They ranged from 2.582 to 1.248 in the Iraqi sample, from 1.387 to 4.090 in the Jordanian sample, and from 1.170 to 3.223 in the U.A.E. sample. In addition, the tolerance values for all formative indicators were higher than 0.20. This showed that collinearity did not present a problem in any of the samples.

In order to assess the significance of the formative indicators, the bootstrapping procedure was run in SmartPLS software with 5,000 samples and no sign changes at a significance level of 0.05 ($p \leq 0.05$). As suggested by Hair et al. (2014), when the outer loading is less than 0.5 but is significant, researchers should carefully consider whether to remove or retain the indicator, as this affects the content validity of the construct. All the formative indicators in the model in the samples for Iraq and the U.A.E. were significant, so they were all retained. In the Jordanian sample, two formative indicators were deleted. The first of these was m-commerce, as the outer weight was insignificant ($p = 0.591$) and the outer loading was less than 0.5 (0.100) and insignificant ($p = 0.131$). The second was mobile banking, as the outer weight was insignificant ($p = 0.775$) and the outer loading was less than 0.5 (0.085) and insignificant ($p = 0.253$).

Assessment of the structural model

The first step in assessing the structural model was to test whether there were any collinearity issues. This was carried out using the same rule that was used for assessing collinearity in the formative measurement model. Accordingly, each set of predictor constructs was assessed separately for each section of the structural model. The first assessment included effort expectancy, perceived relative advantage, enjoyment, habit, price value, culture-specific beliefs and values, facilitating conditions, technological culturation, national IT development, social influence, and the dependent variable of behavioral intention. The second assessment included behavioral intention, habit, national IT development, facilitating conditions, and the dependent variable of actual use. The results showed that the VIF values of the independent variables with the dependent variables were satisfactory in the samples from all countries.

The path coefficients between the latent variables can be evaluated based on their magnitude and significance. The path coefficients represent the hypothesized relationships in the model. Using the path coefficients and their significance level (*p*) (Hair et al., 2014), the path coefficients for the structural model were obtained using the bootstrapping procedure (500 samples). The structural model was set to assess 14 paths (H1 to H14) for the model. Table 1 shows the results of assessing the structural model in each sample.

<Table 1. >

Model fit in Iraq

The results of the analysis from the Iraqi sample showed that, in general, the participants accepted and used smartphones. All the participants were smartphone users. This shows that Arab customers in Iraq are adopting and using smartphones. Therefore, hypothesis H1 was supported for the Iraqi sample. The R^2 value for behavioral intention was 0.776, which means

that the model can explain 78% of the variance in behavioral intention. In addition, the R^2 value for actual use was 0.413, meaning that the model can explain 41% of the variance in actual use.

The path coefficient from behavioral intention to actual use was significant (path coefficient = 0.401, p = 0.000). This shows that behavioral intention is a significant predictor of actual use. Thus, H1 was supported. With regard to H2, the coefficient of the path from perceived relative advantage to behavioral intention was significant (path coefficient = 0.124, p = 0.011). Therefore, H2 was supported. The coefficient of the path from effort expectancy to behavioral intention was significant (path coefficient = 0.127, p = 0.016). Hence, effort expectancy had a significant effect on behavioral intention. The coefficient of the path from social influence to behavioral intention was not significant (path coefficient = 0.024, p = 0.531). Thereby, H3 was rejected. With regard to H5, the coefficient of the path from facilitating conditions to behavioral intention was not significant (path coefficient = -0.028, p = 0.454). Therefore, facilitating conditions had no significant impact on behavioral intention and H5 was rejected. With regard to H6, the coefficient of the path from facilitating conditions to actual use was not significant (path coefficient = -0.010, p = 0.848). Accordingly, H6 was rejected. The coefficient of the path from enjoyment to behavioral intention was not significant (path coefficient = -0.044, p = 0.182). Therefore, H7 was rejected. With regard to H8, the coefficient of the path from price value to behavioral intention was significant (path coefficient = 0.189, p = 0.000). Therefore, H8 was supported. The results showed that there was a significant relationship between habit and behavioral intention (path coefficient = 0.196, p = 0.000). Therefore, H9 was supported. The coefficient of the path from habit to actual use was significant (path coefficient = 0.220, p = 0.004). Therefore, H10 was supported. With regard to H11, the coefficient of the path from technological culturation to behavioral intention was significant (path coefficient = 0.289, p = 0.000). Therefore, H11 was supported. The coefficient of the path from culture-specific beliefs and values to behavioral intention was significant (path

coefficient = 0.094, $p = 0.047$). Therefore, H12 was supported. The results showed that national IT development has a significant effect on behavioral intention, as the path coefficient was significant (path coefficient = 0.122, $p = 0.009$). Therefore, H13 was supported. Although national IT development had a significant effect on behavioral intention, it did not have any significant effect on actual use. The path coefficient is not significant (path coefficient = 0.094, $p = 0.251$); therefore, H14 was rejected.

Based on the above results, technological culturation is the most significant factor affecting behavioral intention, followed by habit, price value, national IT development, perceived relative advantage, effort expectancy, and, finally, culture-specific beliefs and values. Behavioral intention and habit have significant effects on actual use of smartphones but not on national IT development.

Model fit in Jordan

Following the same procedure, some factors were found to have a significant effect on behavioral intention and use in the final model for smartphone adoption in Jordan. National IT development was the most significant factor affecting behavioral intention in the model, followed by habit. This was followed by price value, enjoyment, culture-specific beliefs and values, perceived relative advantage, and effort expectancy. Behavioral intention, habit, and national IT development had significant effects on the actual use of smartphones. Facilitating conditions and social influence had no significant effects within the model in Jordan. In the Jordanian sample, the R^2 values for the endogenous variables in the model (behavioral intention and actual use) were 0.777 and 0.510, respectively. This means that the model can explain 78% of the variance in behavioral intention and 51% of the variance in actual use. Therefore, the model has a higher predictive power than the model for the Iraqi sample with regard to explaining the variance in actual use.

Model fit in the U.A.E.

Following the same procedure, some factors were found to have a significant effect on behavioral intention and use in the final model for smartphone adoption in the U.A.E. In this country, national IT development was the most significant factor affecting behavioral intention to use smartphones. This was followed by price value, enjoyment, habit, perceived relative advantage, culture-specific beliefs and values, and, finally, effort expectancy. Behavioral intention and national IT development were predictors of actual use of smartphones in the U.A.E. Facilitating conditions and social influence had no significant effects in the model in the U.A.E. In the sample from the U.A.E., the R^2 value for behavioral intention was 0.783, indicating that the model can explain 78% of the variance in this factor. The R^2 value for actual use was 0.476, indicating that the model can explain 48% of the variance.

Multi-group analysis

The PLS-MGA test was used to compare the significance of the paths within each of the three pairs: the U.A.E. versus Jordan, Jordan versus Iraq, and Iraq versus the U.A.E. The PLS-MGA is based on estimating the path model for each group which, in turn, is assessed based on a separate bootstrap analysis. The analysis in this approach relies on assessing the observed distribution of the bootstrap outcomes instead of making distributional assumptions (Henseler et al., 2009). The centred bootstrap estimates of the groups are compared, then the difference between the groups is divided by the total number of bootstrap samples to indicate the probability that the second group is greater than the first group, and is evaluated using the p value (Henseler et al., 2009). *P* values of 0.05 or lower or 0.95 or higher indicate significant differences between the paths in the groups (Henseler et al., 2009). The results of the PLS-MGA test (Table 2) showed that some of the significance of the paths differed among the

groups. Mainly, the model in Iraq fitted differently from the model in the other two countries. The results showed that the significance of the following paths differed between the model in Iraq and the model in the U.A.E.: enjoyment → behavioral intention (p = 1.000), habit → actual use (p = 0.010), national IT development → behavioral intention (p = 0.990), national IT development → actual use (p = 0.951), and technological culturation → behavioral intention (p = 0.999). In addition, three paths differed significantly between the model in Iraq and the model in Jordan: enjoyment → behavioral intention (p = 0.999), national IT development → behavioral intention (p =0.990), and technological culturation → behavioral intention (p =1.000). The only path that differed significantly between the models in Jordan and in the U.A.E. was habit → actual use (p = 0.976). While national IT development was the most significant predictor of behavioral intention in both Jordan and the U.A.E., technological culturation was the most significant predictor of behavioral intention in Iraq. Table 2 shows the results of the comparison between the three groups.

<Table 2. >

Discussion

The primary aim of this research was to propose and examine a conceptual model to explain which factors can predict behavioral intention to use smartphones and the actual use of smartphones by young people in Iraq, Jordan, and the U.A.E. This research has made a significant contribution to filling a gap in the literature by conducting cross-national research within the context of the Arab region. This research has provided a comprehensive validation of the UTAUT2 (Venkatesh et al., 2012) by broadening its scope in Arab countries within the context of smartphone adoption and use. The three Arab countries included in this research have different political, social, economic, and technological characteristics. These have

provided clear insights into the current state of smartphone adoption and use in the Arab region and deepened understanding of how the proposed model fits in different countries in the region.

The model included two cultural constructs that apply to young Arab consumers: technological culturation, and culture-specific beliefs and values. In this research, culture-specific beliefs and values were represented by a preference for face-to-face meetings as opposed to technology-mediated meetings (Straub et al., 2001; Loch et al., 2003). The results showed that culture-specific beliefs and values had a strong effect on behavioral intention in all three countries studied. Therefore, they were significant to young people's behavioral intention towards the use of smartphones. Previous studies have shown that Arab people prefer face-to-face meetings (Hill et al., 1998; Rose & Straub, 1998; Straub et al., 2001). However, the findings of this research indicate that young Arab people in all three countries do not object to technology-mediated meetings. Rather, the findings indicate that the inclusion of cultural factors specific to consumers in Arab countries and the technology under investigation is important, even for young consumers, who seem to be more influenced by the integration of technology into their daily lives.

Technological culturation was insignificant in Jordan and the U.A.E. In Iraq, a country that has been through several wars and faced a severe political situation for many years, technological culturation was the most significant factor. This is consistent with the findings of Straub et al. (2001) and Loch et al. (2003). Users in Iraq are seen as "isolated" from countries that are more technologically advanced (Brach, 2010). From the perspective of these users, being more open to technology advancement is important. By contrast, in Jordan, technological culturation was insignificant. A possible reason for this could be that the Jordanian telecommunications market is open; the country has privatized the incumbent operator and international companies are investing in it (Hakim and Neaime, 2014). The case in the U.A.E. is similar, as young users in the U.A.E. are already open to and exposed to countries that are

more advanced. The categorization in Brach's (2010) study of users in the U.A.E. as "consumers" provides further support for and validates this argument. The finding that technological culturation is important in Iraq but not in Jordan or the U.A.E. suggests that technological culturation is an important factor when users are based in an Arab country that is less technologically advanced and less open to foreign companies or to countries that are more advanced.

In addition, the inclusion of the country's national IT development was important. This factor was found to be a significant determinant of behavioral intention to use smartphones in all three countries, despite their differences in ICT structure and policy, which indicates that it is relevant to young people's adoption of smartphones in Arab countries. Indeed, national IT development was the most significant predictor of behavioral intention in Jordan and the U.A.E., while in Iraq the most significant predictor was technological culturation. Furthermore, based on the studies conducted by Straub et al. (2001) and Loch et al. (2003), and because the research was conducted in Arab countries (where, in general, ICT is less developed than in developed countries), national IT development was also included as a predictor of actual use. While this factor had a significant effect on actual use in Jordan and the U.A.E., it did not have a significant effect in Iraq. Within the context of the research model in Iraq, national IT development had a significant effect on behavioral intention only. A reason for this is that users in Iraq have mostly experienced poor levels of ICT infrastructure and policy environment. In Jordan and the U.A.E., young people are aware of the importance of the development of ICT on their behavioral intention to use smartphones and their actual use of smartphones. Surprisingly, the results of this research revealed that national IT development had a more significant effect on behavioral intention than perceived relative advantage (usefulness) and effort expectancy in all three countries. This is inconsistent with previous studies, which

emphasized the importance of usefulness and ease of use (e.g., Davis, 1989; Rogers, 2003; Taylor & Todd, 1995a; Taylor & Todd, 1995b).

Price value was a significant factor in all three countries, which is consistent with the findings of Kamel and Farid (2007). Social influence and facilitating conditions were insignificant in all three countries. Social influence was expected to have a significant effect on behavioral intention due to the collectivistic nature of Arab culture (Hofstede, 2001). The fact that it was not significant indicates that a cultural shift may have taken place from collectivism to individualism as new technologies have encouraged users to adopt new modern cultural values (as found in ASDA'A Burson-Marsteller, 2014) in relation to smartphone adoption and use. Alternatively, it could be that social influence is important in mandatory settings but not in voluntary settings (Venkatesh & Davis, 2000). In addition, the insignificance of social influence within the context of smartphone adoption could be due to users' high levels of awareness and experience of this technology, as smartphones are the most widely used technology product in Arab countries.

Habit had a direct significant effect on actual use in the model in Iraq and Jordan, but it did not in the U.A.E. Limayem et al. (2007) explained that in order for people to develop habits, two conditions must be satisfied: (1) the action must be repeated (on a weekly basis, as a minimum); and (2) the environment in which the action is repeated must be stable. For the respondents in the U.A.E., only the first condition was met. Young Arabs in the U.A.E. use smartphones regularly. The findings of this research indicate that within a rapidly changing technological environment (such as the one in the U.A.E.), and especially among young Arab users, the effect of habit becomes conceptualized as stored intention towards the use of smartphones. In contrast, users in Iraq and Jordan experience fewer environmental changes in terms of smartphones and new technologies, which may explain the stronger effect of habit on actual use.

The findings with regard to enjoyment differed among the three countries. While enjoyment was found to be a significant predictor of behavioral intention to use smartphones in Jordan and the U.A.E., it was not found to be significant in the model in Iraq. Given the type of culture in Iraq, which is low in indulgence in terms of Hofstede's cultural dimensions, and considering the political situation, which can affect young people's perceptions of enjoyment, this result was found to be reasonable. Enjoyment and perceived relative advantage were both found to be important in the model in Jordan and in the U.A.E. Unlike the studies by Igbaria et al. (1996) and Teo et al. (1999), in which usefulness was found to be more important than enjoyment, the findings of this research indicate that enjoyment is more important than usefulness in the U.A.E. and Jordan. This may be due to the fact that the sample included only young people, who may be more hedonistic.

The items that were removed from some of the constructs in the model differed among the three countries. This further confirms that the model fits differently in each country. The model had an acceptable explanatory power in all the studied countries. Nevertheless, it is culturally bound. Although there is a certain level of similarity, Arab countries in general, and the countries studied in particular, differ in their social, cultural, economic, political, and ICT infrastructure. This limits the possibilities of developing a single generic model that has the same fit in all three countries. Nevertheless, the factors of perceived relative advantage, effort expectancy, national IT development, habit, price value, culture-specific beliefs and values, and behavioral intention were significant in all three countries. Social influence and facilitating conditions were insignificant in all three countries.

This research extended the UTAUT2 by including national IT development, which was significant in all three countries. The culture-specific beliefs and values factor was also significant in all three countries. Technological culturation was the most significant factor for behavioral intention in Iraq, but it was not the most significant factor in the other two countries.

Managerial implications

Understanding consumer behavior and preference is at the heart of marketing. The final model in each country included in this research will help telecommunications companies (specifically, mobile companies) currently operating or willing to operate in the region to understand which characteristics are most important within the context of smartphone adoption and use. These companies should consider these factors in their marketing strategies when targeting young people, who form the largest segment of the population in these countries. Mobile companies, handset manufacturers and mobile applications developers need to understand that beyond the two traditional factors in the TAM (usefulness and ease of use of smartphones), other, possibly more important, factors highlighted in this research can affect behavioral intention to use smartphones and the actual use of smartphones by young people in Arab countries.

Price value proved to be significant in all three countries. Therefore, it is important for mobile companies, handset manufacturers, and policymakers to ensure that the prices of mobile handsets, mobile Internet, and applications are reasonable in comparison with the benefits they provide. New pricing policies related to tariffs are also required in all three countries investigated in this research.

Policymakers need to provide a transparent regulatory environment that is easy for consumers to understand and evaluate. This will enhance national IT development, which was found to have a significant influence on behavioral intention to use smartphones and the actual use of smartphones.

The findings of this research indicate that young people in Arab countries do not object to technology-mediated meetings. Therefore, it is important to enable the full use of mobile messaging applications that facilitate these meetings, such as Skype, Viber, FaceTime, and WhatsApp. Furthermore, mobile and marketing companies can concentrate on supporting these

mobile applications for technology-mediated meetings in the three countries included in the study.

Since enjoyment was found to be significant from the consumer perspective in Jordan and the U.A.E., mobile applications developers are encouraged to focus on developing mobile applications for enjoyment and entertainment, such as mobile gaming, for young people in Jordan and the U.A.E.

In Iraq, openness to more technologically advanced countries and the training provided by foreign companies is required. Since technological culturation was found to be highly significant for users in Iraq, it is important for mobile companies in Iraq to collaborate with foreign and international companies or handset manufacturers to provide training and new events to ensure that users are aware of all the options available when using smartphones.

Limitations

Because there was no accurate and up-to-date data on the population of young Arabs in each selected city and district in this research, the sampling frame was not accurate. The selected sample size was appropriate for the PLS analysis. However, this sample still limits the possibility of generalizing the results and findings of this research. The context of this research was consumers in urban areas (major cities in three countries). Therefore, the findings cannot be generalized to include consumers in rural areas, as there are significant differences between consumers in urban and rural areas in terms of their access to technology, experience in using technology, access to ICT infrastructure, education level, and economic and social backgrounds. However, this research creates a new avenue for future studies to be conducted in rural areas in these countries.

Future research

Future studies can test the model proposed in Figure 1 in Arab countries to explore whether social influence and facilitating conditions are significant in any other countries. The model developed in this research should be tested in other Arab countries, using actual consumers of smartphones (rather than students or employees), in order for researchers to be able to make accurate comparisons between their results those obtained in this research. Furthermore, it would be interesting to carry out more cross-cultural and cross-national research in other Arab countries to provide further insights into the similarities and differences between these countries. It would also be interesting to test the model using other technologies in order to ascertain whether it applies to these. Future studies that conduct cross-cultural or cross-national research are encouraged to test their models by analyzing the data collected from each country separately to obtain accurate results. This is important for understanding the differences in technology adoption and use among Arab countries and between Arab and developed countries.

Conclusion

This research has proposed a new model for predicting smartphone adoption and use. The model was developed by extending the UTAUT2 to include factors related to the cultural attributes associated with young people's adoption and use of smartphones in Arab countries, and a factor related to IT development at a national level. The proposed model fitted differently in the three countries included in the study, indicating that: (1) national differences affect the model's fit even when the research is conducted in countries within a single region; and (2) it is not possible to develop one generic model that fits in exactly the same way in the three Arab countries studied. Therefore, the model can be seen as culturally bound, even within the context of Arab countries. Nevertheless, the proposed model has been proved to be applicable in Iraq, Jordan, and the U.A.E. and it has an acceptable explanatory power in all three countries.

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<Appendix A>

Appendix A: Items for each construct and their sources

Item by variable	Source
Facilitating conditions	
FC1. I have the resources necessary to use mobile phones.	Venkatesh et al. (2012)
FC2. I have the resources necessary to use mobile applications.	Authors' own
FC3. I have the knowledge necessary to use mobile phones.	Venkatesh et al. (2012)
FC4. I have the knowledge necessary to use mobile applications.	Authors' own
FC5. My mobile phone is compatible with other technologies I use.	Venkatesh et al. (2012)
FC6. I can get help from others when I have difficulties in using mobile phones.	Venkatesh et al. (2012)
Enjoyment	
Enj1. Using mobile phones is fun.	Venkatesh et al. (2012)
Enj2. Using mobile phones is enjoyable.	Venkatesh et al. (2012)
Enj3. Using mobile phones is very entertaining.	Venkatesh et al. (2012)
Price value	
PV1. Mobile phones are reasonably priced.	Venkatesh et al. (2012)

PV2. Mobile applications are reasonably priced.	Authors' own
PV3. My mobile phone is good value for money.	Venkatesh et al. (2012)
PV4. Mobile applications are good value for money.	Authors' own
PV5. At the current price, mobile phone provides a good value.	Venkatesh et al. (2012)
PV6. At current prices, mobile applications provide good value.	Authors' own

Social influence

SI1. People who are important to me think I should use mobile phones.	Venkatesh et al. (2012)
SI2. People who influence my behavior think I should use mobile phones.	Venkatesh et al. (2012)
SI3. People whose opinions that I value prefer that I use mobile phones.	Venkatesh et al. (2012)

Habit

HT1. The use of mobile phones has become a habit for me.	Venkatesh et al. (2012)
HT2. I am addicted to using mobile phones.	Venkatesh et al. (2012)
HT3. I must use mobile phones.	Venkatesh et al. (2012)

Perceived relative advantage (PRA) (usefulness)

PRA1. I find that a mobile phone is useful in my daily life.	Venkatesh et al. (2012)
PRA2. Using a mobile phone helps me to achieve things more quickly.	Venkatesh et al. (2012) and Moore and Benbasat (1991)
PRA3. Using a mobile phone helps me to stay connected to people.	Authors' own
PRA4. Using a mobile phone makes it easier to carry out my daily activities.	Moore and Benbasat (1991), with minor modifications
Effort expectancy (EE)	
EE1. Learning how to use mobile phones is easy for me.	Venkatesh et al. (2012)
EE2. Learning how to use mobile applications is easy for me.	Authors' own
EE3. My interaction with mobile phones is clear and understandable.	Venkatesh et al. (2012)
EE4. I find mobile applications easy to use.	Authors' own
EE5. It is easy for me to become skillful at using mobile phones.	Venkatesh et al. (2012)
Behavioral intention to use the smartphone (BI)	
BI1. I intend to continue using mobile phones in the future.	Venkatesh et al. (2012)

BI2. I will always try to use mobile phones in my daily life.	Venkatesh et al. (2012)
BI3. I plan to continue to use mobile phones frequently.	Venkatesh et al. (2012)
BI4. I envisage using mobile phones in the future.	Authors' own

Actual use (USE)

The usage frequency for each of the following: a. Mobile phone (for making calls) b. SMS c. Mobile Internet d. Games e. Mobile e-mail f. Mobile messaging apps (e.g., Viber, Skype or WhatsApp) g. Mobile social media h. Mobile banking i. M-commerce.	Initially adopted from Venkatesh et al.'s (2012) study. Additional items related to mobile services are the author's own

Culture-specific beliefs and values (CSBV)

CSBV1. The fact that a mobile phone supports technology-mediated meetings is an important element in its ultimate success or failure.	Originally adopted from Straub et al. (2001), with some modifications to fit

	face-to-face vs. technology-mediated meetings and smartphone adoption
CSBV2. My focus on technology-mediated meetings is a factor in the final outcome.	Originally adopted from Straub et al. (2001), with some modifications to fit face-to-face vs. technology-mediated meetings and smartphone adoption
CSBV3. I prefer technology (mobile) mediated meetings rather than face-to-face meetings.	Authors' own, based on Straub et al. (2001)
Technological culturation (TC)	
TC1. I find that due to the extent of travel for pleasure it is important to use technology.	Straub et al. (2001)
TC2. I find that reading in foreign technology journals supports the use of technology.	Straub et al. (2001)
TC3. I find that training provided from foreign companies in my country is helpful for using technology.	Authors' own
National IT development (ND)	
ND1. I find that the current demand for IT is high.	Loch et al. (2003)

ND2. I find that the current supply of IT is high.	Loch et al. (2003)
ND3. Government IT initiatives in policy making are working well.	Loch et al. (2003) (with adjustments)
ND4. I find current mobile tariffs acceptable.	Loch et al. (2003)
ND5. I find that currently there are no restrictions to using different mobile applications.	Based on Loch et al. (2003) with some modifications to test restrictions on mobile applications

Table 2. PLS-MGA (non-parametric) test results for the three countries (group comparisons).

Path	Path coefficients: diff (U.A.E. – Jordan)	Path coefficients: diff (Iraq – U.A.E.)	Path coefficients: diff (Iraq – Jordan)	*p*-value (U.A.E. vs. Jordan)	*p*-value (Iraq vs. U.A.E.)	*p*-value (Iraq vs. Jordan)
BI → USE	0.079	0.049	0.128	0.279	0.363	0.176
CSBV → BI	0.045	0.014	0.059	0.757	0.595	0.793
EE → BI	0.009	0.025	0.016	0.541	0.355	0.417
ENJ → BI	0.026	0.164	0.137	0.274	1.000	0.999
FC→ BI	0.057	0.070	0.012	0.106	0.939	0.599
FC → USE	0.018	0.108	0.090	0.416	0.910	0.868
HT → BI	0.002	0.065	0.063	0.516	0.120	0.121
HT → USE	0.173	0.219	0.047	0.976	0.010	0.315
ND → BI	0.020	0.160	0.180	0.590	0.990	0.990
ND → USE	0.001	0.194	0.195	0.504	0.951	0.921
PRA → BI	0.035	0.012	0.022	0.300	0.565	0.368
PV → BI	0.026	0.092	0.066	0.362	0.905	0.833
SI → BI	0.026	0.012	0.039	0.215	0.387	0.197
TC →BI	0.024	0.347	0.323	0.702	0.999	1.000

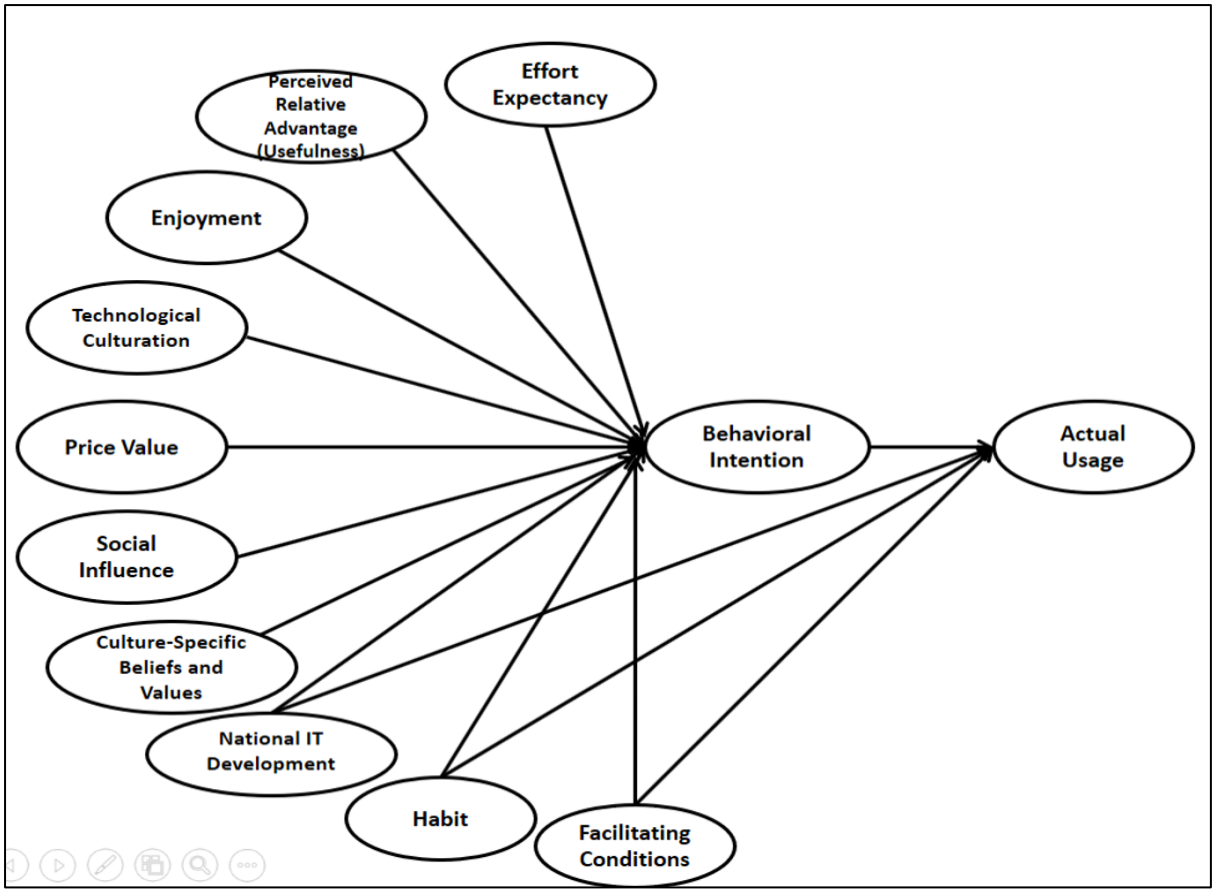

Figure 1. Conceptual model

Table 1. Structural model assessment results for the Iraqi, Jordanian and U.A.E. samples.

Hypothesis	Iraq			Jordan			U.A.E.		
	Path coefficient	Significance level	*p*-value	Path coefficient	Significance level	*p*-value	Path coefficient	Significance level	*p*-value
BI → USE (H1)	0.401	***	0.000	0.284	**	0.005	0.382	***	0.000
PRA → BI (H2)	0.124	*	0.011	0.099	*	0.021	0.164	***	0.001
EE → BI (H3)	0.127	*	0.016	0.125	*	0.024	0.114	**	0.010
SI → BI (H4)	0.024	NS	0.531	-0.012	NS	0.664	0.007	NS	0.646
FC → BI (H5)	-0.028	NS	0.454	-0.019	NS	0.630	0.029	NS	0.183
FC → USE (H6)	-0.010	NS	0.848	0.072	NS	0.247	0.051	NS	0.238
ENJ → BI (H7)	-0.044	NS	0.182	0.099	**	0.002	0.120	***	0.000
PV → BI (H8)	0.189	***	0.000	0.197	***	0.001	0.217	***	0.000
HT → BI (H9)	0.196	***	0.000	0.137	***	0.000	0.133	***	0.000
HT → USE (H10)	0.220	**	0.004	0.175	**	0.009	0.046	NS	0.298
TC → BI (H11)	0.289	***	0.000	-0.022	NS	0.511	-0.043	NS	0.132
CSBV → BI (H12)	0.094	*	0.047	0.160	**	0.008	0.110	**	0.002
ND → BI (H13)	0.122	**	0.009	0.306	***	0.000	0.285	***	0.000
ND → USE (H14)	0.094	NS	0.251	0.285	**	0.006	0.292	***	0.000

Notes: *Significant at $p \leq 0.05$; **Significant at $p \leq 0.01$; ***Significant at $p \leq 0.001$; NS = Not significant
behavioral intention (BI), culture-specific beliefs and values (CSBV), effort expectancy (EE), enjoyment (Enj), facilitating conditions (FC), habit (HT), perceived relative advantage (PRA), price value (PV), technological culturation (TC), national IT development (ND) and social influence (SI).