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# TOWARDS CLOSING GENDER GAPS IN ARAB COUNTRIES: UNDERSTANDING GENDER DIFFERENCES IN SMARTPHONE ADOPTION AND USE IN IRAQ

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**Abstract**

*This paper examines gender differences in Iraq in terms of smartphone adoption and use, with a specific focus on the factors that can affect women's adoption and use of smartphones. The research used the mobile phone acceptance and use model proposed by Ameen et al. (2015). In total, 533 questionnaires were distributed to consumers aged 18–29 and the data were analysed using partial least squares structural equation modelling. The findings revealed that three factors in the model had significantly different effects on the behavioural intention of groups of men and women. These factors were culture-specific beliefs and values, habit, and perceived relative advantage. The model fitted well with both groups, but the order of significance of the factors differed between them. The findings indicate that when targeting Iraqi women, other factors in addition to price must be considered.*

**Keywords**: Gender gap in Iraq, gender differences, digital inclusion, smartphone adoption, young Arab customers, UTAUT2

## 1. Introduction

The role of gender cannot be neglected when studying technology adoption and use (Gefen and Straub, 1997; Venkatesh et al., 2000; Wang et al., 2011). It is important that mobile services are tailored to the needs of the individual consumer (Ghazizadeh, 2012). Terzis and Economides (2011) found that there are major differences between males and females in terms of adopting and using technology. Furthermore, the 2015 GSMA (Group Special Mobile Association) report highlighted that the pattern of women's use of mobile phones is

often different from that of men (GSMA, 2015a). In addition, Sabri et al. (2011) indicated that differences exist in terms of gender in the context of mobile phone adoption in Arab countries. Gender differences are more apparent in Arab countries than in other countries in the world due to the nature of Arab culture (El-Louadi and Everard, 2004). It can be argued that addressing gender differences in mobile phone adoption and use is crucial in the case of developing countries, in particular Arab countries, because of the cultural restrictions that women face in these countries. While in Western countries a large number of women have jobs, significantly fewer women in the Middle East are employed or working for themselves (Elborgh-Woytek et al., 2013). In their previous research, Venkatesh et al. (2003) and Venkatesh et al. (2012) found significant differences between males and females in terms of which factors have the strongest effect on technology adoption. Gender, within the context of Arab countries, was expected to be a significant moderating factor in this research. This is because of the large differences between males and females in terms of need and usage patterns.

The importance of addressing gender gaps in mobile phone adoption and use was highlighted by GSMA (2015b). A large gender gap still exists in Arab countries in terms of ICT adoption and use (GSMA, 2014). In fact, when considering the most accessible technological product, the mobile phone, Iraq has the biggest gender gap among all the Arab countries: only 20% of Iraqi mobile phone users are female (GSMA, 2014). The wide gender gap in Iraq is the result of several cultural, economic and political factors. The gender gap in terms of women's participation in the labour force is higher in Iraq than it is in other Arab countries (European Parliament, 2014). For example, the labour force participation rate for women aged 15–24 is 8%, while for men it is 48% (World Bank, 2016). In addition, according to the World Bank's 2015 report, Iraq is ranked as having the seventh highest number of legal gender differences in terms of the economy (World Bank, 2015). Furthermore, although Iraqi women are interested in using technology, they generally suffer from a lack of access to it (Ameen and Willis, 2016b).

The use of mobile phones is considered as a means for Arab women and, more specifically, Iraqi women to be independent and secure (Ameen and Willis, 2016b). Ameen and Willis (2016a) proposed that using mobile phones can help to reduce the negative effects of the cultural barriers and restrictions faced by women in Arab countries, including Iraq. In addition, the effective use of smartphones and the various services that can be accessed through these devices can help these women to be economically independent, as they can run

a business and gain power through the use of different mobile services (GSMA, 2015a; Ameen and Willis, 2016a). The digital inclusion of women through the use of the services available via smartphones is crucial in order for their voices to be heard (GSMA, 2015a). Therefore, understanding the differences between Arab males and females in terms of smartphone adoption and use can enable mobile companies to develop and use improved targeting techniques, which are crucial to narrowing the gender gap.

The main aim of this research is to examine the differences between males and females in terms of smartphone adoption and use in Iraq. The research focuses on the factors that can affect Iraqi women's adoption and use of smartphones. This research provides important findings that can help to reduce the gender gap in Iraq in the adoption and use of mobile phones and the mobile services that can be accessed through smartphones; for example, m-Internet, m-social media, m-learning, m-health and m-commerce, in addition to other voice over Internet protocol (VOIP) services, such as Viber, WhatsApp and FaceTime. The findings provide an important understanding of gender differences for academics who conduct future studies on technology adoption in Iraq. The findings are also important for mobile companies, enabling them to increase customer satisfaction by understanding the needs and preferences of different segments of customers, specifically women. Addressing the issues mentioned above will also help mobile companies in Iraq to gain profit following the drop in revenue that they have experienced since 2013 (GSMA, 2015b).

The next section of this paper provides background information on the status of the mobile market in Iraq. This is followed by an explanation of the conceptual framework of this research and the proposed hypotheses. The third section sets out the methodology adopted in this research, and the fourth section provides the results of the data analysis. This is followed by a discussion of the results. Finally, the conclusions, limitations and recommendations of this research are set out, along with recommendations for future research.

## 2. The status of the mobile market in Iraq

Iraq is the third-largest mobile market in the Arab region (GSMA, 2014). The population of Iraq in 2014 was 34.8 million, with a GDP purchasing power parity of 494.5 billion US dollars (ASDA'A Burson-Marsteller, 2015). Iraq is a lower-middle-income country in which people in general are on a low income (Rohwerder, 2015). In Iraq, the mobile cellular subscription rate per 100 people was 95 in 2014 (World Bank, 2016) and the smartphone adoption rate was 17% in 2015 (GSMA, 2015b). Iraq is starting to move towards 3G

networks. Nevertheless, mobile operators in Iraq have experienced the highest fall in revenue among operators in all the Arab countries: revenue fell by 12% in 2014 in comparison to 2013 (GSMA, 2015b).

The main mobile operators in Iraq are Asiacell, Zain and Korek (Connect Arab Summit, 2012; Kamli, 2012; Khayyat and Heshmati, 2013). Korek and Asiacell have both introduced special deals and tariffs, including Internet services, for the youth segment of their customers. In an attempt to address the issue of the gender gap in mobile phone use in Iraq, Asiacell launched an additional line for female users called Almas (GSMA, 2015a). The company revealed some positive results after launching this line (GSMA, 2015a), but a gender gap still exists. The company was relying heavily on the price factor, so it reduced the cost of calls in accordance with the call patterns found when women use mobile phones. In addition, the company added a blocking service, which women can use to avoid harassment (GSMA, 2015a). Nevertheless, it can be argued that other factors, which are possibly more important than price, have to be studied and taken into account.

## 3. Proposed model and development of hypotheses

Ghazizadeh (2012) contended that the existing theories and models related to technology adoption are not conclusive and other factors which have not been considered in any of them need to be included. Halaweh (2015) found that the majority of previous studies conducted on technology adoption in Arab countries used or extended TAM and examined the use of a single technology. However, TAM on its own is insufficient to fully explain technology adoption, as its constructs are too general (Fang et al., 2005; Rouibah and Hamdy, 2009). In fact, Bagozzi (2007) further discussed the limitations of the extensions of TAM such as UTAUT (Venkatesh et al., 2003), claiming that the high number of independent variables makes the measuring process complicated and still not completely sufficient to understand the full picture of technology adoption. However, Venkatesh et al. (2003) stated that UTAUT can be adjusted according to the technology in use. Within the context of this research, this is mobile phone adoption. Baabdullah et al. (2013) carried out an extensive review of the existing body of literature related to consumers' ICT adoption in Saudi Arabia, analysing mobile phone technology and m-government adoption. The authors found that UTAUT2 can very well be applied to studying technology adoption in the Middle East (more precisely Saudi Arabia). However, the authors suggested that the model could be modified and extended by adding new constructs applicable to the context of Arab consumers' adoption.

This research adopts the mobile phone acceptance and use model (MPAUM) proposed in previous research conducted by Ameen et al. (2015). The model includes the factors that can predict behavioural intention and actual use of smartphones by young Arab people aged 18–29. The model is based on combining the extended unified theory of acceptance and use of technology (UTAUT2) (Venkatesh et al., 2012) and the cultural influence model of information technology transfer (Straub et al., 2001). The MPAUM includes the following factors: effort expectancy (EE), perceived relative advantage (usefulness) (PRA), price value (PV), habit (HT), social influence (SI), facilitating conditions (FCs), enjoyment (Enj), technological culturation (TC), national IT development (ND), and culture-specific beliefs and values (CSBVs). The two dependent factors in the model are behavioural intention (BI) and actual use (USE), as shown in Figure 1 below.

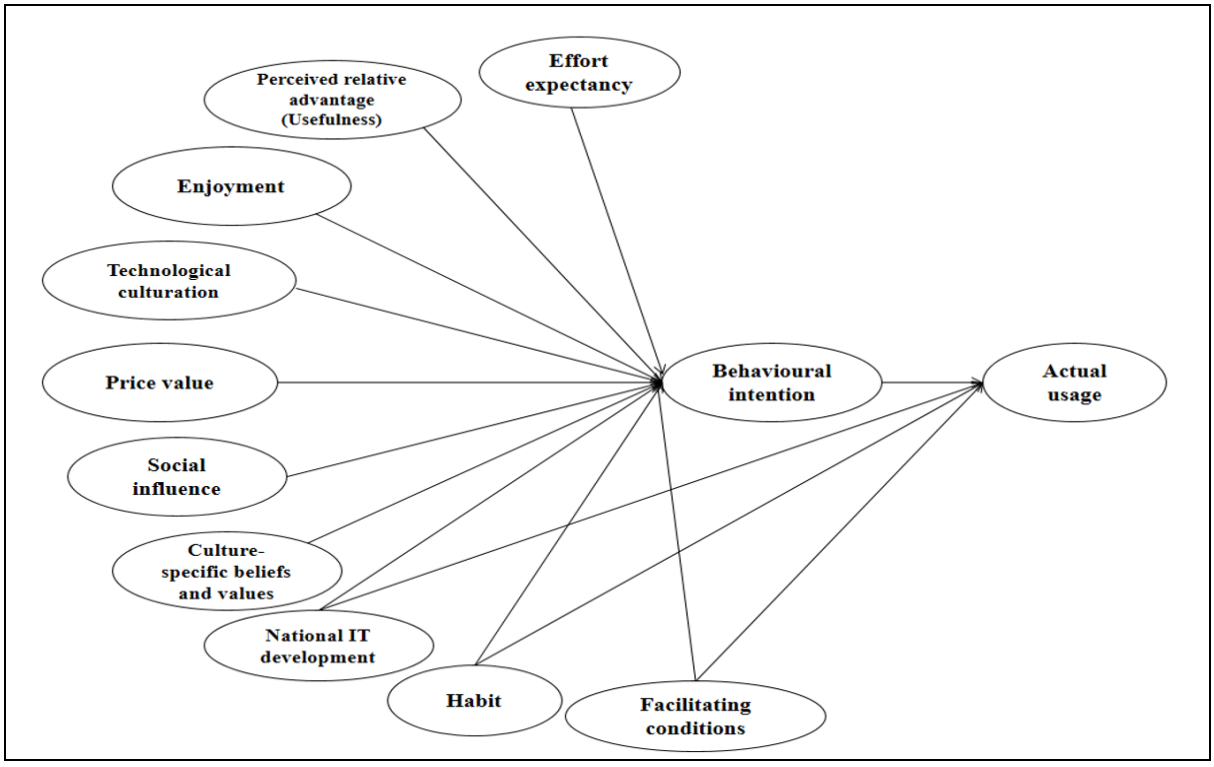


Figure 1: Mobile phone acceptance and use model (MPAUM)

Performance Expectancy (PE) has been defined as 'the degree to which using a technology will provide benefits to consumers in performing certain activities' (Venkatesh et al., 2012). Perceived usefulness has been found to be more significant for men than for women, while women are more influenced by perceived ease of use and social norms (Venkatesh and Morris, 2000). Previous studies have shown that perceived usefulness is a significant determinant of behavioural intention (Davis, 1989; Adams et al., 1992; Davis and Venkatesh,

1996). However, Moore and Benbasat (1991) suggested that the term ‘relative advantage’ is more detailed and perceptive to the user. Therefore, in this research, the term ‘perceived relative advantage’ was used to represent the term ‘performance expectancy’ in UTAUT2 (Venkatesh et al., 2012). Venkatesh et al. (2003) found that the effect of performance expectancy is stronger among men. Thus:

*H1*. Gender moderates the effect of PRA (usefulness) on BI so that the effect is stronger among men.

Effort expectancy (EE) has been defined as ‘the degree of ease associated with consumers’ use of technology’ (Venkatesh et al., 2012). Venkatesh et al. (2003) found that the effect of effort expectancy is stronger among women. Thus:

*H2*. Gender moderates the effect of EE on BI so that the effect is stronger among women.

Social influence (SI) 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). Previous research has found that women are likely to adopt a certain behaviour if it has been adopted by people around them (Gefen and Straub, 1997; Venkatesh et al., 2000; Wang et al., 2011). Venkatesh et al. (2003) found that the effect of social influence on behavioural intention is influenced by gender, as it is stronger among women. Thus:

*H3*. Gender moderates the effect of SI on BI so that the effect is stronger among women.

Facilitating conditions (FCs) have been defined as ‘consumers’ perceptions of the resources and support available to perform a behaviour’ (Venkatesh et al., 2012). Facilitating conditions were hypothesised to significantly affect behavioural intention and actual use (Venkatesh et al., 2012). Gender was found to be significant when studying the effect of facilitating conditions (Venkatesh et al., 2012), as the effect is more significant for women. Thus:

*H4*. Gender moderates the effect of FC on BI so that the effect is stronger among women; and

*H5*. Gender moderates the effect of FC on USE so that the effect is stronger among women.

Venkatesh et al. (2012) defined hedonic motivation as ‘the fun or pleasure derived from using a technology, and it has been shown to play an important role in determining technology

acceptance and use'. This definition is derived from Brown and Venkatesh's (2005) study. The effect of enjoyment on behavioural intention is stronger among men (Venkatesh et al., 2012). Thus:

*H6*. Gender moderates the effect of Enj on BI so that the effect is stronger among men.

Price value (PV) 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). This factor refers to consumers' evaluation of the cost of the product and its benefits. If the benefits outweigh the costs, the PV will be positive (Venkatesh et al., 2012). Men use mobile phones more than women do due to the gender gap in mobile phone adoption. Furthermore, fewer women work in Arab countries than there are in other countries (Elborgh-Woytek et al., 2013). Therefore, price value was expected to have a stronger effect amongst women. Venkatesh et al. (2012) found that the effect of gender on price value means that price value has a stronger effect on behavioural intention among women. Thus:

*H7*. Gender moderates the effect of PV on BI so that the effect is stronger among women.

Based on Limayem et al.'s (2007) study, habit (HT) was defined by Venkatesh et al. (2012) as 'the extent to which people tend to perform behaviors automatically because of learning'. Gender was found to moderate the effect of habit, which is stronger among men (Venkatesh et al., 2012). Thus:

*H8*. Gender moderates the effect of HT on BI so that the effect is stronger among men; and

*H9*. Gender moderates the effect of HT on USE so that the effect is stronger among men.

Technological culturation (TC) has been defined as 'influential experiences that individuals have had with technologically advanced cultures' (Straub et al., 2001). Women in Arab countries do not travel as frequently as men do and, by law, they cannot travel unless their husbands agree (Kirdar, 2010). Therefore, the model included the effect of informal technological culturation. Informal technological culturation in terms of interacting with friends and family and travelling abroad for business or pleasure was proved to be significant in Straub et al.'s (2001) study. Within the context of the Arab countries, technological culturation can take another form. The telecom markets in Arab countries need to be open to foreign telecom companies to invest in, which may, in turn, provide people in these countries with the opportunity to be introduced to and experience new advanced technologies in a

different and less costly way. The items of this construct were adopted from Straub et al.'s (2001) study and include extent of travel for business, extent of travel for pleasure, extent of contact with family and members residing abroad, and reading foreign technology journals. Therefore, it can be contended that the effect of technological culturation is stronger among men.

*H10*. Gender moderates the effect of TC on BI so that the effect is stronger among men.

In this research, culture-specific beliefs and values (CSBVs) took the form of face-to-face versus technology-mediated meetings, as this was expected to be related to mobile phone adoption and it was tested at the level of individual users. Straub et al. (2001) defined CSBVs in their model as 'those specific beliefs, values and meanings that are thought to have a downstream effect on the use of information systems'. Arab people are known for their preference for face-to-face meetings (Enterprise Ireland, 2013). Gender differences exist in Arab culture: women are less powerful and less independent than men (Kirdar, 2010) and they are more reserved. Therefore, it can be contended that the preference for face-to-face meetings is stronger among men. This infers that the preference for technology-mediated meetings is stronger among women, especially when they are more restricted than men.

*H11*. Gender moderates the effect of CSBVs on BI so that the preference for mobile-mediated meetings is stronger among women

National IT Development (ND) was defined by Straub et al. (2001) as '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.'. Men use technology products, including mobiles, more than women in developing countries (Gill et al., 2012). In addition, in the Middle East men have the main responsibility for their families (Kirdar, 2010) and use mobile phones more than women do. Therefore, the effect of national IT development was expected to be stronger among men. The model proposed by Ameen et al. (2015) hypothesised that national IT development would have a significant effect on behavioural intention and actual use. Thus:

*H12*. Gender moderates the effect of ND on BI so that the effect is stronger among men; and

H13. Gender moderates the effect of ND on USE so that the effect is stronger among men.

## 4. Methodology

In order to understand the phenomenon under study, and since the main aim of this research is to examine the differences between males and females in terms of smartphone adoption and use in Iraq, a questionnaire was used. In total, 533 questionnaires were distributed face-to-face to young Arabs aged 18–29 in households in the city of Erbil. Young people form a large segment of the population in Iraq (UNDP, 2014), which means that this age group is more representative of the population. The questionnaires were distributed using multi-stage cluster sampling in which three districts were selected in the city of Erbil.

This research adopted probability sampling by using multistage cluster sampling. Multistage cluster sampling is suitable for research taking place in large geographical areas (Bryman and Bell, 2011). The questionnaires were distributed in three districts in Erbil: Erbil City, Koya and Shaqlawa. Full ethical approval was obtained prior to the data collection. After the data screening process, 398 fully completed questionnaires were obtained.

Unlike reflective measures, formative measures are not assessed using reliability and construct validity (convergent and discriminant validity) (Hair et al., 2014). There were 10 independent variables in the research model. With reference to Jarvis et al.'s. (2003) criteria, PE, EE, SI, HT, FCs, PV, CSBVs and Enj are reflective constructs, while ND and TC are formative constructs. TC was acknowledged as a formative construct in Loch et al.'s (2003) study. There were also two dependent variables: BI, which is a reflective construct, and USE, which is a formative construct, as acknowledged by Venkatesh et al. (2012).

The analysis of the collected data was conducted using partial least squares structural equation modelling over two stages. The first stage involved the analysis of the measurement model, including the reflective measurement model and the formative measurement model (Hair et al., 2014). The second stage included the analysis of the structural model and the multi-group analysis, taking gender into consideration as a moderating factor by using the non-parametric partial least squares multi-group analysis (PLS-MGA) (Henseler, 2007; Henseler et al., 2009).

The questionnaire included questions about respondents' demographic information and whether they owned a mobile phone. This was followed by a section that included the items for each construct, as shown in Appendix A.

# 5. Results

In terms of the descriptive statistics, all the respondents were between 18 and 29 years old: 46.7% were aged 18–22 while 53.3% were aged 23–29. Furthermore, the sample was balanced in terms of gender, as 51% was male and 49% was female. All the respondents were smartphone users and owned a smartphone.

## 5.1 Assessment of the reflective measurement model

The assessment of the reflective measurement model involved evaluating the convergent validity, discriminant validity and reliability of the reflective constructs (Hair et al., 2014). The AVE (Average Variance Extracted) for all reflective constructs exceeded the minimum threshold of 0.50. Cronbach's alpha exceeded the minimum threshold of 0.70 for all reflective constructs (Table 1), ranging from 0.765 to 0.909. This showed that the results are satisfactory in terms of Cronbach's alpha (Sekaran, 2003). This is also the minimum threshold value for composite reliability, which should also be 0.70 or higher (Hair et al., 2014). The results displayed in Table 1 show that the composite reliability for each of the reflective constructs is well above 0.70, ranging from 0.863 to 0.932. Reliability was measured using both Cronbach's alpha and composite reliability (Sekaran, 2003; Hair et al., 2014). The results for both tests were satisfactory.

Table 1: Overview of results for convergent validity and reliability

| | AVE | Cronbach's alpha | Composite reliability |
|---|---|---|---|
| BI | 0.710 | 0.864 | 0.907 |
| CSBVs | 0.727 | 0.816 | 0.888 |
| EE | 0.734 | 0.909 | 0.932 |
| ENJ | 0.786 | 0.865 | 0.917 |
| FCs | 0.643 | 0.861 | 0.900 |
| HT | 0.678 | 0.765 | 0.863 |
| PV | 0.752 | 0.890 | 0.924 |
| PRA | 0.754 | 0.891 | 0.925 |
| SI | 0.753 | 0.836 | 0.901 |

In addition, factor loadings were assessed. Factor 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. Only three items were deleted (including FC6, PV1 and PV6), as they were below 0.70 (0.635, 0.671 and 0.679, respectively). All items loaded significantly (loadings ranged from 0.761 to 0.904), as shown in Table 2.

Table 2: Factor loadings

| | BI | CSBVs | EE | ENJ | FCs | HT | PV | PRA | SI |
|---|---|---|---|---|---|---|---|---|---|
| BI1 | 0.846 | | | | | | | | |
| BI2 | 0.854 | | | | | | | | |
| BI3 | 0.852 | | | | | | | | |
| BI4 | 0.820 | | | | | | | | |
| CSBV1 | | 0.873 | | | | | | | |
| CSBV2 | | 0.890 | | | | | | | |
| CSBV3 | | 0.791 | | | | | | | |
| EE1 | | | 0.851 | | | | | | |
| EE2 | | | 0.892 | | | | | | |
| EE3 | | | 0.888 | | | | | | |
| EE4 | | | 0.817 | | | | | | |
| EE5 | | | 0.835 | | | | | | |
| Enj1 | | | | 0.858 | | | | | |
| Enj2 | | | | 0.898 | | | | | |
| Enj3 | | | | 0.902 | | | | | |
| FC1 | | | | | 0.775 | | | | |
| FC2 | | | | | 0.805 | | | | |
| FC3 | | | | | 0.827 | | | | |
| FC4 | | | | | 0.839 | | | | |
| FC5 | | | | | 0.761 | | | | |
| HT1 | | | | | | 0.852 | | | |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| HT2 | | | | | | 0.776 | | | |
| HT3 | | | | | | 0.841 | | | |
| PV2 | | | | | | | 0.840 | | |
| PV3 | | | | | | | 0.885 | | |
| PV4 | | | | | | | 0.877 | | |
| PV5 | | | | | | | 0.866 | | |
| PRA1 | | | | | | | | 0.871 | |
| PRA2 | | | | | | | | 0.904 | |
| PRA3 | | | | | | | | 0.873 | |
| PRA4 | | | | | | | | 0.824 | |
| SI1 | | | | | | | | | 0.855 |
| SI2 | | | | | | | | | 0.884 |
| SI3 | | | | | | | | | 0.864 |

Discriminant validity was assessed by examining the cross-loadings for each construct, as they should load higher on their own indicators than on the indicators of the other constructs (Chin, 1998). This was the case in this sample, as shown in Table 3.

Table 3: Cross-loadings

| | BI | CSBVs | EE | ENJ | FCs | HT | PV | PRA | SI |
|---|---|---|---|---|---|---|---|---|---|
| BI1 | 0.846 | 0.579 | 0.591 | 0.363 | 0.454 | 0.582 | 0.551 | 0.585 | 0.395 |
| BI2 | 0.854 | 0.576 | 0.564 | 0.379 | 0.455 | 0.549 | 0.594 | 0.587 | 0.457 |
| BI3 | 0.852 | 0.523 | 0.470 | 0.394 | 0.439 | 0.613 | 0.630 | 0.508 | 0.425 |
| BI4 | 0.820 | 0.458 | 0.509 | 0.359 | 0.482 | 0.580 | 0.547 | 0.536 | 0.422 |
| CSBV1 | 0.628 | 0.873 | 0.480 | 0.411 | 0.393 | 0.428 | 0.423 | 0.506 | 0.438 |
| CSBV2 | 0.566 | 0.890 | 0.390 | 0.412 | 0.361 | 0.436 | 0.413 | 0.455 | 0.472 |
| CSBV3 | 0.380 | 0.791 | 0.226 | 0.366 | 0.253 | 0.320 | 0.325 | 0.255 | 0.385 |
| EE1 | 0.556 | 0.429 | 0.851 | 0.383 | 0.606 | 0.447 | 0.397 | 0.687 | 0.287 |
| EE2 | 0.520 | 0.351 | 0.892 | 0.360 | 0.646 | 0.440 | 0.395 | 0.664 | 0.274 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| EE3 | 0.564 | 0.387 | 0.888 | 0.308 | 0.643 | 0.454 | 0.376 | 0.667 | 0.314 |
| EE4 | 0.475 | 0.348 | 0.817 | 0.292 | 0.565 | 0.393 | 0.361 | 0.562 | 0.228 |
| EE5 | 0.588 | 0.403 | 0.835 | 0.331 | 0.532 | 0.404 | 0.381 | 0.602 | 0.263 |
| Enj1 | 0.323 | 0.380 | 0.316 | 0.858 | 0.350 | 0.366 | 0.234 | 0.341 | 0.398 |
| Enj2 | 0.368 | 0.373 | 0.353 | 0.898 | 0.357 | 0.401 | 0.263 | 0.417 | 0.408 |
| Enj3 | 0.464 | 0.470 | 0.367 | 0.902 | 0.385 | 0.503 | 0.333 | 0.427 | 0.449 |
| FC1 | 0.377 | 0.315 | 0.434 | 0.282 | 0.775 | 0.327 | 0.350 | 0.403 | 0.314 |
| FC2 | 0.418 | 0.316 | 0.516 | 0.348 | 0.805 | 0.374 | 0.361 | 0.437 | 0.306 |
| FC3 | 0.458 | 0.318 | 0.626 | 0.349 | 0.827 | 0.393 | 0.338 | 0.544 | 0.311 |
| FC4 | 0.476 | 0.334 | 0.670 | 0.356 | 0.839 | 0.447 | 0.356 | 0.569 | 0.320 |
| FC5 | 0.433 | 0.340 | 0.524 | 0.311 | 0.761 | 0.419 | 0.320 | 0.478 | 0.307 |
| HT1 | 0.639 | 0.438 | 0.469 | 0.422 | 0.447 | 0.852 | 0.475 | 0.456 | 0.395 |
| HT2 | 0.452 | 0.331 | 0.307 | 0.396 | 0.322 | 0.776 | 0.390 | 0.290 | 0.316 |
| HT3 | 0.586 | 0.383 | 0.436 | 0.387 | 0.429 | 0.841 | 0.451 | 0.500 | 0.389 |
| PV2 | 0.531 | 0.352 | 0.372 | 0.257 | 0.317 | 0.475 | 0.840 | 0.363 | 0.323 |
| PV3 | 0.614 | 0.431 | 0.430 | 0.291 | 0.408 | 0.463 | 0.885 | 0.426 | 0.383 |
| PV4 | 0.584 | 0.388 | 0.344 | 0.275 | 0.360 | 0.456 | 0.877 | 0.334 | 0.359 |
| PV5 | 0.651 | 0.420 | 0.398 | 0.279 | 0.396 | 0.470 | 0.866 | 0.414 | 0.399 |
| PRA1 | 0.606 | 0.453 | 0.613 | 0.429 | 0.536 | 0.467 | 0.437 | 0.871 | 0.468 |
| PRA2 | 0.579 | 0.411 | 0.691 | 0.375 | 0.562 | 0.458 | 0.370 | 0.904 | 0.398 |
| PRA3 | 0.595 | 0.447 | 0.690 | 0.409 | 0.525 | 0.472 | 0.405 | 0.873 | 0.371 |
| PRA4 | 0.495 | 0.415 | 0.588 | 0.345 | 0.499 | 0.385 | 0.323 | 0.824 | 0.366 |
| SI1 | 0.413 | 0.414 | 0.300 | 0.379 | 0.336 | 0.351 | 0.366 | 0.436 | 0.855 |
| SI2 | 0.430 | 0.444 | 0.272 | 0.404 | 0.307 | 0.397 | 0.380 | 0.396 | 0.884 |
| SI3 | 0.465 | 0.464 | 0.263 | 0.449 | 0.365 | 0.418 | 0.359 | 0.376 | 0.864 |

The second criterion for evaluating discriminant validity was the Fornell–Larcker criterion (Fornell and Larcker, 1981). In this assessment, a construct should share more variance with

its own indicators than it shares with the other constructs. Table 4 shows that the square root of each construct's AVE was greater than its highest correlation with any other constructs.

Table 4: Fornell–Larcker criterion

| | BI | CSBVs | EE | ENJ | FCs | HT | PV | PRA | SI |
|---|---|---|---|---|---|---|---|---|---|
| BI | 0.843 | | | | | | | | |
| CSBVs | 0.635 | 0.852 | | | | | | | |
| EE | 0.634 | 0.450 | 0.857 | | | | | | |
| ENJ | 0.444 | 0.466 | 0.392 | 0.886 | | | | | |
| FCs | 0.542 | 0.404 | 0.698 | 0.412 | 0.802 | | | | |
| HT | 0.689 | 0.471 | 0.500 | 0.486 | 0.492 | 0.824 | | | |
| PV | 0.689 | 0.461 | 0.446 | 0.318 | 0.429 | 0.537 | 0.867 | | |
| PRA | 0.658 | 0.497 | 0.744 | 0.450 | 0.611 | 0.515 | 0.445 | 0.869 | |
| SI | 0.504 | 0.509 | 0.320 | 0.475 | 0.388 | 0.449 | 0.424 | 0.463 | 0.868 |

Based on the above assessments of the reliability, convergent validity and discriminant validity of all the reflective constructs, it was concluded that the reflective measurement model is satisfactory in terms of reliability and validity.

### 5.2 Results of the formative measurement model

In order to ensure that there were no collinearity issues in the formative constructs, the variance inflation factor (VIF) was assessed. The VIF value should be below 5 (Kock, 2011) and the tolerance value should be higher than 0.20 (Hair et al., 2006). Collinearity was assessed in SPSS (Statistical Package for the Social Sciences) by using BI as a dependent variable in linear regression in order to conduct the collinearity diagnosis. As shown in Table 5, the VIF of the formative indicators ranged from 2.582 to 1.248, which showed that the VIF values for all formative indicators were below 5. In addition, the tolerance values for all formative indicators were higher than 0.20. This showed that collinearity did not present a problem in this sample.

Table 5: Collinearity assessment of formative indicators

| | Collinearity statistics | | | Collinearity statistics | |
|---|---|---|---|---|---|
| Model | Tolerance | VIF | Model | Tolerance | VIF |
| TC1 | 0.478 | 2.090 | CALLS | 0.801 | 1.248 |
| TC2 | 0.492 | 2.032 | SMS | 0.575 | 1.740 |
| TC3 | 0.551 | 1.813 | MOBINT | 0.478 | 2.093 |
| ND1 | 0.509 | 1.966 | GAMES | 0.416 | 2.405 |
| ND2 | 0.480 | 2.082 | MOBEMAIL | 0.387 | 2.582 |
| ND3 | 0.612 | 1.633 | MOBAPPS | 0.488 | 2.048 |
| ND4 | 0.485 | 2.061 | MOBSM | 0.592 | 1.690 |
| ND5 | 0.774 | 1.292 | MOBBANK | 0.677 | 1.476 |
| MCOMMERCE | 0.678 | 1.476 | | | |

To assess the significance of the formative indicators, the bootstrapping procedure was run in SmartPLS software with 5000 samples and no sign changes at a significance level of 0.05 ($p \leq 0.05$). The information in Table 6 shows that all the formative indicators were significant ($p \leq 0.05$) except MOBAPPS and ND5. ND3 was on the edge, as the p value was 0.05 but the outer loading was 0.659, which was well above the threshold of 0.5, so it was at an acceptable level. The outer weight of MOBAPPS was not significant ($p = 0.336$) but the outer loading was 0.506, so it was retained. The weight of ND5 was also insignificant ($p = 0.353$). Moreover, the outer loading was 0.462 (for absolute relevance), which is below the threshold of 0.5. Therefore, we tested the significance of the indicator's outer loading, which was significant ($p = 0.000$). As suggested by Hair et al. (2014), when the outer loading is less than 0.5 but significant, the researcher should carefully consider whether to remove or retain the indicator, as it affects the content validity of the construct. Returning to ND5, 'I find that currently there are no restrictions to using different mobile applications', the decision was taken to retain it, as the outer loading was significant. Moreover, there was theoretical support for the relevance of this indicator in terms of content validity (Hair et al., 2014).

Table 6: Results of outer weight significance testing

| | Outer weight (O) | Standard error (STERR) | T statistic (\|O/STERR\|) | Significance level | P value | Outer loading | P value for outer loading |
|---|---|---|---|---|---|---|---|
| CALLS -> USE | 0.281 | 0.070 | 1.966 | * | 0.027 | 0.896 | 0.025 |
| SMS -> USE | 0.384 | 0.097 | 3.957 | *** | 0.000 | 0.782 | 0.000 |
| GAMES -> USE | 0.350 | 0.094 | 3.718 | *** | 0.000 | 0.757 | 0.000 |
| MCOMMERCE -> USE | 0.279 | 0.059 | 2.270 | * | 0.015 | 0.028 | 0.041 |
| MOBAPPS -> USE | -0.106 | 0.097 | 1.090 | NS | 0.336 | 0.506 | 0.000 |
| MOBBANK -> USE | 0.270 | 0.056 | 2.254 | * | 0.030 | 0.081 | 0.021 |
| MOBEMAIL -> USE | 0.266 | 0.112 | 2.175 | * | 0.041 | 0.675 | 0.000 |
| MOBINT -> USE | 0.516 | 0.099 | 5.229 | *** | 0.000 | 0.868 | 0.000 |
| MOBSM -> USE | 0.265 | 0.094 | 2.190 | * | 0.036 | 0.483 | 0.000 |
| ND1 -> ND | 0.310 | 0.078 | 3.958 | *** | 0.000 | 0.816 | 0.000 |
| ND2 -> ND | 0.464 | 0.074 | 6.272 | *** | 0.000 | 0.874 | 0.000 |
| ND3 -> ND | 0.159 | 0.081 | 1.963 | * | 0.050 | 0.659 | 0.000 |
| ND4 -> ND | 0.276 | 0.078 | 3.537 | *** | 0.000 | 0.776 | 0.000 |
| ND5 -> ND | 0.050 | 0.053 | 0.929 | NS | 0.353 | 0.462 | 0.000 |
| TC1 -> TC | 0.537 | 0.063 | 8.483 | *** | 0.000 | 0.908 | 0.000 |
| TC2 -> TC | 0.317 | 0.071 | 4.498 | *** | 0.000 | 0.811 | 0.000 |
| TC3 -> TC | 0.321 | 0.066 | 4.846 | *** | 0.000 | 0.796 | 0.000 |

* Significance level $p \leq 0.05$. ** Significance level $p \leq 0.01$. *** Significance level $p \leq 0.001$.

NS = not significant

### 5.3 Assessment of the structural model for males and females

During the analysis of the structural model as a whole for both groups together, the factors Enj, FCs and SI were found to be insignificant in the model. In addition, ND did not have a significant direct effect on USE. The coefficient of the path from SI to BI was not significant (path coefficient = 0.024, p = 0.531). The coefficient of the path from FCs to BI was not significant (path coefficient = -0.028, p = 0.454). Therefore, FCs had no significant impact on BI. The coefficient of the path from FCs to USE was not significant (path coefficient = -0.010, p = 0.848). The coefficient of the path from Enj to BI was not significant (path coefficient = -0.044, p = 0.182). Therefore, these relationships were not included in the PLS-MGA in this research. All other relationships were found to be significant in the model for both groups.

The PLS-MGA was adopted to compare the groups and identify the differences between them in SmartPLS. The PLS-MGA introduced by Henseler (2007) and Henseler et al. (2009) as a non-parametric approach was adopted in this research using the PLS path analysis for each subsample (group) to test the hypotheses.

The gender variable was categorical. Two main subsamples (groups) were used: males (203 participants) and females (195 participants). Figures 2 and 3 show the measurement models for the group of male users and for the group of female users. Overall, the results showed that the loadings of the items of the variables were significant in both groups. The $R^2$ values for BI and USE for the group of males were 0.784 (78%) and 0.491 (49%), respectively. In addition, the $R^2$ values for BI and USE for the group of females were 0.802 (80%) and 0.363 (36%), respectively.

The results obtained from running the PLS-MGA procedure in SmartPLS are shown in Table 7. Table 7 shows that gender significantly moderated the paths of CSBVs -> BI (p = 1.000), HT -> BI (p = 0.045) and PRA -> BI (p = 0.050) but none of the remaining paths. Furthermore, the results showed that the effect of CSBVs on BI was stronger among females (path coefficient = 0.262) than males (path coefficient = -0.015). Therefore, *H11* was supported. However, the effect of HT on BI was stronger among males (path coefficient= 0.241). Accordingly, *H8* was also supported. Also, the relationship between PRA and BI had a greater impact on males (path coefficient = 0.170) than on females (path coefficient = 0.025). Thus, *H1* was supported. The remaining hypotheses were not supported, as gender was not a significant moderator for the rest of the relationships in the model.

For the group of females, the most significant determinant in the model was CSBVs, followed by TC, PV, EE and HT. HT did not have any significant effect on USE, and ND and PRA did not have any significant effect on BI. For the group of males, the most significant factor in the model was TC, followed by HT, PRA, PV and ND. CSBVs and EE were not significant and HT had a significant effect on USE.

Table 7: PLS-MGA results for the effect of gender moderators

| | $R^2$ Male users | $R^2$ Female users |
|---|---|---|
| BI | 0.784 (78%) | 0.802 (80%) |
| USE | 0.491 (49%) | 0.363 (36%) |

| Hypothesis | Relationship | Subsample (1) Male users | | | | Subsample (2) Female users | | | | Path coefficient – difference | p value (male users vs female users) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Path coefficient | Standard error | t value | p value | Path coefficient | Standard error | t value | p value | | |
| H11 | CSBVs -> BI | -0.015 | 0.055 | 0.276 | 0.783 | 0.262 | 0.061 | 4.261 | 0.000 | 0.277 | 1.000 |
| H2 | EE -> BI | 0.060 | 0.056 | 1.076 | 0.282 | 0.158 | 0.055 | 2.863 | 0.004 | 0.098 | 0.892 |
| H8 | HT -> BI | 0.241 | 0.051 | 4.685 | 0.000 | 0.112 | 0.054 | 2.066 | 0.039 | 0.128 | 0.045 |
| H9 | HT -> USE | 0.336 | 0.096 | 3.484 | 0.001 | 0.115 | 0.124 | 0.925 | 0.356 | 0.221 | 0.081 |
| H12 | ND -> BI | 0.155 | 0.063 | 2.447 | 0.015 | 0.034 | 0.066 | 0.512 | 0.609 | 0.121 | 0.092 |
| H1 | PRA -> BI | 0.170 | 0.058 | 2.922 | 0.004 | 0.025 | 0.071 | 0.352 | 0.725 | 0.145 | 0.050 |
| H7 | PV -> BI | 0.163 | 0.058 | 2.790 | 0.005 | 0.237 | 0.066 | 3.570 | 0.000 | 0.074 | 0.801 |
| H10 | TC -> BI | 0.322 | 0.066 | 4.849 | 0.000 | 0.282 | 0.074 | 3.805 | 0.000 | 0.040 | 0.342 |

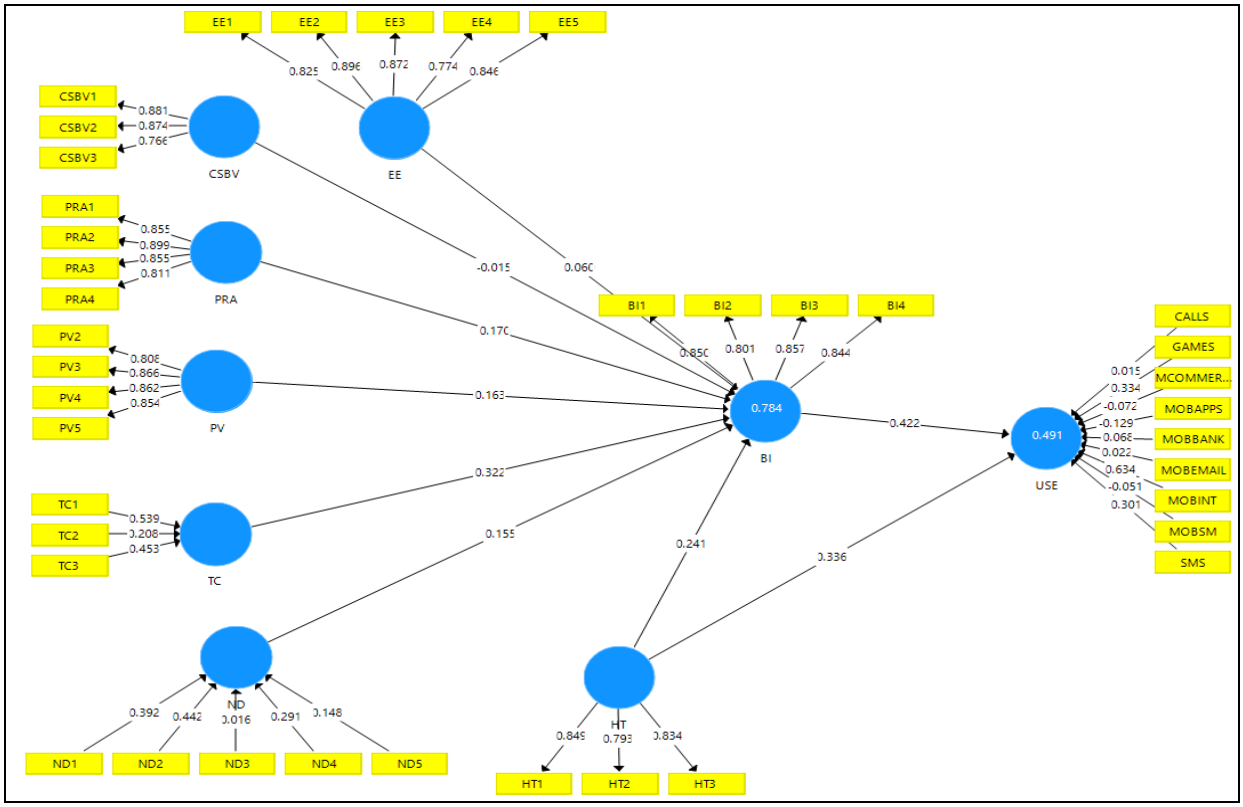


Figure 2: PLS-SEM model for male users

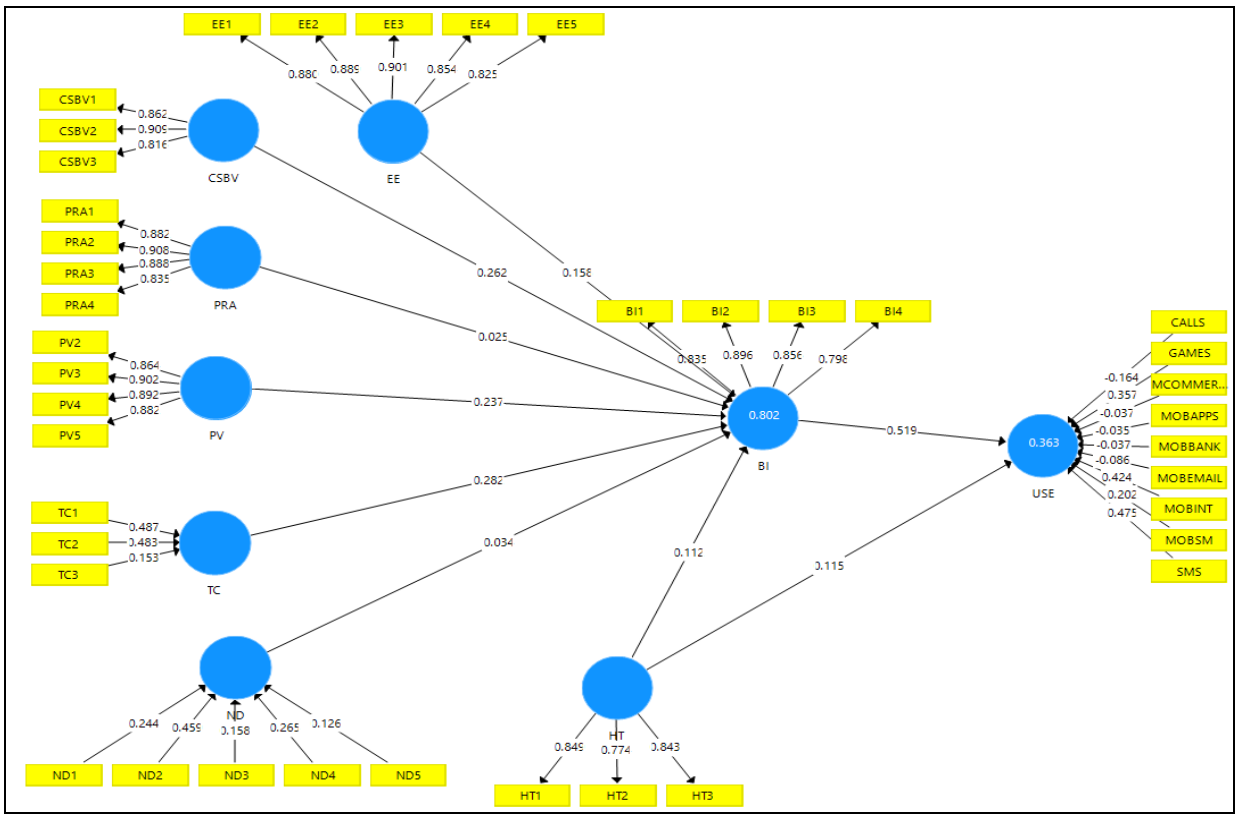


Figure 3: PLS-SEM model for female users

## 6. Discussion

The results showed that gender moderated three relationships in the model: perceived relative advantage and behavioural intention, culture specific beliefs and values and behavioural intention, and habit and behavioural intention. The effect of perceived relative advantage was significantly stronger amongst males. Furthermore, the factor culture specific beliefs and values had a significantly stronger effect on behavioural intention amongst females. In fact, the factor culture specific beliefs and values was the most significant predictor of behavioural intention in the model for Iraqi females, while it was the least significant factor (in fact, it was insignificant) for males. This means that females think that technology-mediated meetings are highly important for mobile phone adoption and use. This may be due to the wide gender gap in Iraq, as confirmed by previous reports (e.g., European Parliament, 2014; GSMA, 2014). In Iraq, women are more reserved than men and have fewer opportunities for face-to-face interaction.

With regard to the moderating effect of gender on the relationship between habit and behavioural intention, the results showed that the effect of habit on behavioural intention is significantly stronger amongst males, which is consistent with UTAUT2 (Venkatesh et al., 2012). Nevertheless, habit was a significant predictor of behavioural intention in the model for Iraqi women. Contrary to the findings of Venkatesh et al. (2012), while habit had a significant effect on actual use in the model for male users, it had no significant effect on actual use in the model for female users. A possible explanation for this is that women in Iraq use mobile phones less than men do.

Gender did not significantly moderate the remaining relationships in the model. However, the results did not contradict the hypotheses, as effort expectancy was more significant amongst women, national IT development was more significant amongst men, price value was stronger amongst women, and technological culturation was stronger amongst men. Originally, it was hypothesised that the effect of perceived relative advantage on behavioural intention would be stronger among males than amongst females, as found in UTAUT2 (Venkatesh et al., 2012). The results confirmed this, as perceived relative advantage was significantly stronger among men.

Examining the results from the group of females more closely revealed some interesting findings. While previous research showed that usefulness and ease of use are the most significant predictors of behavioural intention (Davis, 1989; Venkatesh et al., 2003;

Venkatesh et al., 2012), the findings of this research indicated that the factors perceived relative advantage and effort expectancy were not the most significant predictors in the model for Iraqi women. In fact, we found the factor perceived relative advantage to be insignificant in the model for females. This shows that the advantages of using mobile phones are not seen as important for females in Iraq and are not regarded as an important factor in the adoption and use of smartphones. This indicates that there is a lack of awareness among Iraqi women of the importance and usefulness of smartphones and the mobile services available through them. In addition, while national IT development did not have a significant effect on behavioural intention in the model for female users, it was significant in the model for male users. This shows that women are unaware of the importance of national IT development on their use of mobile phones. It also shows that other factors may be more significant in the view of these women.

Although the results of this research showed that the effect of price value on behavioural intention is more significant among women, it was not the most significant factor affecting Iraqi women's BI towards smartphone adoption and use. This contradicts the findings of GSMA (2015a) and the research project carried out by Asiacell with the aim of increasing women's use of mobile phones in Iraq. The findings of this research suggest that mobile companies should not consider price as the most important factor influencing Iraqi women's adoption and use of mobile phones. Price value was less significant than culture specific beliefs and values and technological culturation in the model for female users. The findings of this research show that the two factors (culture specific beliefs and values and technological culturation) proposed by Ameen et al. (2015), based on the previous research carried out by Straub et al. (2001) and Loch et al. (2003), are the most significant predictors in the model for female users.

# 7. Conclusion

## 7.1 Limitations and future research

One of the main limitations of this research is the sample size, as the sample was only 533 respondents. This does not provide a good opportunity for generalisation. In addition, the data were collected from urban areas in Iraq. Future studies should collect data from rural areas, where the levels of technological advancement, access to technology, education and income are lower and where women face more cultural restrictions. Using mobile phones may be even more important for women in rural areas. In addition, the data in this research were

collected from men and women in a specific age group. Future studies could collect data from older users and compare the results with the results of this research. The selected culture specific beliefs and values in this research was face-to-face vs technology-mediated meetings, which is applicable to the case of smartphone adoption. However, future studies could test other culture specific beliefs and values that are applicable to the region and to the specific technology under investigation.

## 7.2 Conclusion and recommendations

This research examined gender differences in Iraq in terms of smartphone adoption and use. The use of smartphones and the various applications available through them is vital for empowering Iraqi women to overcome the cultural barriers they face. Closing the gender gap in mobile phone adoption and use is important for mobile companies too, as it will allow them to increase their customer base and improve customer satisfaction.

Addressing gender differences is necessary in order to accurately target more women in order to reduce the gender gap in general, especially in Iraq. The model has shown that gender differences in mobile phone adoption and use exist. Therefore, there is a need to increase awareness among Iraqi women of the importance of using smartphones and of the benefits they offer; specifically, the benefits beyond the calling function. Iraqi women need to be made aware of not only the existence of various mobile services that are available via smartphones but also the benefits and uses of each mobile application. This was revealed through the insignificance of perceived relative advantage in the model for Iraqi females.

The results of this research revealed that Iraqi women are interested in technology-mediated meetings. Hence, mobile companies in Iraq need to rethink their targeting strategies, as concentrating on the price factor alone may not bring the required results. Promoting and enabling VOIP services, such as Viber, WhatsApp, FaceTime and Skype, is important if mobile companies are to target this segment of the population. Since informal technological culturation was found to be important for women in Iraq, these women need to be given more opportunities to access more advanced technology from other countries and training provided by foreign companies. Therefore, it is important for local mobile companies to collaborate with foreign and international companies and handset manufacturers to provide training and events that apprise women users in Iraq of all the options available when using mobile phones.

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Appendix A: Items used in the model 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 | |

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| 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 behaviour 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 (usefulness) | |

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| 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 | |
| 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 skilful at using mobile phones. | Venkatesh et al. (2012) |

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| Behavioural intention | |
| 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 usage | |
| The usage frequency for each of the following: | Initially adopted from Venkatesh et al.'s (2012) |

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| a. Mobile phone (for making calls) (CALLS)<br>b. SMS<br>c. Mobile Internet (MOBINT)<br>d. Games (GAMES)<br>e. Mobile e-mail (MOBEMAIL)<br>f. Mobile messaging apps (e.g., Viber, Skype or WhatsApp) (MOBAPPS)<br>g. Mobile social media (MOBSM)<br>h. Mobile banking (MOBBANK)<br>i. M-commerce (MCOMMERCE) | study. Additional items related to mobile services are the author's own |
| Culture-specific beliefs and values | |
| 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.'s (2001) study, 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.'s (2001) study, 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.'s (2001) study |

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| Technological culturation | |
| 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 | |
| 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.'s (2003) study with some modifications to test restrictions on mobile applications |