Asia Pacific Management Review xxx (xxxx) xxx

HOSTED BY

ELSEVIER

Contents lists available at ScienceDirect

Asia Pacific Management Review

journal homepage: www.elsevier.com/locate/apmrv

Antecedents and outcomes of internet usage within organisations in Yemen: An extension of the Unified Theory of Acceptance and Use of Technology (UTAUT) model

Osama Isaac [a,*], Zaini Abdullah [b], Adnan H. Aldholay [c], Ali Abdulbaqi Ameen [d]

[a] Faculty of Business and Accountancy, Lincoln University College (LUC), Selangor, Malaysia
[b] Faculty of Business Management, Universiti Teknologi MARA (UiTM), Selangor, Malaysia
[c] Faculty of Business Management and Professional Studies, Management and Science University (MSU), Shah Alam, Malaysia
[d] Faculty of Computer Science, Lincoln University College (LUC), Selangor, Malaysia

ARTICLE INFO

Article history:
Received 11 December 2017
Received in revised form
12 October 2018
Accepted 13 December 2018
Available online xxx

Keywords:
Internet usage
UTAUT
Task-technology fit
User satisfaction
Yemen

ABSTRACT

In the past few years, the increasing use of the internet in many countries has changed the manner in the people socialise, learn, govern or do their business. However, there are countries such as Yemen which has a very low internet usage rate and sees little economic, social and cultural progress as a result. A significant volume of theoretical studies have already undertaken, seeking to understand ambiguities in technology usage, with a number of models being proposed. In this study, the researcher has focused on extending the UTAUT using an antecedent variable for the actual internet use (i.e., task-technology fit) and 4 outcome variables (i.e., decision quality, communication quality, knowledge acquisition, and user satisfaction). Survey questionnaires were distributed among the employees working in the various Yemeni governmental institutions and ministries, and primary data was collected from 520 different internet users. The data analysis was carried out using 2-stage procedures, wherein a measurement model was initially used, followed by a structural model for the assessment of the data, with the help of the SmartPLS 3.0. The multivariate data analysis yielded 2 results: 1) The different antecedent variables (like effort expectancy, performance expectancy, social influence, and the task-technology fit) positively affected the internet usage, and 2) The outcome variables (decision quality, communication quality, knowledge acquisition, and user satisfaction) were positively affected by internet usage. The proposed model could explain 29% of variance noted in the actual internet use. Finally, the researchers investigated the different practical and theoretical implications of the study.

1. Introduction

Currently, internet technology is one of the most essential technologies that can be used by individuals, organisations and countries, for increasing their growth and prosperity. This can be seen from the increasing number of internet users today (4,156,932,140) in comparison to those in 1993 (14,161,570) (Internet World Stats, 2018). Though internet usage is recognised as one of the primary requirements in the world, Yemen still lags in this area, and currently has one of the lowest internet application rates. Furthermore, Yemen still shows a lower internet penetration compared to its Arabic neighbouring countries like UAE (wherein 98.4% of the population uses the internet), Qatar (98.1%), Bahrain (98.0%), Kuwait (97.8%), Lebanon (91.0%), Saudi Arabia (90.2%), Jordan (87.8%), Oman (68.5%), and Palestine (60.5%). Yemen shows a poor internet penetration (24.3%), while the global average was 54.4% (Internet World Stats, 2018). A poor internet penetration affects the economic, social and political development of the country (Oyedemi, 2012), thereby decreasing the overall productivity and performance (Delone & Mclean, 1992; Delone & McLean, 2003; Isaac, Abdullah, Ramayah, & Mutahar, 2017b; Makokha & Ochieng, 2014; Norzaidi & Salwani, 2009).

Currently, Yemen is facing many economic problems and has

* Corresponding author.
E-mail address: osama2isaac@gmail.com (O. Isaac).

Peer review under responsibility of College of Management, National Cheng Kung University.

https://doi.org/10.1016/j.apmrv.2018.12.003
1029-3132/

Please cite this article as: Isaac, O et al., Antecedents and outcomes of internet usage within organisations in Yemen: An extension of the Unified Theory of Acceptance and Use of Technology (UTAUT) model, Asia Pacific Management Review, https://doi.org/10.1016/j.apmrv.2018.12.003

one of the lowest GDP per capita rate in the world (International Monetary Fund, 2015). An increased internet usage could stimulate the economic growth in Yemen, thereby improving the individual performance and the efficiency of the governmental organisations. Many studies showed that the internet use improved the gross national income (Pew Research Centre, 2013), significantly enhanced the individual productivity (Simsim, 2011) and the organisational performance (Chen, 2008; Wang & Hou, 2003). Other studies stated that internet-based learning significantly affected the individual performance (Aldholay et al., 2018a; 2018b, 2018c; Isaac, Abdullah, Ramayah, & Mutahar, 2018).

In the past, many models and theories were proposed for investigating and understanding the characteristics of the internet technology usage. These studies were able to decrease the uncertainties surrounding higher internet usage. Many popular models were also used for answering the doubts related to internet usage, like the Technology Acceptance Model (TAM) (Davis, 1989), the DeLone and McLean Information Systems success Model (DMISM) (Delone & Mclean, 1992), the Task-Technology Fit (TTF) (Goodhue, Dale, & ThompsonRonald, 1995), updated DMISM model (Delone & McLean, 2003), and the Unified Theory of Acceptance and Use of Technology (UTAUT) (Venkatesh, Morris, Davis, Davis, & Sam, 2003).

Out of the above technologies, UTAUT, proposed by Venkatesh et al. (2003) was used for understanding internet usage behaviour. The UTAUT model is one of the most popular models and was validated by different empirical studies as a precise model that predicted the system acceptance and usage, for the following reasons:

Firstly, the UTAUT model consists of 8 unified theories and models, as it combined various theoretical concepts and frameworks, like the - Theory of Reasoned Action (TRA) (Ajzen & Fishbein, 1980), Theory of Planned Behaviour (TPB) (Ajzen, 1985, pp. 11–39), Social Cognitive Theory (SCT) (Bandura, 1986), Technology Acceptance Model (TAM) (Davis, 1989), Combined-TAM and TPB (C-TAM-TPB) (Todd & Taylor, 1995), Motivational Model (MM) (Vallerand, 1997), Model of PC Utilization (MPCU) (Chang & Cheung, 2001) and the Diffusion of Innovation Theory (DOI) (Rogers, 2002).

Secondly, scholars obtained empirical support for the UTAUT model across contexts and time as:

- North American (Armida, 2008; Awuah, 2012, pp. 1–186; Cameron, 2006; Keeton, 2008; Marchewka & Kostiwa, 2007; Serbern, 2014):
- South American (Thomas et al., 2014):
- Europe (Brown, Dennis, & Venkatesh, 2010; Sumak, Polancic, & Hericko, 2010; Ney, 2012; Nuq & Aubert, 2013; Escobar-Rodríguez, Carvajal-Trujillo, & Monge-Lozano, 2014):
- Asia (Fang, 2014; Im, Hong, & Kang, 2011; Kripanont, 2007; Lin & Anol, 2008; Moghawemi, Mohd Salleh, Zhao, & Mattila, 2012; Raman & Don, 2013; Raman et al., 2014; Singeh, Abrizah, & Karim, 2013; Thakur & Srivastava, 2013; Toh, 2013; Wiratmadja, Govindaraju, & Athari, 2012; Wu, Tao, & Yang, 2007; Yang, 2013; Zhou, 2008; Zhou, Lu, & Wang, 2010):
- Sub-Saharan Africa (Karuri, Waiganjo, & Manya, 2013; Tibenderana & Ogao, 2008):
- Oceania (Ally & Gardiner, 2012; Casey & Wilson-Evered, 2012):
- The Middle East and North Africa: (AbuShanab & Pearson, 2007; Al-Gahtani, Hubona, & Wang, 2007; Al-Qeisi, 2009; Alharbi, 2014; Alwahaishi & Snášel, 2013; Nassuora, 2013; Yurdakul, Ursavas, & Isciturk, 2014).

Thirdly, there is a diversity of applications which supports the effectiveness of UTAUT to predict user behaviour. These include Wireless LAN Technology (Anderson & Schwager, 2003), E-Learning System (Fang, 2014; C.-H.; Wang, Liu, Tseng, & Tsai, 2010), Internet Technology (Kripanont, 2007; Sam, Othman, & Nordin, 2005; Touray & Salminen, 2013), smart mobile (Wu et al., 2007; Zhou, 2008), E-government (Alawadhi & Morris, 2008; Awuah, 2012, pp. 1–186), Internet Banking (Al-Qeisi, 2009; Ismail, 2012; Martins, Oliveira, & Popovič, 2014), Mobile Banking (Khraim, Ellyan, Shoubaki, & Khraim, 2011; Oliveira, Faria, Thomas, & Popovič, 2014; Zhou et al., 2010), Virtual Learning Environment (Sumak et al., 2010), eBay Technology (Pahnila, Siponen, & Zheng, 2011), E-Health Technology (Boontarig, Chutimaskul, Chongsuphajaisiddhi, & Papasratorn, 2012; Nuq & Aubert, 2013), ERP System (Keong, Ramayah, Kurnia, & Chiun, 2012), Mobile Learning (Almatari, Iahad, & Balaid, 2012; Nassuora, 2013; Yang, 2013), Wikis Technology (Toh, 2013), Cloud Computing Technology (Alharbi, 2014), Facebook and Social Media (Escobar-Rodríguez et al., 2014; Serbern, 2014), Online Games Technology (Xu, 2014), Smart Board Technology (Raman et al., 2014) and Webinars Technology (Khechine, Pascot, & Bytha, 2014).

Fourthly, studies found that UTAUT has successfully explained a wide proportion of variance in IT usage behaviour (Anderson, Schwager, & Kerns, 2006; Venkatesh et al., 2003).

The UTAUT model is a very popular model which has been investigated amongst the various information system researchers, who aimed to study the system acceptance and usage behaviour (Alharbi, 2014; Serbern, 2014). It also combined various characteristics at the individual (performance expectancy and effort expectancy), organisational (facilitating conditions) and social (social influence) levels. On the other hand, this model does not investigate the task-technology fit construct, i.e., the extent to which the system fits the needs and tasks of an individual. With respect to the technology usage in the organisations, the actual internet usage does not present the complete picture, without considering if the technology fits the various individual tasks (Goodhue et al., 1995). This task-technology fit was important for studying the technology usage in the organization (D'Ambra, Wilson, & Akter, 2013).

Moreover, the UTAUT model does not evaluate the technological usage, like the customer satisfaction or the performance effect. Many studies have highlighted the significance of investigating the success of the Information Systems (IS) based on the performance and user satisfaction (Montesdioca & Maçada, 2015). Earlier reports stated that the adoption and usage of the information technology only investigated the actual internet usage as the resultant construct (Y.-M. Cheng, 2014; R. Cheung & Vogel, 2013; Fatimah, Ahmad, Downe, & Lai, 2011; Fusilier & Durlabhji, 2005; Iqbal & Qureshi, 2012; Joo & Sang, 2013; Y. H. Lee, Hsieh, & Ma, 2011). Some studies attempted to fill this gap by investigating the connection between the internet usage and the individual/organisational performance (Norzaidi, Chong, Murali, & Salwani, 2007; Norzaidi & Salwani, 2009; Son, Park, Kim, & Chou, 2012). In this paper, the researchers have tried to fill this gap by extending the UTAUT application with one antecedent variable to the internet actual usage (task-technology fit) and the 4 outcome variables (i.e., decision quality, communication quality, knowledge acquisition, and user satisfaction) (Appendix D).

This research aims to fulfil the following objectives: (1) Examine the impact of the social influence, effort expectancy, performance expectancy, facilitating conditions, and the task-technology on the internet actual usage (2) Determining the effect of the actual internet use on the decision quality, communication quality, knowledge acquisition, and user satisfaction. If the study results indicate that the proposed variables significantly affected the actual internet usage, the researchers would make further recommendations on the efficient use of internet technology. This study could guide other important sectors which are associated with internet

technology usage.

2. Literature review

2.1. Performance expectancy

The performance expectancy can be defined as the extent to which the user believes that the use of the system would help them satisfy their job-related objectives (Venkatesh et al., 2003). Many studies have proven that performance expectancy or perceived usefulness factor plays a major role in the context of IS (Alrajawy, Daud, Isaac, & Mutahar, 2016; Ramayah, 2006; Tarhini, Alalwan, Al-Qirim, Algharabat, & Masa'deh, 2018; Venkatesh, Thong, Chan, Hu, & Brown, 2011). Table 1 shows the different indicators that measure the performance expectancy in the context of IS. Several studies claimed that when the performance expectancy increased, the system usage also increased (Al-Qeisi, Dennis, Alamanos, & Jayawardhena, 2014; Faaeq, Alqasa, & Al-Matari, 2014; Wu et al., 2007; Zhou et al., 2010). This is echoed by other results which found a positive relationship between performance expectancy and usage behaviour (Datta, 2011; Lin & Anol, 2008; Moghawemi et al., 2012; Raman & Don, 2013; Raman et al., 2014; Ramayah, Ignatius, & Aafaqi, 2005; Wang, Hung, & Chou, 2006). However (Faraliza, Noor, Azmi, & Ramalingam, 2014; Lian, 2015; Singeh et al., 2013; Yueh, Huang, & Chang, 2015), found no relationship between performance expectancy and usage behaviour. As Yemen is one of the lowest countries in per capita income, people are exploring ways to enhance their skills and competence to increase their income and thus if they realize the usefulness of internet technology, they will be motivated to utilize it. Hence, the following hypothesis was proposed:

H1. Performance expectancy positively influence actual usage of internet.

2.2. Effort expectancy

In their study, Venkatesh et al. (2003) described the effort expectancy or the perceived ease of use as the extent of ease related to the system usage. It was considered to be a fundamental antecedent factor related to technology adoption and usage (Ramayah & Lo, 2007 (Pahnila et al., 2011)Mutahar et al., 2016, pp. 884–898;). Table 2 presents the various indicators that could be used for investigating the effort expectancy. Many studies were conducted for investigating the effect of the effort expectancy on the system usage. One study (Martins et al., 2014) noted a positive correlation between the effort expectancy and internet banking usage. Different studies also highlighted this positive relationship in differing contexts or technological applications (Boonsawat & Naennab, 2014; Escobar-Rodríguez & Carvajal-Trujillo, 2014; Fang, 2014; Hsu, Chen, Lin, Chang, & Hsieh, 2014; Im et al., 2011; Venkatesh et al., 2011). In contrast, there are other studies which found that effort expectancy does not predict usage behaviour (Guo, 2015; Taiwo and Mahmood 2012; Toh, 2013; Yang, 2013; Zhou, 2008; Zhou et al., 2010). In Yemen, studies indicate that students perceived learning through the internet as understandable, clear, and easy to use which could contribute to the expansion of the use of the internet (Aldholay et al., 2018a; 2018b, 2018c). Therefore, the hypothesis is proposed as follows:

H2. Effort expectancy positively influence actual usage of internet.

2.3. Social influence

Social influence was another factor which affected the actual system usage. It can be defined as the extent of user perception regarding the effect of the society on his decision to use the system (Venkatesh et al., 2003). This social influence parameter was important for the technological success (Martins et al., 2014). Table 3 presents the different indicators used in earlier studies that could assess the social influence with respect to the IS usage. Venkatesh, Thong, and Xu (2012) stated that social influence positively affected the system usage behaviour. This fact was also highlighted by earlier studies (Escobar-Rodríguez & Carvajal-Trujillo, 2014; Gonzalez et al., 2012; Hendarman & Tjakraatmadja, 2012; Ifinedo, 2012; Isaac, Abdullah, Ramayah, & Mutahar, 2017a; Martins et al., 2014; Sumak et al., 2010; Wang, Liu, Tseng, & Tsai, 2005). However, some other studies reported the opposite (Addo, 2014; Faaeq et al., 2014; Faraliza et al., 2014; Nassuora, 2013; Nysveen & Pedersen, 2014). According to Hofstede and Minkov (2010), unlike most of the western countries, Yemen has a significantly high power distance and low individualism traits. But rather they tend to respect hierarchical order from top to bottom and have consideration of their society, friends, and relatives. Thus such cultural traits may represent an area of interest when studying the adaption and use of new technology and how it enables/hinder the prescribed process. Hence, the following hypothesis was proposed:

Table 1
Indicators of performance expectancy (perceived usefulness) in the context of IS among previous studies.

Authors/Year	Indicators					
	Accomplish tasks quickly	Accomplish tasks easily	Improves performance	Increases productivity	Enhances effectiveness	Useful in the job
Moghawemi et al. (2012)	✓			✓		✓
Im et al. (2011)	✓			✓		✓
(M. D. Norzaidi, Chong, Murali, & Salwani, 2009)	✓	✓				✓
Lian (2015)	✓	✓	✓	✓		✓
Al-Qeisi (2009)	✓	✓				✓
Venkatesh Viswanath and Morris (2000)			✓	✓	✓	✓
Addo (2014)			✓	✓		✓
Gonzalez, Sharma, and Galletta (2012)	✓			✓		✓
Escobar-Rodríguez et al. (2014)	✓	✓				✓
Escobar-Rodríguez and Carvajal-Trujillo (2014)	✓	✓				
Escobar-Rodríguez and Carvajal-Trujillo (2013)	✓	✓				
Fuksa (2013)	✓	✓		✓		✓
Tan, Chong, and Lin (2013)	✓	✓	✓	✓	✓	✓

Please cite this article as: Isaac, O et al., Antecedents and outcomes of internet usage within organisations in Yemen: An extension of the Unified Theory of Acceptance and Use of Technology (UTAUT) model, Asia Pacific Management Review, https://doi.org/10.1016/j.apmrv.2018.12.003

Table 2
Indicators of effort expectancy (perceived ease of use) in the context of IS among previous studies.

Authors/Year	Indicators					
	Learning to use the system is easy	Easy to use the system to find what I want	Interaction with the system is clear and understandable	The system is flexible to interact with	Easy to become skillful at using the system	In general, the system easy to use
Kim, Park, and Lee (2007)	✓	✓	✓	✓	✓	✓
Huang (2008)	✓	✓	✓	✓	✓	✓
Burton-Jones and Hubona (2006)	✓	✓	✓	✓	✓	✓
Shih (2004)	✓	✓	✓			✓
Lee and Lehto (2013)		✓	✓	✓		✓
Cheung and Vogel (2013)	✓				✓	✓
Teo, Lim, and Lai (1999)	✓	✓			✓	✓
Cheng, Lam, and Yeung (2006)	✓		✓		✓	✓
Fusilier and Durlabhji (2005)		✓	✓	✓		✓
Porter and Donthu (2006)	✓		✓		✓	✓

H3. Social influence positively influence actual usage of internet.

2.4. Facilitating conditions

Here, the researchers defined the facilitating conditions as the extent to which the user believed that the technical and organisational infrastructure was available for supporting their internet usage level (Venkatesh et al., 2003). Table 4 presents the different indicators used in earlier studies that could measure the facilitating conditions. Guo (2015) presented the important facilitating conditions that could affect the individual's system usage. The users must be properly introduced to the system, and also proper back-up must be provided before the organisations expect that their employees use any innovative technology, for ensuring that the system was well-utilised. An earlier report showed that such facilitating conditions positively affected the user behaviour in the context of the learning management software, used in Malaysia (Raman & Don, 2013). This agrees with other studies which found that facilitating conditions predict the usage behaviour (Chang, 2013; Guo, 2015; Lin & Anol, 2008; Moghawemi et al., 2012; Sánchez, Cortijo, & Javed, 2014; Wu et al., 2007; Yu-Lung, Yu-Hui, & Pei-Chi, 2008). However, contrasting studies have found that facilitating conditions do not influence usage behaviour (Fang, 2014; Lian, 2015; Martins et al., 2014; Singeh et al., 2013; Yueh et al., 2015). Yemen lags behind its neighbours in terms of technological infrastructure (Isaac, Abdullah, Ramayah, & Mutahar, 2017c) which prevents its population from using new technology. This construct is important due to the notion that the Yemeni government is meant to provide the tools and means to use the internet. Hence, the following hypothesis was proposed:

H4. Facilitating conditions positively influence actual usage of internet.

2.5. Task-technology fit

The researchers defined the task-technology fits as the extent to which a system satisfies the needs of its users, matches the user interests and fits with the tasks (Lin & Wang, 2012). Furthermore,

Table 3
Indicators of social influence in the context of IS among previous studies.

Authors/Year	Indicators									
	Important People	Family	Friends	Coworkers	Superiors	Experts	Beliefs	Values	Lifestyle	Needs
Lian (2015)	✓		✓							
Brown, Venkatesh, and Hoehle (2014)			✓	✓	✓					
Escobar-Rodríguez et al. (2014)	✓									
Rui-jin, Guo-xin, and Ze-zhou (2014)									✓	✓
Cheng, Liu, Qian, and Song (2013)		✓	✓		✓					
Escobar-Rodríguez and Carvajal-Trujillo (2013)	✓									
Son et al. (2012)	✓									
Venkatesh et al. (2012)	✓									
Velarde (2012)		✓	✓							
Moghawemi et al. (2012)	✓					✓				
Ifinedo (2012)							✓	✓		✓
Pahnila et al. (2011)	✓	✓	✓	✓						
Cheng (2011)			✓	✓	✓	✓				
Zhou et al. (2010)	✓									
Brown et al. (2010)	✓		✓	✓	✓					
Gu, Lee, and Suh (2009)	✓									
McGill and Klobas (2009)	✓	✓	✓							
Lu, Yao, and Yu (2005)	✓		✓							
Cheung, Chang, and Lai (2000)				✓	✓					

Table 4
Indicators facilitating conditions in the context of IS among previous studies.

Authors/Year	Indicators				
	Resources necessary (Hardware, Software, knowledge)	Training	Technical assistance	Compatible with other technologies	Top Management Support
Lian (2015)	✓		✓	✓	
Escobar-Rodríguez et al. (2014)	✓				
Nistor, Lerche, Weinberger, Ceobanu, and Heymann (2014)	✓		✓	✓	
Khechine et al. (2014)	✓		✓	✓	
Escobar-Rodríguez and Carvajal-Trujillo (2014)	✓				
Martins et al. (2014)	✓			✓	
Escobar-Rodríguez and Carvajal-Trujillo (2013)	✓				
Son et al. (2012)			✓		✓
Boontarig et al. (2012)	✓		✓	✓	
Gonzalez et al. (2012)	✓		✓	✓	
Moghawemi et al. (2012)	✓		✓	✓	
Venkatesh et al. (2012)	✓		✓	✓	
Ifinedo (2012)	✓		✓		✓
Datta (2011)	✓	✓			
Im et al. (2011)	✓				
Venkatesh et al. (2011)	✓		✓		
Pahnila et al. (2011)	✓		✓		✓
Zhou et al. (2010)	✓		✓		
Chan, Brown, Hu, and Tam (2010)	✓		✓		
Gu et al. (2009)	✓		✓		
Al-Gahtani et al. (2007)	✓		✓		✓
Kim et al. (2007)	✓	✓	✓		✓
Cheung et al. (2000)					✓

Lu and Yang (2014) also described it as the extent to which the system helps in completing all tasks and fit, based on the task requirements (Lu & Yang, 2014). The Task-Technology fit construct consisted of different viewpoints about its indicators, as described in Table 5. With regards to the technology usage in the organisations, the actual technology usage and the user satisfaction cannot offer the complete picture without considering the task characteristics, i.e., if the technology fits the task or not (Goodhue et al., 1995). The task-technology fit is vital for the technology usage in the organisations (D'Ambra et al., 2013). Many studies investigated the positive effect of the task-technology fit on the usage behaviour. In their study, Norzaidi and Salwani (2009) investigated the internet technology and noted that the task-technology fit could predict the actual technology usage. Similar results were observed by other studies, wherein they stated that the better the system match with the user interests, the higher is the system usage (Norzaidi et al., 2007; D'Ambra & Wilson, 2011; D'Ambra et al., 2013). Some studies (Tarhini et al., 2014b, 2015, 2014a) stated that it was not likely for the technology used in the developed countries to get adapted in the developing systems unless the system was very important and satisfied their work requirements. Hence, the following hypothesis was proposed:

H5. Task-technology fit positively influence actual usage of internet.

2.6. Actual usage of internet

The actual usage can be described as the actual technology usage frequency along with the usage times (Kim et al., 2007). Several studies have measured the actual IS usage with regards to its usage frequency and duration (Cheung et al., 2000; Shih & Fang, 2004; Porter & Donthu, 2006; Chiu, Chiu, & Chang, 2007; Kim et al., 2007; Mohammadi, 2015; Sun & Mouakket, 2015; Aldholay, Isaac, Abdullah, Abdulsalam, & Al-Shibami, 2018). Table 6 describes the indicators used for measuring the actual IS usage. The future studies must determine the effect of the system usage on the IS-related success factors like the performance and user satisfaction (Venkatesh et al., 2003). Very few researchers addressed this gap and studied the connection between the actual usage and the total benefits (Hou, 2012; Norzaidi et al., 2007; Norzaidi & Salwani, 2009; Son et al., 2012).

Some studies (Isaac, Abdullah, Ramayah, Mutahar, & Alrajawy, 2016; Makokha & Ochieng, 2014) investigated the effect of the actual IS usage on the total benefit and IS performance, and noted that a higher IS usage increased the net benefit. Similar results were also seen by Norzaidi and Salwani (2009). Yuthas and Young (1998) observed that the IS usage was significantly related to the decision effectiveness and the task performance (Burton-Jones & Straub, 2006). Many studies emphasized that the actual IS usage positively affected the net benefit and the system performance (Lee, Lee, & Kim, 2005; Fan & Fang, 2006; Norzaidi et al., 2007; Wang & Liao, 2008; D'Ambra & Wilson, 2011; Hou, 2012; D'Ambra et al., 2013; Makokha & Ochieng, 2014), while other studies reported an opposite result (Cho et al., 2015; Khayun & Ractham, 2011; Wu & Wang, 2006). Despite these contrasting opinions, this study attempted to assess the outcome variable constructs using factors like the decision quality, communication quality, and knowledge acquisition. Hence, the following hypotheses were proposed:

H6. Actual usage of internet positively influence knowledge acquisition.

H7. Actual usage of internet positively influence communication quality.

H8. Actual usage of internet positively influence decision quality.

However, very few studies determined the effect of the actual IS usage on the user satisfaction, whereas some others investigated the opposite relationship (Petter, DeLone, & McLean, 2008). In their study, Norzaidi and Salwani (2009) noted that the actual internet

Table 5
Indicators task-technology fit in the context of IS among previous studies.

Authors/Year	Indicators						
	Fits with the work tasks	Necessary to the work tasks	Meet the work needs	Enough to complete the work tasks	Match with the interests	Appropriate to the job	Available when needed
Lee and Lehto (2013)	✓		✓				
Larsen, Sørebø, and Sørebø (2009)	✓		✓				
Lu and Yang (2014)	✓			✓			
Zhou et al. (2010)			✓	✓		✓	
Lin and Wang (2012)	✓				✓		
Negahban and Chung (2014)	✓	✓	✓				
Oliveira et al. (2014)				✓		✓	
Larsen et al. (2009)	✓						
Vogiatzi (2015)							✓
Kim, Suh, Lee, and Choi (2010)		✓				✓	✓

Table 6
Indicators Actual usage in the context of IS among previous studies.

Authors/Year	Indicators	
	Frequency of usage	Duration of use
Sun and Mouakket (2015)	✓	✓
Mohammadi (2015)	✓	✓
Nistor et al. (2014)	✓	
Zhou et al. (2010)	✓	
Kim et al. (2007)	✓	✓
Chiu et al. (2007)	✓	✓
Porter and Donthu (2006)	✓	✓
Burton-Jones and Hubona (2006)	✓	✓
Shih and Fang (2004)	✓	✓
Cheung et al. (2000)	✓	✓
Teo et al. (1999)	✓	✓

usage positively affected the user satisfaction in Malaysia. Other studies too noted that the actual usage predicted the user satisfaction (Anandarajan, Igbaria, & Anakwe, 2002; Hou, 2012; Khayun & Ractham, 2011). Hence, the following hypothesis was proposed.

H9. Actual usage of internet positively influence user satisfaction.

2.7. Outcome variables

This study described the outcome variables as the degree to which the IS can contribute to the success of the users, with regards to areas like the knowledge acquisition, decision-making, productivity and communication quality. Many IS studies have investigated the system usage as an outcome construct (Y.-M. Cheng, 2014; R. Cheung & Vogel, 2013; Fatimah et al., 2011; Fusilier & Durlabhji, 2005; Joo & Sang, 2013; Y. H. Lee et al., 2011), however, they have not examined the consequences of the actual IS usage based on its effect on the performance or the total benefits (Shih & Chen, 2013), which must be used for measuring the IS success (Montesdioca & Maçada, 2015). Earlier studies focused on the performance or the total benefits as the output variable in the IS (Hou, 2012; Son et al., 2012). This study aims to fill the gap and contribute to the knowledge; by studying the connection between the actual IS usage and the individual net benefits in the organization. This study also examined the outcome variable constructs of decision quality, communication quality, knowledge acquisition, and user satisfaction.

In the case of the IS studies, the outcome variables can be defined and measured using different indicators. For instance, Wu and Wang (2006) described the outcome as the extent to which the IS can improve the decision-making quality, improve the job efficiency, job performance and communication quality, present many innovative ideas, enhance the job effectiveness, accomplish all the tasks quickly, and also improve the work-life quality. Norzaidi et al. (2007) described the outcome as the extent to which the IS usage helps in accomplishing a task, improves the job performance and work quality, eliminates all errors, helps in controlling the work and also enhances the job efficiency. According to Benedetto, Calantone, and Zhang (2003), the outcome is measured using the following indicators; improve efficiency, enhance effectiveness, and increase productivity and problem identification. Different indicators were used to measure the outcome variables in the IS context as shown in Table 7.

Furthermore, the user satisfaction must be considered when determining the technology usage (Delone & McLean, 2003). IT evaluation through the user satisfaction can be carried out for measuring the IS success (Montesdioca & Maçada, 2015). In this study, the researchers defined the user satisfaction as the extent to which the IS users can be satisfied with their decision to use the internet technology, and whether this usage met their expectations (Roca, Chiu, & Martínez, 2006; Y.-S.; Wang & Liao, 2008; Wang, 2008). Various indicators that were used for measuring the user satisfaction in earlier studies were presented in Table 8.

3. Research method

3.1. The proposed research model

This research applied the UTAUT model, proposed by Venkatesh et al. (2003), which included 4 constructs as the antecedent variables that determined the usage behaviour (effort expectancy, performance expectancy, facilitating conditions and the social influence). This model was extended for studying the connection between the actual system usage and the outcome variables (decision quality, communication quality, knowledge acquisition, and user satisfaction), in addition to the task-technology fit as the antecedent variable, which was proposed earlier by Goodhue and Thompson (1995). This proposed extended UTAUT model presented 9 hypotheses, as shown in Fig. 1.

3.2. Development of instrument and data collection

The researchers developed a 30-item questionnaire, based on the current IS literature. They also applied the multi-item Likert scales, which were popularly used in the questionnaire-based perception reports (Lee, Yoon, & Lee, 2009). Unlike the actual

Table 7
Indicators of outcome variables in the context of IS among previous studies.

Authors/Year	Indicators									
	Accomplish tasks quickly	Accomplish tasks easily	Improve decision-making quality	Improve decision-making speed	Improve job efficiency	Improve job effectiveness	Improve communication quality	Acquire new knowledge	Acquire new skills	Acquire innovative ideas
(M. Norzaidi et al., 2007)	✓				✓	✓				
Hou (2012)			✓	✓	✓	✓				
(M. D. Norzaidi et al., 2009)	✓				✓	✓				
Wu and Wang (2006)	✓		✓		✓	✓	✓	✓		✓
D'Ambra et al. (2013)	✓				✓					
McGill and Klobas (2009)	✓	✓			✓	✓				
D'Ambra and Wilson (2011)	✓		✓		✓			✓		
Lee et al. (2005)					✓					
Princely (2014)	✓		✓		✓					
Hasim and Salman (2010)	✓				✓	✓				
Benedetto et al. (2003)					✓	✓				
Lwoga (2013)	✓				✓				✓	
Khayun and Ractham (2011)	✓				✓					
Cheng (2011)					✓	✓				

Source (Isaac et al., 2017b)

Table 8
Indicators of user satisfaction in the context of IS among previous studies.

Authors/Year	Indicators					
	Satisfied with the decision	Satisfied with the experience	Satisfied with the Usage	Satisfied with the Characteristics (Speed, Functions, Format)	Meet the expectations	Overall satisfaction
Islam and Azad (2015)		✓				
Sun and Mouakket (2015)		✓				
Hsu and Lin (2015)			✓			
Hsu and Lin (2014)			✓			
Zhou (2013)			✓			
Lin and Wang (2012)				✓		✓
Revels, Tojib, and Tsarenko (2010)		✓				
Huang (2008)				✓		✓
Roca et al. (2006)	✓		✓			
Wu and Wang (2006)					✓	✓
Wang (2008)					✓	✓
Lin, Wu, and Tsai (2005)			✓			

system usage that is measured using a 5-point scale, the researchers measured the variables using the 7-point Likert scale, where 7 was 'Strongly Agree' and 1 indicated 'Strongly Disagree'. Since the respondents were mostly Arabic-speakers, the questionnaire had to be translated from English to the Arabic language. This study used a back translation process, which could determine the translation accuracy in the cross-cultural survey (Brislin, 1970). All validated instruments were derived from the earlier studies, and used for measuring the variables described in Appendix A. With regards to the number of items for every construct, the researchers in this study followed the suggestions presented by Hayduk and Littvay (2012), who stated that if there are a few items, generally 2 were adequate, 3 would be occasionally helpful while additional redundant items do not offer any further research benefits.

Here, the researchers asked 25 Yemeni University students to reply to a pre-test, which helped in resolving any ambiguity related to the wording or the measurement. This questionnaire was pilot-tested for examining the internal consistency. During the time of the study, the targeted sample population was ≈6090 Yemeni internet users, who worked in the head offices of the 30 governmental ministries, known as the Dwa'win (Appendix C). The adequate sample size for every ministry was chosen according to the employee number.

The study data was collected with the help of self-administered

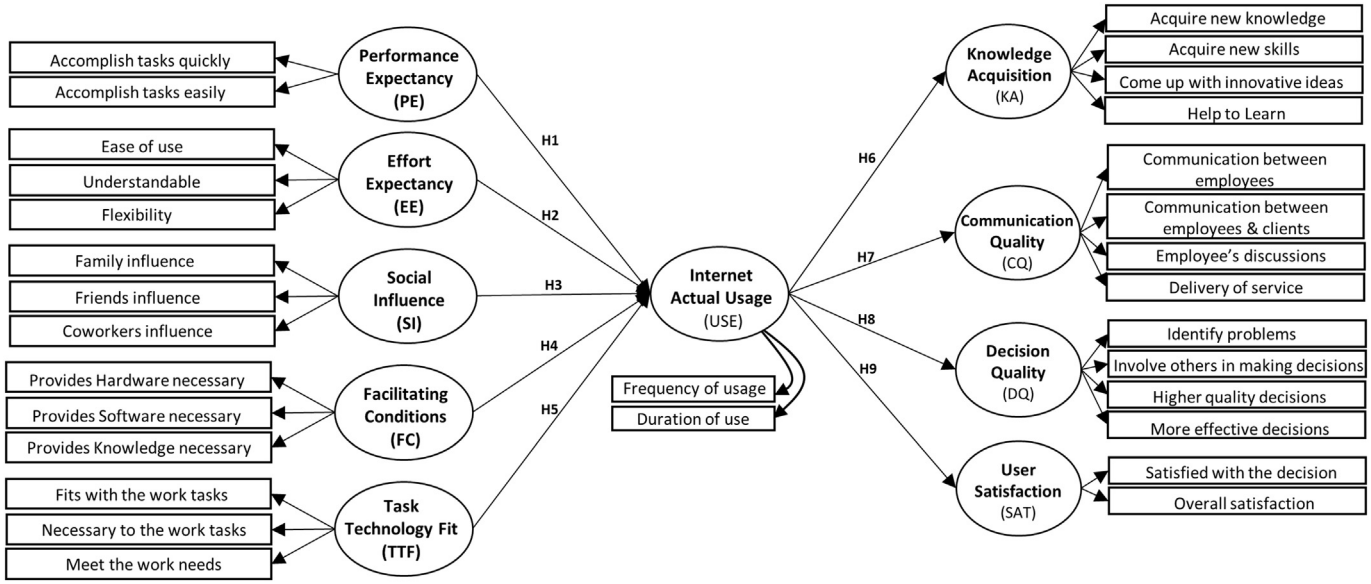

Fig. 1. Proposed extended UTAUT model.

questionnaires that were delivered to the human resource department in each ministry head office. One of human resource department employee with the researcher is responsible for distributing the questionnaires "in-person" to the employees who use the internet during the working hours and collect them directly from them before the end of the official working hours. Around 700 total questionnaires were distributed, out of which 530 were returned, and 508 responses were selected for the data analysis. This sample size was seen to be adequate for further analysis (Krejcie & Morgan, 1970; Tabachnick & Fidell, 2012), and a 76% response rate was good (Baruch & Holtom, 2008) compared to other similar studies published in the literature. In total, 22 questionnaires were deleted, wherein 12 were removed due to missing data for 15% of the questions, while 4 cases were seen to be outliers and 6 involved a straight lining. Table 9 presents the demographic profile of all respondents. The results showed that 412 (81.1%) respondents were male, while 96 (18.9%) were female. Out of all the respondents, 1.4% were <20 y old, while 28.3% respondents were between 20 and 29 y, 53.9% were between 30 and 39, 12.6% were between 40 and 49, and 3.7% > 50 y old. With regards to their educational background, 10.4% possessed a high school certificate, 8.7% were diploma-holders, and 72.2% were graduates while 8.7% were post-graduates.

Table 9
Summary of the demographic profile of respondents.

No	*Demographic Item*	*Categories*	*Frequency*	*Percentage*
1	Gender	1. Male	412	81.1
		2. Female	96	18.9
2	Age	1. Less than 20 years	7	1.4
		2.20–29 years	144	28.3
		3.30–39 years	274	53.9
		4.40–49 years	64	12.6
		5.50 years and above	19	3.7
3	Education background	1. High School	53	10.4
		2. Diploma	44	8.7
		3. Bachelor Degree	367	72.2
		4. Master Degree	44	8.7
4	Marital status	1. Single	117	23.0
		2. Married	380	74.8
		3. Divorced	9	1.8
		4. Widowed	2	0.4
5	Department	1. IT department	181	35.6
		2. Not IT department	327	64.4

4. Data analysis and results

The researchers used the Partial Least Squares (PLS) method for analysing the research model with the help of the SmartPLS 3.0 software (Ringle, Wende, & Becker, 2015). After conducting the initial descriptive analysis, the researchers used a 2-stage analytical process (Anderson & Gerbing, 1988; Hair, Hult, Ringle, & Sarstedt, 2017). Initially, the researchers conducted a measurement model assessment (i.e., validity and reliability), which was followed by a structural model assessment (that determined the hypothesized relationships). Some studies (Hair, Black, Babin, & Anderson, 2010; Schumacker & Lomax, 2004) stated that this 2-step assessment, which included the measurement and structural models, was better than a 1-step process. Hair et al. (2017) mentioned that the measurement model describes the manner in which every construct is measured, whereas a structural model indicates how the variables were related to one another.

4.1. Descriptive analysis

Table 10 describes the mean and the standard deviation of every variable in this study. The participants were requested to state their opinion regarding their internet usage, using a 7-point scale, which ranged between 1 (strongly disagree) and 7 (strongly agree). The effort expectancy showed the maximum average score of 5.877 out of 7.0, whereas a standard deviation of 1.74 indicated that the participants regarded the internet usage as easy, flexible and understandable. The performance expectancy showed an average score of 5.329 out of 7.0, wherein the standard deviation of 1.545 showed that the participants believed that internet usage helped them accomplish all their tasks easily and quickly. The majority of respondents agree that internet usage improves their knowledge acquisition (mean score 4.408 out of 7.0), communication quality

Table 10
Mean, standard deviation, loading, cronbach's Alpha, CR and AVE.

Construct	Item	Loading (>0.5)	M	SD	α (>0.7)	CR (>0.7)	AVE (>0.5)
Performance expectancy (PE)	PE1: Accomplish tasks quickly	0.94	5.329	1.545	0.871	0.939	0.886
	PE2: Accomplish tasks easily	0.94					
Effort expectancy (EE)	EE1: Easy to use	0.83	5.877	1.74	0.838	0.903	0.757
	EE2: Understandable	0.90					
	EE3: Flexible	0.88					
Social influence (SI)	SI1: Family influence	0.86	5.089	1.336	0.824	0.895	0.739
	SI2: Friends influence	0.88					
	SI3: Coworkers influence	0.85					
Facilitating conditions (FC)	FC1: Provides hardware necessary	0.92	4.941	1.051	0.888	0.931	0.817
	FC2: Provides software necessary	0.90					
	FC3: Provides knowledge necessary	0.90					
Task-technology fit (TTF)	TTF1: Fits with the work tasks	0.94	4.858	1.485	0.918	0.948	0.860
	TTF2: Necessary to the work tasks	0.93					
	TTF3: Meet the work needs	0.92					
Internet actual usage (USE)	USE1: Frequency of usage	0.91	3.359	1.012	0.759	0.892	0.805
	USE2: Duration of use	0.88					
Knowledge acquisition (KA)	KA1: Acquire new knowledge	0.91	4.408	1.614	0.930	0.950	0.827
	KA2: Acquire new skills	0.94					
	KA3: Come up with innovative ideas	0.91					
	KA4: Help to learn	0.87					
Communication quality (CQ)	CQ1: Communication between employees	0.89	5.197	1.506	0.916	0.941	0.798
	CQ2: Communication between employees & clients	0.89					
	CQ3: Employee's discussions	0.89					
	CQ4: Delivery of service	0.90					
Decision quality (DQ)	DQ1: Identify problems	0.93	5.585	1.106	0.921	0.944	0.808
	DQ2: Involve others in making decisions	0.87					
	DQ3: Higher quality decisions	0.90					
	DQ4: More effective decisions	0.90					
User satisfaction (SAT)	SAT1: Satisfied with the decision	0.94	5.164	1.271	0.868	0.938	0.883
	SAT2: Overall satisfaction	0.94					

Note: M = Mean; SD=Standard Deviation, α = Cronbach's alpha; CR = Composite Reliability, AVE = Average Variance Extracted.
- CR= $(\sum K)^2/((\sum K)^2 + (\sum 1\text{-}K^2))$, AVE = $\sum K^2/n$. where K = factor loading of every item, n = number of item in a model.

(5.197), and decision quality (5.585), with a standard deviation of 1.614, 1.506, and 1.106, respectively.

4.2. Measurement model assessment

With regards to the construct reliability, the researchers determined the individual Cronbach's alpha coefficient value for measuring the reliability of every core variable used in the measurement model. The model results showed that the individual Cronbach's alpha values for all constructs ranged between 0.759 and 0.930, which were higher than the recommended value of 0.7 (Kannana & Tan, 2005; Nunnally & Bernstein, 1994). Furthermore, the researchers tested the Composite Reliability (CR) value, which ranged between 0.892 and 0.950, and was higher than the recommended 0.7 value (Gefen, Straub, & Boudreau, 2000; Kline, 2010). These results indicate that the CR is fulfilled, as presented in Table 10. Hence, the Cronbach's Alpha and CR values for the constructs were seen to be relatively error-free.

The researchers used the factor loading test for testing the indicator reliability. A high loading of the construct showed that these indicators had many similarities, which was noted by the construct (Hair et al., 2017). A factor loading >0.7 must be considered as significant (Hair et al., 2010). The results showed that the factor loading for all items was higher than 0.7, as presented in Table 10, which fulfilled all the model requirements.

The study used the Average Variance Extracted (AVE) for testing the convergent validity. The results indicated that the AVE values were >0.5, and ranged between 0.739 and 0.886 (Hair et al., 2010). Thus, the convergent validity was fulfilled, as shown in Table 10.

The study determined the discriminant validity (which indicates the extent to which the items differentiate amongst all constructs or also measure some distinctive concepts) of the measurement model using 3 different criteria like the cross-loadings, Fornell-Larcker and the HeteroTrait- MonoTrait (HTMT) ratio. Hair et al. (2017) stated that the cross-loading is one of the primary techniques used for testing the discriminant validity of all indicators. The results for the cross loading criterion are presented in Appendix B, and it could be seen that this factor fulfilled the model requirements since the outer loadings amongst the constructs of an indicator were higher than the cross-loading values with the other constructs. Table 11 presents the discriminant validity results which were determined using the Fornell-Larcker test. As shown in the Table, the square root values of all AVEs (represented as bold values on the diagonal) were higher than the correlation noted amongst the constructs (the corresponding column and row values). This showed that the constructs were related to their corresponding indicators in comparison to other constructs in the model (Fornell & Larcker, 1981), thereby indicating a good discriminant validity (Hair et al., 2017). Furthermore, the correlation noted between the exogenous constructs was <0.85 (Awang, 2014), which fulfilled the discriminant validity of the constructs.

In the past few years, the Fornell-Larcker criterion faced some criticism, wherein Henseler, Ringle, and Sarstedt (2015) stated that this technique could not accurately detect the absence of discriminant validity in some common research scenarios. Hence, they proposed a different technique wherein they determined the HTMT ratio of the correlations, using the multitrait-multi method matrix. In this study, the researchers assessed the discriminant validity using the HTMT. However, the discriminant validity was inadequate if the HTMT value > HTMT0.90 of 0.90 (Gold, Malhotra, & Segars,

Table 11
Results of discriminant validity by Fornell-Larcker criterion.

	Factors	*1* USE	*2* CQ	*3* DQ	*4* EE	*5* FC	*6* KA	*7* PE	*8* SI	*9* TTF	*10* SAT
1	USE	**0.897**									
2	CQ	0.401	**0.893**								
3	DQ	0.203	0.289	**0.899**							
4	EE	0.326	0.318	0.332	**0.870**						
5	FC	0.115	0.259	0.169	0.267	**0.904**					
6	KA	0.479	0.649	0.33	0.293	0.209	**0.909**				
7	PE	0.448	0.475	0.347	0.431	0.274	0.553	**0.941**			
8	SI	0.286	0.315	0.199	0.367	0.254	0.300	0.307	**0.859**		
9	TTF	0.481	0.485	0.262	0.326	0.178	0.579	0.619	0.317	**0.927**	
10	SAT	0.355	0.565	0.327	0.377	0.252	0.447	0.576	0.362	0.472	**0.940**

Note: Diagonals represent the square root of the average variance extracted while the other entries represent the correlations.
Key**:** PE: performance expectancy, EE: effort expectancy, SI: social influence, FC: facilitating conditions, TTF: task-technology fit, USE: internet actual usage, KA: knowledge acquisition, CQ: communication quality, DQ: decision quality, SAT: user satisfaction.

2001), or > HTMT0.85 of 0.85 (Kline, 2010). Table 12 presents that the HTMT <0.85, which indicated that the discriminant validity was adequate.

4.3. Structural model assessment

Hair et al. (2017) stated that the structural model can be assessed based on the beta (β), R^2 and corresponding t-values, using the bootstrapping process with a resample size of 5000. They also suggested that the effect sizes (f^2) and the predictive relevance (Q^2) must be reported. Sullivan and Feinn (2012) mentioned that the p-value shows if the effect exists, however, it does not indicate the effect size.

4.3.1. Hypotheses tests

Table 13 and Fig. 2 present the results of the structural model evaluation of all hypotheses. 8 out of 9 hypotheses were supported in this study. The only exception was H4. On the other hand, H1 ($\beta = 0.193$, $t = 3.139$, $p < 0.01$), H2 ($\beta = 0.122$, $t = 2.629$, $p < 0.01$), H3 ($\beta = 0.100$, $t = 2.259$, $p < 0.05$) and H5 ($\beta = 0.298$, $t = 5.437$, $p < 0.001$) were accepted and satisfied. Thus, effort expectancy, performance expectancy, social influence, and the task-technology fit could significantly affect the internet usage. Furthermore, the internet actual usage was seen to predict the decision quality, communication quality, knowledge acquisition, and user satisfaction. Therefore, the H6 ($\beta = 0.479$, $t = 13.713$, $p < 0.001$), H7 ($\beta = 0.401$, $t = 9.757$, $p < 0.001$), H8 ($\beta = 0.203$, $t = 4.479$, $p < 0.001$), and H9 ($\beta = 0.355$, $t = 8.461$, $p < 0.001$) were also supported. It must be noted that the standardized path coefficients highlight the strong relationship between the endogenous and exogenous constructs; hence, the task-technology fit has a stronger effect on the actual internet usage compared to other variables, based on their path coefficient values. Furthermore, the internet usage showed a higher direct effect on the knowledge acquisition compared to the decision quality, communication quality and user satisfaction.

The social influence, effort expectancy, performance expectancy, facilitating conditions, and the task-technology fit could explain 29% of the variance noted in the actual internet usage. The actual usage could also explain 23%, 16%, 13% and 4% of the variance noted in factors like knowledge acquisition, communication quality, and user satisfaction and decision quality, respectively. The R2 values acquired an acceptable explanatory power, which indicated that it was an appropriate model (Chin, 1998; Cohen, 1988). In this study, the researchers assessed the effect sizes (f^2), which is described as an exogenous latent variable that can significantly affect the endogenous latent variable (Gefen & Rigdon, 2011). In their study, Hair et al. (2017) stated that any change in the R2 values must be tested. Furthermore, Cohen (1988) proposed a guideline for measuring the magnitude of f2, wherein 0.35, 0.15, and 0.02, represented the large, medium, and small effects, respectively. Table 13 presents the f2 results, wherein all 5 relationships showed a small effect size.

This study used a blindfolding process for examining the predictive relevance of the model. Hair et al. (2017) stated that this process must only be used for the endogenous constructs having a reflective measurement. When the $Q^2 > 0$, the proposed model

Table 12
Results of discriminant validity by HTMT.

	Factors	*1* USE	*2* CQ	*3* DQ	*4* EE	*5* FC	*6* KA	*7* PE	*8* SI	*9* TTF	*10* SAT
1	USE										
2	CQ	0.478									
3	DQ	0.241	0.308								
4	EE	0.410	0.360	0.373							
5	FC	0.139	0.286	0.187	0.311						
6	KA	0.561	0.704	0.346	0.325	0.226					
7	PE	0.549	0.530	0.381	0.504	0.312	0.611				
8	SI	0.357	0.361	0.228	0.438	0.296	0.344	0.360			
9	TTF	0.571	0.527	0.279	0.370	0.197	0.620	0.690	0.360		
10	SAT	0.436	0.633	0.362	0.440	0.288	0.493	0.663	0.429	0.529	

Key: PE: performance expectancy, EE: effort expectancy, SI: social influence, FC: facilitating conditions, TTF: task-technology fit, USE: internet actual usage, KA: knowledge acquisition, CQ: communication quality, DQ: decision quality, SAT: user satisfaction.

Please cite this article as: Isaac, O et al., Antecedents and outcomes of internet usage within organisations in Yemen: An extension of the Unified Theory of Acceptance and Use of Technology (UTAUT) model, Asia Pacific Management Review, https://doi.org/10.1016/j.apmrv.2018.12.003

Table 13
Structural path analysis result.

Hypothesis	Relationship	Std Beta	Std Error	t-value	Decision	R^2	f^2	Q^2	VIF
H1	PE→USE	0.193	0.062	3.139**	Supported	0.29	0.029	0.218	1.837
H2	EE→USE	0.122	0.046	2.629**	Supported		0.016		1.352
H3	SI→USE	0.100	0.044	2.259*	Supported		0.011		1.249
H4	FC→USE	0.049	0.039	1.267	Not supported		0.003		1.139
H5	TTF→USE	0.298	0.055	5.437***	Supported		0.075		1.672
H6	USE→KA	0.479	0.035	13.713***	Supported	0.23		0.176	1.000
H7	USE→CQ	0.401	0.041	9.757***	Supported	0.16		0.119	
H8	USE→DQ	0.203	0.045	4.479***	Supported	0.04		0.029	
H9	USE→SAT	0.355	0.042	8.461***	Supported	0.13		0.106	

***p < 0.001; **p < 0.01; *p < 0.05.
Key: PE: performance expectancy, EE: effort expectancy, SI: social influence, FC: facilitating conditions, TTF: task-technology fit, USE: internet actual usage, KA: knowledge acquisition, CQ: communication quality, DQ: decision quality, SAT: user satisfaction.

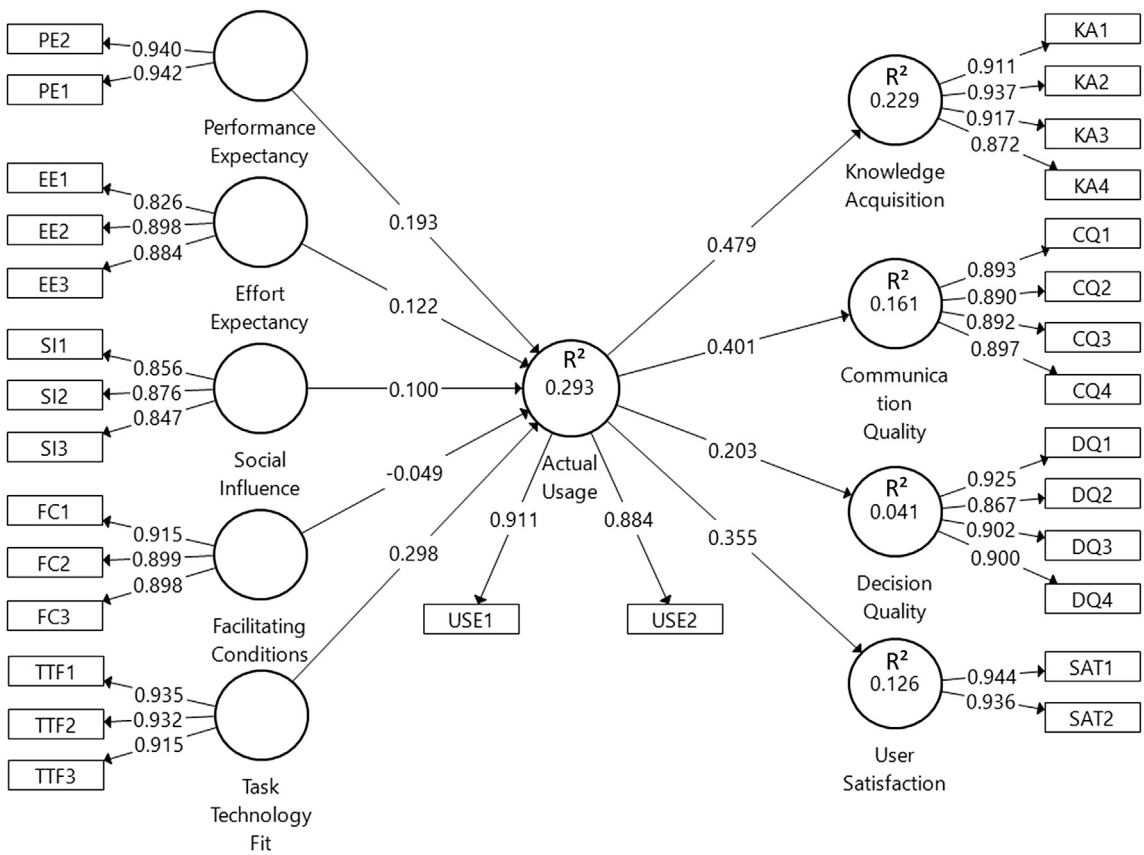

Fig. 2. PLS algorithm results.

showed a predictive relevance for a specific endogenous construct (Fornell & Cha, 1994; Hair et al., 2017). As shown in Table 13, all Q^2 values were higher than 0 and ranged between 0.029 and 0.218, which indicated that the model showed an acceptable predictive relevance. With regards to the Q^2 values, Hair et al. (2017) stated that there were a relative measure of the predictive relevance, and the values of 0.35, 0.15, and 0.02 showed that the exogenous construct had a large, medium, or small predictive relevance for a specific endogenous construct. This study showed that the 2 exogenous constructs had a medium predictive relevance, while other variables displayed a small predictive relevance.

An undesirable multicollinearity issue exists in any study, which indicates that the variance existing in the exogenous constructs can highlight the variance in the endogenous constructs, since they overlap with one another, and cannot explain the unique variances in the endogenous variables (O'brien, 2007). One study used the Variance Inflation Factor (VIF) for measuring and assessing the degree of multicollinearity (O'brien, 2007). This can be concerning if the VIF value exceeds 10 (Bowerman & O'Connell, 1990; Myers, 1990). Hair, Hult, Ringle, and Sarstedt (2013) stated that the multicollinearity issue existed when the maximal VIF value was more than 5. Table 13 presents the multicollinearity assessment using the VIF, wherein the exogenous constructs used in the study showed no significant multicollinearity since the VIF values < 5. This showed that the variance in the exogenous constructs, explained in the endogenous construct, indicated that they do not overlap one another.

4.3.2. Importance-performance map analysis (IPMA)

Here, this research used a post-hoc IPMA (IPMA) process, wherein the internet usage was considered as an outcome

construct. The IPMA process is based on PLS estimates, wherein the total effects represent the significance of the predecessor constructs in the shaping of the target construct (i.e., actual usage), whereas their mean latent variable score shows their performance. The researchers calculated the index values (i.e., performance scores) after rescaling the latent construct scores so they ranged between 0 (i.e., poor performance) to 100 (i.e., best performance) (Hair et al., 2017). Table 14 presents the results of the importance (i.e., total effects) and performance (i.e., index values) for the IPMA process.

Fig. 3 presents the priority map plot of the total effect scores and the index values. It was seen that the task-technology fit was a vital factor that helped in determining the internet usage amongst the Yemeni government employees since it showed very high importance values in comparison to the other constructs. However, the performance value of the significant factor (i.e., task-technology fit) was lower than the other antecedent parameters (like performance expectancy, effort expectancy, facilitating conditions and the social influence). Hair et al. (2017) stated that the IPMA process must identify the predecessors which showed a higher importance value for the target construct (i.e., with a high total effect) but a lower performance (i.e., low mean latent variable scores). Therefore, the criteria underlying these constructs can be considered as areas that need further improvement. Though the variables like the facilitating conditions showed a relatively moderate performance score, it showed a smaller relevance in its effect on the internet usage. Thus, the management can improve the actual internet usage amongst the Yemeni employees, if they improve the performance of the task-technology fits and the performance expectancy.

5. Discussion

In this empirical study, employee usage of internet technology within public sector organisations in Yemen was analysed. This study developed an extended model of UTAUT by adding task-technology fit as an antecedent variable and knowledge acquisition, communication quality, decision quality, and user satisfaction as outcome variables. One of the major findings is that the UTAUT sufficiently predicts employee internet usage.

The researchers noted that the performance expectancy positively affects the internet usage. This effect was also seen in earlier studies (Datta, 2011; Moghawemi et al., 2012; Raman & Don, 2013; Raman et al., 2014), and was based on the fact that if the employees considered the internet as a useful tool, it would increase the duration and frequency of internet usage. Effort expectancy was found to positively affect actual usage of the internet. The impact is also supported by previous studies (Boonsawat & Naennab, 2014; Fang, 2014; Venkatesh et al., 2011), and the result suggests that the more employees perceive the internet as easy to use, understandable and flexible, the more actual usage of internet (frequency and duration of use). This was in contrast to the results reported earlier (Guo, 2015; Toh, 2013; Zhou, 2008; Zhou et al., 2010), which did not note any relation between the effort expectancy and the system usage. This paradoxical result may suggest that perceived effort expectancy in some contexts is not enough to drive someone to use the internet without the awareness of its usefulness.

The result also found that social influence positively impacts actual internet usage. This is explained by the fact that the more family, friends, and co-workers think that using the Internet is a good idea, the more employees use the internet. This finding is supported by previous studies (Martins et al., 2014; Sumak et al., 2010; Wang et al., 2005). Surprisingly, this study found that facilitating conditions does not influence actual internet usage, although this finding contradicts the result of several previous studies (Chang, 2013; Lin & Anol, 2008; Pahnila et al., 2011; Sánchez et al., 2014), However, it is consistent with other studies (Fang, 2014; Singeh et al., 2013). This result may be because providing an individual with hardware and software to use the internet is not necessary since the majority of individuals in this age of information technology access the internet through their own laptop, smartphone, or similar device. Thus those involved in the studies show more concern about performance expectancy and effort expectancy to determine their internet usage.

The task-technology fit showed a positive effect on internet use because the more the internet matched the employee interests, the higher is the internet usage. This result was also noted in earlier studies (Norzaidi et al., 2007; Norzaidi & Salwani, 2009; D'Ambra & Wilson, 2011; D'Ambra et al., 2013).

The internet usage showed a positive effect on the decision quality, communication quality and knowledge acquisition, which was also seen in earlier studies (Lee et al., 2005; Fan & Fang, 2006; Norzaidi et al., 2007; Wang & Liao, 2008; D'Ambra & Wilson, 2011; Hou, 2012; D'Ambra et al., 2013; Makokha & Ochieng, 2014). This fact was also explained by the fact that if the government employees increased their duration and frequency of internet usage, it could improve their overall performance with regards to the knowledge acquisition (i.e., propose innovative ideas, acquire novel skills and knowledge, are encouraged to learn), the communication quality (i.e., communication between all employees, the clients and employees, the employee discussions and service delivery), or moderately enhanced the decision quality (involving others in better decision-making and identifying problems). Though many researchers noted the positive effect of the internet usage on the performance of the employees, Khayun and Ractham (2011) did not observe any relationship between the performance and the internet usage. Also, Cho et al. (2015) stated that the internet usage did not affect the performance.

This study did not observe a positive effect of the internet usage on the user satisfaction, which was also noted in earlier studies (Anandarajan et al., 2002; Hou, 2012; Khayun & Ractham, 2011; Norzaidi & Salwani, 2009). This could be due to the fact that if internet usage increased amongst the employees, it could improve employee satisfaction.

6. Implications

6.1. Theoretical implications

This study provided strong support that UTAUT predicts internet usage among employees. The findings noted in this study could

Table 14
IPMA for actual usage of internet among Yemeni employees.

Latent Variable	The total effect of the latent variable actual usage of the Internet *(Importance)*	Index values (Performance)
Performance expectancy (PE)	0.193	72.17
Effort expectancy (EE)	0.122	81.36
Social influence (SI)	0.100	68.13
Facilitating conditions (FC)	0.049	65.68
Task-technology fit (TTF)	0.298	64.09

Please cite this article as: Isaac, O et al., Antecedents and outcomes of internet usage within organisations in Yemen: An extension of the Unified Theory of Acceptance and Use of Technology (UTAUT) model, Asia Pacific Management Review, https://doi.org/10.1016/j.apmrv.2018.12.003

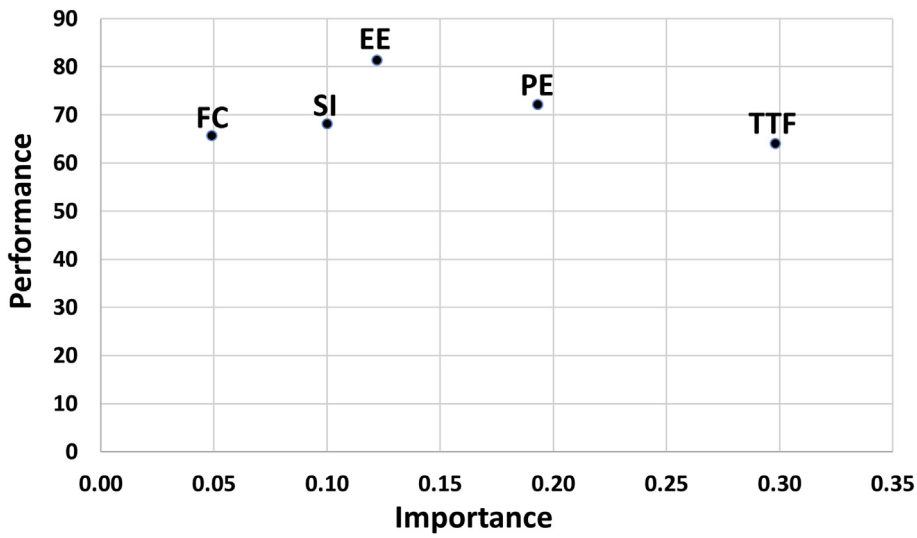

Fig. 3. IPMA (Priority Map) for actual usage of internet among Yemeni employees.
Key: PE: performance expectancy, EE: effort expectancy, SI: social influence, FC: facilitating conditions, TTF: task-technology fit.

contribute to the published literature since the researchers extended the UTAUT model and investigated the impact of the system usage on the individual effect. Future studies can apply the proposed model for deriving a better understanding of the internet usage. The extended UTAUT model, which used the usage outcome of decision quality, communication quality, knowledge acquisition, and user satisfaction, could improve the understanding of the IT usage. This would help in all efforts regarding the promotion of the internet usage in the organisations. Furthermore, this task-technology fit model could show that the task-technology fit construct could effectively predict the employee performance. Hence, it could be seen that the prediction offered by the model was based on its ability to define the relationship between the main constructs used in the hypothesized model with regards to the technology usage, i.e., IT services.

According to Agarwal (2000), there are four categories that influence the technology usage. These factors categories are technology, social, organisational, and task characteristics. Most of the previous studies focused on one, two or three factors categories, for instance, Lai and Li (2005); Ramayah and Suki (2006); and J. C. Lin and Chang (2011) focused on technology characteristics, Singh, Fassott, Chao, and Hoffmann (2006) and Iqbal and Qureshi (2012); focused on technology and social characteristics, Kim, Lee, and Law (2008); Lee and Kim (2009); Pai and Huang (2011) Kim (2012) focused on technology and organisational characteristics, Luarn and Lin (2005) focused on technology, organisational and individual characteristics, Son et al. (2012) focused on technology, institutional and social characteristics. In this study, however, the study contributes to the knowledge by including the four factors categories of technology, social, organisational, and task characteristics.

6.2. Practical implications

A long-term strategy has been formulated by the Yemeni government to reform and enhance the performance of its different departments and ministries in order to offer its citizens better public services, besides improving its standing in the world stage for providing an efficient and reliable administration practice. Nevertheless, the goals of improving governmental functions have yet to be achieved. Therefore, this study's findings can serve in this direction where internet technology was found to enhance individual employee performance in the public sector and the country at large.

All the above-mentioned results helped the practitioners determine the factors which affected the employee performance and satisfaction. These findings were seen to be helpful at the individual and organisational level and highlighted the significance of IT on the work quality. Hence, all data derived from these results could encourage and support the development of the future policy, at the organisational and national level. If the government used these results by developing new strategies that promoted the internet usage, improved the professional practices, work-life quality, personal development, and also encouraged the employees to use IT services in their regular work. This study was considered to be timely and conducted at the right time. It was predicted that the important results and the proposed model would support the national and governmental policies in Yemen, specifically policies related to the increase in the ICT usage in all professions in the organisations and the national e-government policies. Evidence showed that a connection existed between the ICT usage and better productivity and performance (Hou, 2012; Khayun & Ractham, 2011; Son et al., 2012; Xinli, 2015). While Yemen is facing difficulties in many aspects, increased ICT usage such as the internet can lead to social, economic and political development (Oyedemi, 2012), and increased internet usage was a major contributing factor for development, as studies showed that there is a link between internet usage and national income (Pew Research Centre, 2013).

Moreover, Kunniger and Walwyn (2017) indicated that among the obstacles that are faced by developing countries in their efforts to develop an innovation policy is the issue of rapid and pervasive technology diffusion. China can be as an example of the impact of technology utilization on national productivity and capability, where Sawang, Zhou, and Yang (2017) reported that technology policy had a significant impact on the countries productivity. Thus, Yemen can benefit from internet technology as it lags behind in terms of the efficiency and effectiveness of the public organisations.

7. Limitations and suggestions for future work

The first issue is related to the generalisation of all results. In this study, the researcher investigated the Yemeni employees, working in the public sector, which consisted of 3 sections, i.e., the Governmental Agencies, Prime Minister's Department, and Yemeni Ministries. In this study, the researchers focused on the Yemeni employees working in the Yemeni Ministries. Furthermore, this data was also collected by cross-sectional methods and was not longitudinal in nature. Hence, there was ambiguity regarding the fact that this usage was influenced by expectations and vice versa. A third issue was explained by Straub, Limayem, and Karahanna-Evaristo (1995) who stated that biases existed when the researchers used self-reporting measures of the system usage, which could differ from the actual system usage scores.

Future research should aim to apply the proposed extended UTAUT model with other technology applications such as mobile learning, or other sectors such as the private sector. This could improve the model ability to explain the actual internet usage and its result in a IS context. The variable of facilitating conditions could not accurately predict the internet usage in the study, however, this was considered to be an important factor which affected the internet usage in other countries, besides Yemen, like Taiwan (Wu et al., 2007), Korea (Im et al., 2011), China (Pahnila et al., 2011), Malaysia (Raman & Don, 2013), Portugal (Martins et al., 2014), Norway (Nysveen & Pedersen, 2014), Spain (Escobar-Rodríguez & Carvajal-Trujillo, 2014), and Thailand (Boonsawat & Naennab, 2014). Hence, future cross-cultural research must be conducted for investigating the effect of facilitating conditions on the internet usage.

8. Conclusion

In the past few years, the internet has become an essential and pervasive technique, which is being used in daily life, and helps in the transmission of the minds, bodies, ideas, words, pictures, and global experiences, rapidly and cheaply. It was considered to be an important invention of the era (Hypponen, 2013). Yemen shows the lowest internet usage rate, i.e., only 25.1% of its population uses the internet (World Development Indicators, 2016). In this study, the researchers aimed to determine all factors which affect the internet usage amongst the employees in the Yemeni public sector and also investigate the result of the internet usage. The study results indicated that the performance expectancy and the task-technology fit were strong determinants of the internet usage amongst all employees, while the effort expectancy and social influence could effectively explain the internet usage. A higher employee internet usage in organisations can improve the decision and communication quality, knowledge acquisition, and increased the user satisfaction. Finally, the results derived from the study could offer the policymakers with insights on developing a successful model for designing and implementing the internet technology-related techniques in the organisations. It would also help the researchers determine techniques that would encourage the senior management to create a better environment, where the employees use the internet technology, which could improve their professionalism, work-life quality and help in their professional development.

Appendix A. Instrument for varibles

Varible	Measure	Source
Performance expectancy (PE)	- Internet helps me to accomplish my tasks more quickly. - Using Internet make it easier to complete my tasks.	(Martins et al., 2014; Venkatesh et al., 2012)
Effort expectancy (EE)	- Learning to use the Internet is easy for me. - My interaction with the Internet is clear & understandable. - I find the Internet to be flexible to interact with.	(Martins et al., 2014; Venkatesh et al., 2012)
Social influence (SI)	- My family thinks that using the Internet is a good idea. - My close friends think that using the Internet is a good idea - My coworkers think that using the Internet is a good idea.	(Cheng, 2011; Pahnila et al., 2011; Venkatesh et al., 2012)
Facilitating conditions (FC)	- Organization provides the hardware necessary to use Internet. - Organization provides the software necessary to use Internet. - Organization provides the knowledge necessary to use the Internet.	(Chan et al., 2010; Escobar-Rodríguez et al., 2014; Venkatesh et al., 2012)
Task-technology fit (TTF)	- Internet services fits with the way I accomplish my work tasks. - Internet services are necessary to my work tasks. - Internet services meet my work needs.	(Larsen et al., 2009; Lee & Lehto, 2013; Lu & Yang, 2014)
Actual usage (USE)	- USE1 (Frequency): How often do you use the internet? ☐ Don't use ☐ Once each month ☐ Once each week ☐ once each day ☐ several times in day - USE2 (Time): How often do you use the internet each time? ☐ Don't use ☐ less than 1 h ☐ 1–2 h ☐ 3–4 h ☐ More than 5 h	Shih and Fang (2004)
knowledge acquisition (KA)	- Internet helps me acquire new knowledge - Internet helps me acquire new skills. - Internet helps me to come up with innovative ideas. - Internet helps me to learn.	Isaac et al. (2017b)
Communication quality (CQ)	- The use of Internet improves communication between employees. - The use of Internet improves communication between the employees and the clients. - The use of Internet improves employee's discussions. - The use of Internet improves the delivery of service.	Isaac et al. (2017a)
Decision Quality (DQ)	- Internet helps me identify problems. - Internet helps me involve others in making decisions. - Internet helps me make higher quality decisions. - Internet helps me make more effective decisions.	
User satisfaction (SAT)	- My decision to use the Internet was a wise one. - Overall, I am satisfied with the Internet.	

Please cite this article as: Isaac, O et al., Antecedents and outcomes of internet usage within organisations in Yemen: An extension of the Unified Theory of Acceptance and Use of Technology (UTAUT) model, Asia Pacific Management Review, https://doi.org/10.1016/j.apmrv.2018.12.003

Appendix B. Results of discriminant validity by the cross loading

	CQ	*DQ*	*EE*	*FC*	*KA*	*PE*	*SAT*	*SI*	*TTF*	*USE*
CQ1	**0.893**	0.287	0.323	0.260	0.536	0.462	0.564	0.292	0.470	0.375
CQ2	**0.890**	0.228	0.226	0.244	0.552	0.396	0.475	0.262	0.415	0.331
CQ3	**0.892**	0.237	0.293	0.194	0.607	0.409	0.496	0.268	0.397	0.363
CQ4	**0.897**	0.276	0.289	0.229	0.626	0.425	0.479	0.301	0.448	0.361
DQ1	0.309	**0.925**	0.329	0.186	0.340	0.373	0.351	0.212	0.278	0.206
DQ2	0.217	**0.867**	0.257	0.144	0.227	0.261	0.264	0.181	0.190	0.141
DQ3	0.266	**0.902**	0.324	0.140	0.347	0.326	0.278	0.143	0.235	0.200
DQ4	0.229	**0.900**	0.271	0.132	0.245	0.266	0.271	0.181	0.223	0.171
EE1	0.245	0.237	**0.826**	0.181	0.238	0.349	0.304	0.305	0.282	0.283
EE2	0.332	0.319	**0.898**	0.245	0.296	0.392	0.369	0.349	0.309	0.291
EE3	0.250	0.310	**0.884**	0.271	0.228	0.383	0.307	0.302	0.258	0.276
FC1	0.247	0.162	0.276	**0.915**	0.210	0.291	0.260	0.257	0.192	0.105
FC2	0.202	0.198	0.254	**0.899**	0.165	0.261	0.238	0.223	0.172	0.098
FC3	0.251	0.102	0.196	**0.898**	0.189	0.193	0.187	0.208	0.122	0.108
KA1	0.618	0.328	0.338	0.233	**0.911**	0.547	0.489	0.271	0.612	0.496
KA2	0.578	0.294	0.281	0.177	**0.937**	0.527	0.391	0.270	0.530	0.442
KA3	0.554	0.295	0.211	0.162	**0.917**	0.449	0.368	0.289	0.474	0.415
KA4	0.613	0.277	0.219	0.179	**0.872**	0.478	0.362	0.263	0.473	0.373
PE2	0.415	0.322	0.398	0.239	0.524	**0.940**	0.502	0.280	0.543	0.419
PE1	0.478	0.331	0.413	0.277	0.517	**0.942**	0.582	0.297	0.621	0.424
SAT1	0.518	0.299	0.372	0.223	0.402	0.526	**0.944**	0.358	0.436	0.344
SAT2	0.544	0.316	0.335	0.251	0.440	0.558	**0.936**	0.322	0.452	0.322
SI1	0.279	0.189	0.360	0.216	0.244	0.293	0.286	**0.856**	0.308	0.267
SI2	0.283	0.177	0.300	0.202	0.261	0.267	0.331	**0.876**	0.249	0.222
SI3	0.249	0.146	0.281	0.234	0.270	0.227	0.320	**0.847**	0.254	0.244
TTF1	0.473	0.299	0.348	0.177	0.545	0.615	0.450	0.300	**0.935**	0.458
TTF2	0.470	0.237	0.299	0.176	0.587	0.577	0.464	0.313	**0.932**	0.452
TTF3	0.403	0.188	0.258	0.141	0.477	0.526	0.398	0.265	**0.915**	0.425
USE1	0.384	0.159	0.282	0.112	0.464	0.417	0.333	0.284	0.482	**0.911**
USE2	0.334	0.209	0.306	0.093	0.391	0.385	0.303	0.226	0.375	**0.884**

Key: PE: performance expectancy, EE: effort expectancy, SI: social influence, FC: facilitating conditions, TTF: Task-technology fit, USE: internet actual usage, KA: knowledge acquisition, CQ: communication quality, DQ: decision quality, SAT: user satisfaction.

Appendix C. Study population

#	Ministry	Number of Employees	#	Ministry	Number of Employees
1	Ministry of Education	3000	16	Ministry of Fisheries	280
2	Ministry of Finance	1703	17	Media Ministry	419
3	Ministry of Defense	2750	18	Ministry of Social Affairs and Labor	404
4	Ministry of the Interior	1750	19	Ministry of Planning and International Cooperation	445
5	Ministry of Justice	6228	20	Ministry of Transportation	130
6	Ministry of Public Health and Population	817	21	Ministry of Communications and Information Technology	108
7	Ministry of Foreign Affairs	644	22	Ministry of Human Rights	137
8	Ministry of Higher Education and Scientific Research	257	23	Ministry of Public Works	1209
9	Ministry of Technical Education and Vocational Training	358	24	Ministry of Industry and Trade	511
10	Ministry of Culture	573	25	Ministry of Local Administration	950
11	Ministry of Youth and Sports	481	26	Ministry of Awqaf & Guidance	258
12	Ministry of Agriculture and Irrigation	1543	27	Ministry of Tourism	153
13	Ministry of Water and Environment	129	28	Ministry of Civil Service and Insurance	641
14	Ministry of Electricity and Energy	74	29	Ministry of Legal Affairs	192
15	Ministry of Oil and Minerals	658	30	Ministry of Expatriate Affairs	148
	Total	26950			
	Population: internet users among employees 22.6%	6090			

Source: (Central Statistical Organization Report, 2012).

Please cite this article as: Isaac, O et al., Antecedents and outcomes of internet usage within organisations in Yemen: An extension of the Unified Theory of Acceptance and Use of Technology (UTAUT) model, Asia Pacific Management Review, https://doi.org/10.1016/j.apmrv.2018.12.003

Appendix D. Theoretical contribution

Theory/Model & Source	Antecedent variables					Actual Behaviour	Outcome variable
	Technology Characteristics		*Organisational Characteristics*	*Social Characteistics*	*Task Characteristics*	Actual Usage	Performance Impact
	Performance Expectancy	Effort Expectancy	Facilitating Conditions	Social Influence	Task-Technology Fit		
Unified Theory of Acceptance and Use of Technology (UTAUT) Venkatesh et al. (2003)	✓	✓	✓	✓	gap	✓	gap
Proposed model for closing the gaps (Theoretical Contribution)	✓	✓	✓	✓	✓	✓	✓

References

AbuShanab, E., & Pearson, J. M. (2007). Internet banking in Jordan: The unified theory of acceptance and use of technology (UTAUT) perspective. *Journal of Systems and Information Technology, 9*(1), 78–97. https://doi.org/10.1108/13287260710817700.

Addo, H. (2014). Using the UTAUT model to analyze students' ICT adoption. *International Journal of Education and Development using Information and Communication Technology, 10*(3), 75–86.

Agarwal, R. (2000). Individual acceptance of information technologies. *Framing the Domains of IT Management: Projecting the Future through the Past*, 85–104.

Ajzen, I. (1985). *From intentions to actions: A theory of planned behavior. From Cognition to behavior*. Berlin, Heidelber, New York: Springer-Verlag.

Ajzen, I., & Fishbein, M. (1980). *Understanding attitudes and predicting social behaviour*. Prentice-Hall.

Al-Gahtani, S. S., Hubona, G. S., & Wang, J. (2007). Information technology (IT) in Saudi Arabia: Culture and the acceptance and use of IT. *Information & Management, 44*(8), 681–691. https://doi.org/10.1016/j.im.2007.09.002.

Al-Qeisi, K. (2009). *Analyzing the use of UTAUT model in explaining an online behaviour: Internet banking adoption (doctoral thesis)*. Brunel University.

Al-Qeisi, K., Dennis, C., Alamanos, E., & Jayawardhena, C. (2014). Website design quality and usage behavior: Unified theory of acceptance and use of technology. *Journal of Business Research, 67*(11), 2282–2290. https://doi.org/10.1016/j.jbusres.2014.06.016.

Alawadhi, S., & Morris, A. (2008). The use of the UTAUT model in the adoption of e-government services in Kuwait. *Proceedings of the Annual Hawaii International Conference on System Sciences, 1–11*. https://doi.org/10.1109/HICSS.2008.452.

Aldholay, A., Abdullah, Z., Ramayah, T., Isaac, O., & Mutahar, A. M. (2018). Online learning usage and performance among students within public universities in Yemen. *International Journal of Services and Standards, 12*(2), 163–179.

Aldholay, A., Isaac, O., Abdullah, Z., Abdulsalam, R., & Al-Shibami, A. H. (2018). An extension of Delone and McLean IS success model with self-efficacy. *International Journal of Information and Learning Technology, 35*(4), 285–304. https://doi.org/10.1108/IJILT-11-2017-0116.

Aldholay, A., Isaac, O., Abdullah, Z., & Ramayah, T. (2018). The role of transformational leadership as a mediating variable in DeLone and McLean information system success model: The context of online learning usage in Yemen. *Telematics and Informatics, 35*(5), 1421–1437. https://doi.org/10.1016/j.tele.2018.03.012.

Alharbi, S. T. (2014). Trust and acceptance of cloud computing: A revised UTAUT model. In *2014 international conference on computational science and computational intelligence, (mm)* (pp. 131–134). https://doi.org/10.1109/CSCI.2014.107.

Ally, M., & Gardiner, M. (2012). The moderating influence of device characteristics and usage on user acceptance of Smart Mobile Devices. In *23rd australasian conference on information systems (ACIS 2012)* (pp. 1–10) (Geelong, Australia).

Almatari, A., Iahad, N., & Balaid, A. (2012). Factors influencing students ' intention to use M-learning. *Journal of Information Systems Research and Innovation*, 1–8.

Alrajawy, I., Daud, N. M., Isaac, O., & Mutahar, A. M. (2016). Factors influence intention to use mobile learning within public universities students in Yemen. In *The 7th international conference postgraduate education (ICPE7)* (pp. 1050–1064). Malaysia: Shah Alam.

Alwahaishi, S., & Snášel, V. (2013). Consumers ' acceptance and use of information and communications Technology : A UTAUT and flow based theoretical model. *Journal of Technology Management and Innovation, 8*(2), 61–74. https://doi.org/https://doi.org/10.4067/s0718-27242013000200005.

Anandarajan, M., Igbaria, M., & Anakwe, U. P. (2002). IT acceptance in a less-developed country: A motivational factor perspective. *International Journal of Information Management, 22*, 47–65. https://doi.org/10.1016/S0268-4012(01)00040-8.

Anderson, J. C., & Gerbing, D. W. (1988). Structural equation modeling in practice: A review and recommended two-step approach. *Psychological Bulletin, 103*(3), 411–423. https://doi.org/10.1037/0033-2909.103.3.411.

Anderson, J. E., & Schwager, P. H. (2003). SME adoption of wireless LAN technology: Applying the UTAUT model. In *The 7th annual conference of the southern association for information systems* (pp. 39–43).

Anderson, J., Schwager, P., & Kerns, R. (2006). The drivers for acceptance of tablet PCs by faculty in a college of business. *Journal of Information Systems Education, 17*(4), 429–440.

Armida, E. (2008). *Adoption process for VOIP: The influence of trust in the UTAUT model*. Purdue University.

Awang, Z. (2014). *Structural equation modeling using AMOS. Shah alam*. Malaysia: Penerbit Universiti Teknologi MARA.

Awuah, L. J. (2012). *An empirical analysis of citizens' acceptance decisions of electronic-government services: A modification of the unified theory of acceptance and use of technology (UTAUT) model to include trust as a basis for investigation*. ProQuest Dissertations and Theses http://search.proquest.com.library.capella.edu/docview/1143268752?accountid=27965%5Cnhttp://wv9lq5ld3p.search.serialssolutions.com.library.capella.edu/?ctx_ver=Z39.88-2004&ctx_enc=info:ofi/enc:UTF-8&rfr_id=info:sid/Dissertations+&+Theses+@+Capella+Univer.

Bandura, A. (1986). *Social foundations of thought and action: A social cognitive theory*. NJ: Prentice Hall.

Baruch, Y., & Holtom, B. C. (2008). Survey response rate levels and trends in organizational research. *Human Relations, 61*(8), 1139–1160. https://doi.org/10.1177/0018726708094863.

Benedetto, C. A. Di, Calantone, R. J., & Zhang, C. (2003). International technology transfer: Model and exploratory study in the People's Republic of China. *International Marketing Review, 20*(4), 446–462. https://doi.org/10.1108/02651330310485171.

Boonsawat, S., & Naennab, T. (2014). *The UTAUT model for the study of acceptance and use of capability maturity model integration*.

Boontarig, W., Chutimaskul, W., Chongsuphajaisiddhi, V., & Papasratorn, B. (2012). Factors influencing the Thai elderly intention to use smartphone for e-Health services, 2012 IEEE symposium on humanities *Science and Engineering Research*, 479–483.

Bowerman, B. L., & O'Connell, R. (1990). *Linear statistical models: An applied approach* (2nd ed.). Belmont, CA: Duxbury.

Brislin, R. W. (1970). Back-translation for cross-cultural research. *Journal of Cross-Cultural Psychology, 1*(3), 185–216.

Brown, S. a., Dennis, A. R., & Venkatesh, V. (2010). Predicting collaboration technology use: Integrating technology adoption and collaboration research. *Journal of Management Information Systems, 27*(2), 9–54. https://doi.org/10.2753/MIS0742-1222270201.

Brown, S. A., Venkatesh, V., & Hoehle, H. (2014). Technology adoption decisions in the household: A seven-model comparison. *Journal of the Association for Information Science and Technology, 2*(1), 1–17. https://doi.org/10.1002/asi.

Burton-Jones, A., & Hubona, G. S. (2006). The mediation of external variables in the technology acceptance model. *Information Management, 43*(6), 706–717. https://doi.org/10.1016/j.im.2006.03.007.

Burton-Jones, A., & Straub, D. W. (2006). Reconceptualizing system usage: An approach and empirical test. *Information Systems Research, 17*(3), 220–246.

Cameron, C. (2006). *Examining the relationship that age, gender, experience and communication technology has on acceptance and use of information technology: Using the unified theory of acceptance and use of technology (UTAUT) model*. Touro University International.

Casey, T., & Wilson-Evered, E. (2012). Predicting uptake of technology innovations in online family dispute resolution services: An application and extension of the UTAUT. *Computers in Human Behavior, 28*(6), 2034–2045. https://doi.org/10.1016/j.chb.2012.05.022.

Central Statistical Organization Report. (2012). *Ministry of planning & int. Cooperation of Yemen*.

Chan, F. K. Y., Brown, S. A., Hu, P. J., & Tam, K. Y. (2010). Modeling citizen satisfaction

with mandatory adoption of an E-government technology. *Journal of the Association for Information Systems, 11*(10), 519–549.

Chang, C.-C. (2013). Library mobile applications in university libraries. *Library Hi Tech, 31*(3), 478–492. https://doi.org/10.1108/LHT-03-2013-0024.

Chang, M., & Cheung, W. (2001). Determinants of the intention to use internet/www at work: A confirmatory study. *Information Management, 39*(1), 1–14.

Chen, C. (2008). Study on application of E-commerce and organizational performance in Taiwanese professional sports event promotion organizations. *The Journal of Human Resource and Adult Learning, 4*(1), 66–73.

Cheng, Y. M. (2011). Antecedents and consequences of e-learning acceptance. *Information Systems Journal, 21*(1), 269–299. https://doi.org/10.1111/j.1365-2575.2010.00356.x.

Cheng, Y.-M. (2014). Exploring the intention to use mobile learning: The moderating role of personal innovativeness. *Journal of Systems and Information Technology, 16*(1), 40–61. https://doi.org/10.1108/JSIT-05-2013-0012.

Cheng, T. C. E., Lam, D. Y. C., & Yeung, A. C. L. (2006). Adoption of internet banking: An empirical study in Hong Kong. *Decision Support Systems, 42*(3), 1558–1572. https://doi.org/10.1016/j.dss.2006.01.002.

Cheng, D., Liu, G., Qian, C., & Song, Y.-F. (2013). *Customer acceptance of internet banking: Integrating trust and quality with UTAUT model* (pp. 383–388). IEEE.

Cheung, W., Chang, M. K., & Lai, V. S. (2000). Prediction of internet and world wide web usage at work: A test of an extended triandis model. *Decision Support Systems, 30*(1), 83–100. https://doi.org/10.1016/S0167-9236(00)00125-1.

Cheung, R., & Vogel, D. (2013). Predicting user acceptance of collaborative technologies: An extension of the technology acceptance model for e-learning. *Computers & Education, 63*(1), 160–175. https://doi.org/10.1016/j.compedu.2012.12.003.

Chin, W. W. (1998). Issues and opinion on structural equation modeling. *MIS Quarterly, 22*(1), 7–16.

Chiu, C. M., Chiu, C. S., & Chang, H. C. (2007). Examining the integrated influence of fairness and quality on learners' satisfaction and Web-based learning continuance intention. *Information Systems Journal, 17*(3), 271–287. https://doi.org/10.1111/j.1365-2575.2007.00238.x.

Cho, K. W., Bae, S.-K., Ryu, J.-H., Kim, K. N., An, C.-H., & Chae, Y. M. (2015). Performance evaluation of public hospital information systems by the information system success model. *Healthcare Informatics Research, 21*(1), 43–48. https://doi.org/10.4258/hir.2015.21.1.43.

Cohen, J. (1988). *Statistical power analysis for the behavioral sciences* (2nd ed.). New York: Routledge.

Datta, P. (2011). A preliminary study of ecommerce adoption in developing countries. *Information Systems Journal, 21*(1), 3–32. https://doi.org/10.1111/j.1365-2575.2009.00344.x.

Davis, F. D. (1989). Perceived Usefulness, Perceived ease of use, and User Acceptence of inforamtion technology. *MIS Quarterly, 13*(3), 319–340.

Delone, W. H., & Mclean, E. R. (1992). Information systems success: The quest for the dependent variable. *Information Systems Research, 3*(1), 60–95.

Delone, W. H., & McLean, E. R. (2003). The DeLone and McLean model of information systems Success : A ten-year update. *Journal of Management Information Systems, 19*, 9–31.

D'Ambra, J., & Wilson, C. S. (2011). Explaining perceived performance of the world wide Web : Uncertainty and the task-technology fit model. *Internet Research, 14*(4), 294–310. https://doi.org/10.1108/10662240410555315.

D'Ambra, J., Wilson, C. S., & Akter, S. (2013). Application of the task-technology fit model to structure and evaluate the adoption of E-books by academics. *Journal of the American Society for Information Science and Technology, 64*(1), 48–64. https://doi.org/10.1002/asi.

Escobar-Rodríguez, T., & Carvajal-Trujillo, E. (2013). Online drivers of consumer purchase of website airline tickets. *Journal of Air Transport Management, 32*(1), 58–64. https://doi.org/10.1016/j.jairtraman.2013.06.018.

Escobar-Rodríguez, T., & Carvajal-Trujillo, E. (2014). Online purchasing tickets for low cost carriers: An application of the unified theory of acceptance and use of technology (UTAUT) model. *Tourism Management, 43*(1), 70–88. https://doi.org/10.1016/j.tourman.2014.01.017.

Escobar-Rodríguez, T., Carvajal-Trujillo, E., & Monge-Lozano, P. (2014). Factors that influence the perceived advantages and relevance of Facebook as a learning tool: An extension of the UTAUT. *Australasian Journal of Educational Technology, 30*(2), 136–151. https://doi.org/10.14742/ajet.v30i2.585.

Faaeq, M. K., Alqasa, K., & Al-Matari, E. M. (2014). Technology adoption and innovation of E-Government in Republic of Iraq. *Asian Social Science, 11*(3), 135–145. https://doi.org/10.5539/ass.v11n3p135.

Fan, J. C., & Fang, K. (2006). ERP implementation and information systems success: A test of DeLone and McLean's model. *Portland International Conference on Management of Engineering and Technology, 3*(1), 1272–1278. https://doi.org/10.1109/PICMET.2006.296695.

Fang, S.-F. (2014). *Using UTAUT model to explore the user behavior of E-learning system in a public sector*. Department of Communications Management.

Faraliza, N., Noor, M., Azmi, A. A. C., & Ramalingam, L. (2014). The unified theory of acceptance and use of technology (UTAUT) and the goods and service tax (GST) application system. *Research Journal of Applied Sciences, Engineering and Technology, 8*(17), 1911–1916.

Fatimah, W., Ahmad, W., Downe, A. G., & Lai, T. T. (2011). *Determinants of Computer Usage among Educators, 2007*(2).

Fornell, C., & Cha, J. (1994). Partial least squares. In R. P. Bagozzi (Ed.), *Advanced methods in marketing research* (pp. 52–78). Cambridge: Blackwell.

Fornell, C., & Larcker, D. F. (1981). Evaluating structural equation models with unobservable variables and measurement error. *Journal of Marketing Research, 18*(1), 39–50.

Fuksa, M. (2013). Mobile technologies and services development impact on mobile internet usage in Latvia. *Procedia Computer Science, 26*(December 2013), 41–50. https://doi.org/10.1016/j.procs.2013.12.006.

Fusilier, M., & Durlabhji, S. (2005). An exploration of student internet use in India: The technology acceptance model and the theory of planned behaviour. *Campus-Wide Information Systems, 22*(4), 233–246. https://doi.org/10.1108/10650740510617539.

Gefen, D., & Rigdon, E. E. (2011). An update and extension to SEM guidelines for administrative and social science research. *MIS Quarterly, 35*(2), 1–7.

Gefen, D., Straub, D., & Boudreau, M.-C. (2000). Structural equation modeling and regression: Guidelines for research practice. *Communications of the Association for Information Systems, 4*(1), 1–79.

Gold, A. H., Malhotra, A., & Segars, A. H. (2001). Knowledge management: An organizational capabilities perspective. *Journal of Management Information Systems, 18*(1), 185–214.

Gonzalez, G. C., Sharma, P. N., & Galletta, D. (2012). Factors influencing the planned adoption of continuous monitoring technology. *Journal of Information Systems, 26*(2), 53–69. https://doi.org/10.2308/isys-50259.

Goodhue, Dale, L., & Thompson, Ronald, L. (1995). Task-technology fit and individual performance. *MIS Quarterly, 19*(2), 213–236.

Gu, J.-C., Lee, S.-C., & Suh, Y.-H. (2009). Determinants of behavioral intention to mobile banking. *Expert Systems with Applications, 36*(9), 11605–11616. https://doi.org/10.1016/j.eswa.2009.03.024.

Guo, Y. (2015). Moderating effects of gender in the acceptance of mobile SNS based on UTAUT model. *International Journal of Smart Home, 9*(1), 203–216.

Hair, J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2010). *Multivariate data analysis* (7th ed.). New York: Pearson.

Hair, J. F., Hult, G. T. M., Ringle, C. M., & Sarstedt, M. (2013). *A primer on partial Least squares structural equation modeling (PLS-SEM)*. New York: SAGE Publications.

Hair, J. F., Hult, G. T. M., Ringle, C., & Sarstedt, M. (2017). *A primer on partial Least squares structural equation modeling (PLS-SEM)* (2nd ed.). London: Thousand Oaks: SAGE.

Hasim, M. S., & Salman, A. (2010). Factors affecting sustainability of internet usage among youth. *The Electronic Library, 28*(2), 300–313. https://doi.org/10.1108/02640471011033657.

Hayduk, L., & Littvay, L. (2012). Should researchers use single indicators, best indicators, or multiple indicators in structural equation models? *BMC Medical Research Methodology, 12*(1), 159–176.

Hendarman, A. F., & Tjakraatmadja, J. H. (2012). Relationship among soft skills, hard skills, and innovativeness of knowledge workers in the knowledge economy era. *Procedia - Social and Behavioral Sciences, 52*(1), 35–44. https://doi.org/10.1016/j.sbspro.2012.09.439.

Henseler, J., Ringle, C. M., & Sarstedt, M. (2015). A new criterion for assessing discriminant validity in variance-based structural equation modeling. *Journal of the Academy of Marketing Science, 34*(1), 115–135.

Hofstede, G., & Minkov, M. (2010). *Cultures and organizations: Software of the mind* (3rd ed.).

Hou, C.-K. (2012). Examining the effect of user satisfaction on system usage and individual performance with business intelligence systems: An empirical study of Taiwan's electronics industry. *International Journal of Information Management, 32*(6), 560–573. https://doi.org/10.1016/j.ijinfomgt.2012.03.001.

Hsu, C.-L., Chen, M.-C., Lin, Y.-H., Chang, K.-C., & Hsieh, A.-Y. (2014). *Adopting the Extension of UTAUT Model to Investigate the Determinants of e-book Adoption*.

Hsu, C.-L., & Lin, J. C.-C. (2014). What drives purchase intention for paid mobile apps? – an expectation confirmation model with perceived value. *Electronic Commerce Research and Applications, 14*(1), 46–57. https://doi.org/10.1016/j.elerap.2014.11.003.

Hsu, C.-L., & Lin, J. C.-C. (2015). What drives purchase intention for paid mobile apps? – an expectation confirmation model with perceived value. *Electronic Commerce Research and Applications, 14*(1), 46–57. https://doi.org/10.1016/j.elerap.2014.11.003.

Huang, E. (2008). Use and gratification in e-consumers. *Internet Research, 18*(4), 405–426. https://doi.org/10.1108/10662240810897817.

Hypponen, M. (2013). *How the NSA betrayed the world's trust - time to act*.

Ifinedo, P. (2012). Technology acceptance by health professionals in Canada: An analysis with a modified UTAUT model. *Proceedings of the Annual Hawaii International Conference on System Sciences*, 2937–2946. https://doi.org/10.1109/HICSS.2012.556.

Im, I., Hong, S., & Kang, M. S. (2011). An international comparison of technology adoption: Adoption testing the UTAUT model. *Information & Management, 48*(1), 1–8. https://doi.org/10.1016/j.im.2010.09.001.

International Monetary Fund. (2015). *GDP per capita: Yemen vs. Neighbor arab countries*.

Internet World Stats. (2018). Internet technology usage as percentage of population. Retrieved June 10, 2018, from https://www.internetworldstats.com/stats5.htm.

Iqbal, S., & Qureshi, I. A. (2012). M-Learning adoption: A perspective from a developing country. *International Review of Research in Open and Distance Learning, 13*(3), 147–164.

Isaac, O., Abdullah, Z., Ramayah, T., & Mutahar, A. M. (2017a). Examining the relationship between overall quality, user satisfaction and internet usage: An integrated individual, technological, organizaional and social perspective. *Asian Journal of Information Technology, 16*(1), 100–124.

Isaac, O., Abdullah, Z., Ramayah, T., & Mutahar, A. M. (2017b). Internet usage, user

satisfaction, task-technology fit, and performance impact among public sector employees in Yemen. *International Journal of Information and Learning Technology, 3*(34), 1–34.

Isaac, O., Abdullah, Z., Ramayah, T., & Mutahar, A. M. (2017c). Internet usage, user satisfaction, task-technology fit, and performance impact among public sector employees in Yemen. *The International Journal of Information and Learning Technology, 34*(3), 210–241. https://doi.org/10.1108/IJILT-11-2016-0051.

Isaac, O., Abdullah, Z., Ramayah, T., & Mutahar, A. M. (2018). Factors determining user satisfaction of internet usage among public sector employees in Yemen. *International Journal of Technological Learning, Innovation and Development, 10*(1), 37–68. https://doi.org/10.1504/IJTLID.2018.091800.

Isaac, O., Abdullah, Z., Ramayah, T., Mutahar, A. M., & Alrajawy, I. (2016). Perceived usefulness, perceived ease of use, perceived compatibility, and net benefits: An empirical study of internet usage among employees in Yemen. In *7th International conference on postgraduate education* (pp. 899–919). Malaysia: Shah Alam.

Islam, A. K. M. N., & Azad, N. (2015). Satisfaction and continuance with a learning management system Comparing perceptions of educators. *The International Journal of Information and Learning Technology, 32*(2), 109–123. https://doi.org/10.1108/IJILT-09-2014-0020.

Ismail, M. A. (2012). Factors influencing the adoption of E-banking in Sudan: Perception of retail banking clients. *Journal of Internet Banking and Commerce, 17*(3), 1–16.

Joo, J., & Sang, Y. (2013). Exploring Koreans' smartphone usage: An integrated model of the technology acceptance model and uses and gratifications theory. *Computers in Human Behavior, 29*(6), 2512–2518. https://doi.org/10.1016/j.chb.2013.06.002.

Kannana, V. R., & Tan, K. C. (2005). Just in time, total quality management, and supply chain management: Understanding their linkages and impact on business performance. *Omega: International Journal of Management Sciences, 33*(2), 153–162.

Karuri, J., Waiganjo, P., & Manya, A. (2013). Adoption of health information systems by health workers in developing countries - contextualizing UTAUT. In *IST-africa 2013 conference proceedings* (pp. 1–8).

Keeton, K. (2008). *An extension of the UTAUT model: How organizational factors and individual differences influence technology acceptance*. University of Houston.

Keong, M. L., Ramayah, T., Kurnia, S., & Chiun, L. M. (2012). Explaining intention to use an enterprise resource planning (ERP) system: An extension of the UTAUT model. *Business Strategy Series, 13*(4), 173–180. https://doi.org/10.1108/17515631211246249.

Khayun, V., & Ractham, P. (2011). Measuring e-excise tax success factors: Applying the DeLone & McLean information systems success model. In *Proceedings of the annual Hawaii international conference on system sciences* (pp. 1–10) (Honolulu).

Khechine, H., Pascot, D., & Bytha, A. (2014). UTAUT model for blended Learning : The role of gender and age in the intention to use Webinars. *Nterdisciplinary Journal of E-Learning and Learning Objects, 10*(1), 33–52.

Khraim, H. S., Ellyan, Y., Shoubaki, A. L., & Khraim, A. S. (2011). Factors affecting Jordanian consumers ' adoption of mobile banking services. *International Journal of Business and Social Science, 2*(20), 96–105.

Kim, S. (2012). Factors affecting the use of social software: TAM perspectives. *The Electronic Library, 30*(5), 690–706. https://doi.org/10.1108/02640471211275729.

Kim, T. G., Lee, J. H., & Law, R. (2008). An empirical examination of the acceptance behaviour of hotel front office systems: An extended technology acceptance model. *Tourism Management, 29*(3), 500–513. https://doi.org/10.1016/j.tourman.2007.05.016.

Kim, B. G., Park, S. C., & Lee, K. J. (2007). A structural equation modeling of the Internet acceptance in Korea. *Electronic Commerce Research and Applications, 6*(4), 425–432. https://doi.org/10.1016/j.elerap.2006.08.005.

Kim, T. T., Suh, Y. K., Lee, G., & Choi, B. G. (2010). Modelling roles of task-technology fit and self-efficacy in hotel employees' usage behaviours of hotel information systems. *International Journal of Tourism Research, 12*(June), 709–725. https://doi.org/10.1002/jtr.787.

Kline, R. B. (2010). *Principles and practice of structural equation modeling* (3rd ed.). New York: The Guilford Press.

Krejcie, R. V., & Morgan, D. W. (1970). Determining sample size for research activities robert. *Educational and Psychological Measurement, 38*(1), 607–610. https://doi.org/10.1177/001316447003000308.

Kripanont, N. (2007). *Examining a technology acceptance model of internet usage by academics within Thai business schools*. School of Information Systems, Faculty of Business and Law, Victoria University.

Kunniger, D., & Walwyn, D. R. (2017). Weaknesses in policy to support technology diffusion: A study of additive manufacturing in South Africa. *International Journal of Technological Learning, Innovation and Development, 9*(2), 137–152.

Lai, V. S., & Li, H. (2005). Technology acceptance model for internet banking: An invariance analysis. *Information & Management, 42*(2), 373–386. https://doi.org/10.1016/j.im.2004.01.007.

Larsen, T. J., Sørebø, A. M., & Sørebø, Ø. (2009). The role of task-technology fit as users' motivation to continue information system use. *Computers in Human Behavior, 25*(3), 778–784. https://doi.org/10.1016/j.chb.2009.02.006.

Lee, Y. H., Hsieh, Y. C., & Ma, C. Y. (2011). A model of organizational employees' e-learning systems acceptance. *Knowledge-Based Systems, 24*(3), 355–366. https://doi.org/10.1016/j.knosys.2010.09.005.

Lee, S., & Kim, B. G. (2009). Factors affecting the usage of intranet: A confirmatory study. *Computers in Human Behavior, 25*(1), 191–201. https://doi.org/10.1016/j.chb.2008.08.007.

Lee, K., Lee, S., & Kim, J. (2005). Analysis of mobile commerce performance by using the task-technology fit. *Mobile Information Systems, 158*(1), 135–153.

Lee, D. Y., & Lehto, M. R. (2013). User acceptance of YouTube for procedural learning: An extension of the technology acceptance model. *Computers & Education, 61*(1), 193–208. https://doi.org/10.1016/j.compedu.2012.10.001.

Lee, B.-C., Yoon, J.-O., & Lee, I. (2009). Learners' acceptance of e-learning in South Korea: Theories and results. *Computers & Education, 53*(4), 1320–1329. https://doi.org/10.1016/j.compedu.2009.06.014.

Lian, J.-W. (2015). Critical factors for cloud based e-invoice service adoption in Taiwan: An empirical study. *International Journal of Information Management, 35*(1), 98–109. https://doi.org/10.1016/j.ijinfomgt.2014.10.005.

Lin, C.-P., & Anol, B. (2008). Learning online social support: An investigation of network information technology based on UTAUT. *CyberPsychology and Behavior: The Impact of the Internet, Multimedia and Virtual Reality on Behavior and Society, 11*(3), 268–272. https://doi.org/10.1089/cpb.2007.0057.

Lin, J. C., & Chang, H. (2011). The role of technology readiness in self-service technology acceptance. *Managing Service Quality: International Journal, 21*(4), 424–444. https://doi.org/10.1108/09604521111146289.

Lin, W.-S., & Wang, C.-H. (2012). Antecedences to continued intentions of adopting e-learning system in blended learning instruction: A contingency framework based on models of information system success and task-technology fit. *Computers & Education, 58*(1), 88–99. https://doi.org/10.1016/j.compedu.2011.07.008.

Lin, C. S., Wu, S., & Tsai, R. J. (2005). Integrating perceived playfulness into expectation-confirmation model for web portal context. *Information Management, 42*(1), 683–693. https://doi.org/10.1016/j.im.2004.04.003.

Luarn, P., & Lin, H.-H. (2005). Toward an understanding of the behavioral intention to use mobile banking. *Computers in Human Behavior, 21*(6), 873–891. https://doi.org/10.1016/j.chb.2004.03.003.

Lu, H.-P., & Yang, Y.-W. (2014). Toward an understanding of the behavioral intention to use a social networking site: An extension of task-technology fit to social-technology fit. *Computers in Human Behavior, 34*(1), 323–332. https://doi.org/10.1016/j.chb.2013.10.020.

Lu, J., Yao, J. E., & Yu, C.-S. (2005). Personal innovativeness, social influences and adoption of wireless Internet services via mobile technology. *The Journal of Strategic Information Systems, 14*(3), 245–268.

Lwoga, E. (2013). Measuring the success of library 2.0 technologies in the African context: The suitability of the DeLone and McLean model. *Campus-Wide Information Systems, 30*(4), 288–307. https://doi.org/10.1108/CWIS-02-2013-0011.

Makokha, M. W., & Ochieng, D. O. (2014). Assessing the success of ICT ' s from a user Perspective : Case study of coffee research foundation in Kenya. *Journal of Management and Strategy, 5*(4), 46–54. https://doi.org/10.5430/jms.v5n4p46.

Marchewka, J. T., & Kostiwa, K. (2007). An application of the UTAUT model for understanding student perceptions using course management software. *Communications of the IIMA, 7*(2), 93–104. http://scholar.google.com/scholar?hl=en&btnG=Search&q=intitle:An+Application+of+the+UTAUT+Model+for+Understanding+Student+Perceptions+Using+Course+Management+Software#0.

Martins, C., Oliveira, T., & Popovič, A. (2014). Understanding the internet banking adoption: A unified theory of acceptance and use of technology and perceived risk application. *International Journal of Information Management, 34*(1), 1–13. https://doi.org/10.1016/j.ijinfomgt.2013.06.002.

McGill, T. J., & Klobas, J. E. (2009). A task-technology fit view of learning management system impact. *Computers & Education, 52*(2), 496–508. https://doi.org/10.1016/j.compedu.2008.10.002.

Moghawemi, S., Mohd Salleh, N. A., Zhao, W., & Mattila, M. (2012). The entrepreneur's perception on information technology innovation adoption: An empirical analysis of the role of precipitating events on usage behavior. *Innovation: Management, Policy & Practice, 14*(2), 231–246. https://doi.org/10.5172/impp.2012.14.2.231.

Mohammadi, H. (2015). Investigating users ' perspectives on e-learning : An integration of TAM and IS success model. *Computers in Human Behavior, 45*(1), 359–374. https://doi.org/10.1016/j.chb.2014.07.044.

Montesdioca, G. P. Z., & Maçada, A. C. G. (2015). Measuring user satisfaction with information security practices. *Computers & Security, 48*(1), 267–280. https://doi.org/10.1016/j.cose.2014.10.015.

Mutahar, A. M., Daud, N. M., Ramayah, T., Putit, L., Isaac, O., & Alrajawy, I. (2016). The role of trialability, awareness, perceived ease of use, and perceived usefulness in determining the perceived value of using mobile banking in Yemen. *7th international conference postgraduate education (ICPE7)*. Malaysia: Shah Alam.

Myers, R. H. (1990). *Classical and modern regression with applications* (2nd ed.). Boston: MA: Duxbury.

Nassuora, A. (2013). Students acceptance of mobile learning for higher education in Saudi Arabia. *International Journal of Learning Management Systems, 1*(1), 1–9. https://doi.org/10.12785/ijlms/010101.

Negahban, A., & Chung, C.-H. (2014). Discovering determinants of users perception of mobile device functionality fit. *Computers in Human Behavior, 35*, 75–84. https://doi.org/10.1016/j.chb.2014.02.020.

Ney, B. (2012). *Unraveling the adoption of mCRM smartphone applications among Dutch retailers*. University of Twente.

Nistor, N., Lerche, T., Weinberger, A., Ceobanu, C., & Heymann, O. (2014). Towards the integration of culture into the unified theory of acceptance and use of technology. *British Journal of Educational Technology, 45*(1), 36–55. https://doi.org/10.1111/j.1467-8535.2012.01383.x.

Norzaidi, M., Chong, S. C., Murali, R., & Salwani, M. I. (2007). Intranet usage and

managers' performance in the port industry. *Industrial Management & Data Systems, 107*(8), 1227–1250. https://doi.org/10.1108/02635570710822831.

Norzaidi, M. D., Chong, S. C., Murali, R., & Salwani, M. I. (2009). Towards a holistic model in investigating the effects of intranet usage on managerial performance: A study on Malaysian port industry. *Maritime Policy & Management, 36*(3), 269–289. https://doi.org/10.1080/03088830902861235.

Norzaidi, M. D., & Salwani, M. I. (2009). Evaluating technology resistance and technology satisfaction on students' performance. *Campus-Wide Information Systems, 26*(4), 298–312. https://doi.org/10.1108/10650740910984637.

Nunnally, J. C., & Bernstein, I. H. (1994). *Psychometric theory*. New York: McGraw-Hill.

Nuq, P. A., & Aubert, B. (2013). Towards a better understanding of the intention to use eHealth services by medical professionals: The case of developing countries. *International Journal of Healthcare Management, 6*(4), 217–236. https://doi.org/10.1179/2047971913Y.0000000033.

Nysveen, H., & Pedersen, P. E. (2014). Consumer adoption of RFID-enabled services. Applying an extended UTAUT model. *Information Systems Frontiers*. https://doi.org/10.1007/s10796-014-9531-4.

Oliveira, T., Faria, M., Thomas, M. A., & Popovič, A. (2014). Extending the understanding of mobile banking adoption: When UTAUT meets TTF and ITM. *International Journal of Information Management, 34*(5), 689–703. https://doi.org/10.1016/j.ijinfomgt.2014.06.004.

Oyedemi, T. D. (2012). Digital inequalities and implications for social inequalities: A study of internet penetration amongst university students in South Africa. *Telematics and Informatics, 29*(3), 302–313. https://doi.org/10.1016/j.tele.2011.12.001.

O'brien, R. M. (2007). A caution regarding rules of thumb for variance inflation factors. *Quality and Quantity, 41*(5), 673–690. https://doi.org/10.1007/s11135-006-9018-6.

Pahnila, S., Siponen, M., & Zheng, X. (2011). Integrating habit into UTAUT: The Chinese eBay case. *Pacific Asia Journal of the Association for Information Systems, 3*(2), 1–30.

Pai, F.-Y., & Huang, K.-I. (2011). Applying the Technology Acceptance Model to the introduction of healthcare information systems. *Technological Forecasting and Social Change, 78*(4), 650–660. https://doi.org/10.1016/j.techfore.2010.11.007.

Petter, S., DeLone, W., & McLean, E. (2008). Measuring information systems success: Models, dimensions, measures, and interrelationships. *European Journal of Information Systems, 17*(3), 236–263.

Pew Research Centre. (2013). *Nations embrace internet & mobile technology*.

Porter, C. E., & Donthu, N. (2006). Using the technology acceptance model to explain how attitudes determine Internet usage: The role of perceived access barriers and demographics. *Journal of Business Research, 59*(9), 999–1007. https://doi.org/10.1016/j.jbusres.2006.06.003.

Princely, I. (2014). An examination of information technology assets and resources as antecedent factors to ERP SYSYTEM success. *Eighth Mediterranean Conference on Information Systems, 1–17*.

Raman, A., & Don, Y. (2013). Preservice teachers' acceptance of learning management software: An application of the UTAUT2 model. *International Education Studies, 6*(7), 157–164. https://doi.org/10.5539/ies.v6n7p157.

Raman, A., Don, Y., Khalid, R., Hussin, F., Omar, M. S., & Ghani, M. (2014). Technology acceptance on smart board among teachers in terengganu using UTAUT model. *Asian Social Science, 10*(11). https://doi.org/10.5539/ass.v10n11p84.

Ramayah, T. (2006). Interface characteristics, perceived ease of use and intention to use an online library in Malaysia. *Information Development, 22*(2), 123–133. https://doi.org/10.1177/0266666906065575.

Ramayah, T., Ignatius, J., & Aafaqi, B. (2005). PC usage among students in A private institution of higher Learning : The moderating role of prior experience. *Jurnal Pendidik Dan Pendidikan, 20*(1), 131–152.

Ramayah, T., & Lo, M.-C. (2007). Impact of shared beliefs on "perceived usefulness" and "ease of use" in the implementation of an enterprise resource planning system. *Management Research News, 30*(6), 420–431. https://doi.org/10.1108/01409170710751917.

Ramayah, T., & Suki, N. M. (2006). Intention to use mobile pc among mba Students : Implications for technology integration in the learning curriculum. *UNITAR e-journal, 2*(2), 30–39.

Revels, J., Tojib, D., & Tsarenko, Y. (2010). Understanding consumer intention to use mobile services. *Australasian Marketing Journal, 18*(2), 74–80. https://doi.org/10.1016/j.ausmj.2010.02.002.

Ringle, C. M., Wende, S., & Becker, J.-M. (2015). SmartPLS 3. Bonningstedt: SmartPLS. Retrieved October 30, 2017, from http://www.smartpls.com.

Roca, J. C., Chiu, C.-M., & Martínez, F. J. (2006). Understanding e-learning continuance intention: An extension of the Technology Acceptance Model. *International Journal of Human-Computer Studies, 64*(8), 683–696. https://doi.org/10.1016/j.ijhcs.2006.01.003.

Rogers, E. M. (2002). Diffusion of preventive innovations. *Addictive Behaviors, 27*(6), 989–993. https://doi.org/10.1016/S0306-4603(02)00300-3.

Rui-jin, Z., Guo-xin, L., & Ze-zhou, S. (2014). Relationship between consumer innovativeness and internet banking acceptance. In *International conference on management science & engineering (21th)* (pp. 308–314).

Sam, H. K., Othman, A. E. A., & Nordin, Z. S. (2005). Computer self-efficacy, computer anxiety, and attitudes toward the internet: A study among undergraduates in unimas. *Educational Technology & Society, 8*(4), 205–219. https://doi.org/10.2307/jeductechsoci.8.4.205.

Sánchez, R., Cortijo, V., & Javed, U. (2014). Students' perceptions of Facebook for academic purposes. *Computers & Education, 70*(1), 138–149. https://doi.org/10.1016/j.compedu.2013.08.012.

Sawang, S., Zhou, Y., & Yang, X. (2017). Does institutional context matter in building innovation capability? *International Journal of Technological Learning, Innovation and Development, 9*(2), 153–168.

Schumacker, R. E., & Lomax, R. G. (2004). *A beginner's guide to structural equation modeling*. New York: Lawrence Erlbaum.

Serbern, D. F. (2014). *The examination of factors influencing social Media usage by african American small business owners using the UTAUT model*. Capella University.

Shih, H.-P. (2004). Extended technology acceptance model of Internet utilization behavior. *Information & Management, 41*(6), 719–729. https://doi.org/10.1016/j.im.2003.08.009.

Shih, Y. Y., & Chen, C. Y. (2013). The study of behavioral intention for mobile commerce: Via integrated model of TAM and TTF. *Quality and Quantity, 47*(580), 1009–1020. https://doi.org/10.1007/s11135-011-9579-x.

Shih, Y.-Y., & Fang, K. (2004). The use of a decomposed theory of planned behavior to study Internet banking in Taiwan. *Internet Research, 14*(3), 213–223. https://doi.org/10.1108/10662240410542643.

Simsim, M. T. (2011). Internet usage and user preferences in Saudi Arabia. *Journal of King Saud University - Engineering Sciences, 23*(2), 101–107. https://doi.org/10.1016/j.jksues.2011.03.006.

Singeh, F. W., Abrizah, A., & Karim, N. H. A. (2013). Malaysian authors' acceptance to self-archive in institutional repositories: Towards a unified view. *The Electronic Library, 31*(2), 188–207. https://doi.org/10.1108/02640471311312375.

Singh, N., Fassott, G., Chao, M. C. H., & Hoffmann, J. a. (2006). Understanding international web site usage: A cross-national study of German, Brazilian, and Taiwanese online consumers. *International Marketing Review, 23*(1), 83–97. https://doi.org/10.1108/02651330610646304.

Son, H., Park, Y., Kim, C., & Chou, J.-S. (2012). Toward an understanding of construction professionals' acceptance of mobile computing devices in South Korea: An extension of the technology acceptance model. *Automation in Construction, 28*(1), 82–90. https://doi.org/10.1016/j.autcon.2012.07.002.

Straub, D., Limayem, M., & Karahanna-Evaristo, E. (1995). Measuring system usage: Implications for IS theory testing. *Management Science, 41*(8), 1328–1342.

Sullivan, G. M., & Feinn, R. (2012). Using Effect Size - or why the p Value is not enough. *Journal of Graduate Medical Education, 4*(3), 279–282.

Sumak, B., Polancic, G., & Hericko, M. (2010). An empirical study of virtual learning environment adoption using UTAUT. In *, Vols. 17–22. 2010 second international Conference on mobile, hybrid, and on-line learning*. https://doi.org/10.1109/eLmL.2010.11.

Sun, Y., & Mouakket, S. (2015). Assessing the impact of enterprise systems technological characteristics on user continuance behavior: An empirical study in China. *Computers in Industry, 70*(1), 1–15. https://doi.org/10.1016/j.compind.2015.01.003.

Tabachnick, B. G., & Fidell, L. S. (2012). *Using multivariate statistics* (6th ed.). New York: Pearson.

Taiwo, A., Mahmood, A., & Downe, A. (2012). User acceptance of eGOVERNMENT : Integrating risk and trust dimensions with UTAUT model. In *2012 international conference on computer & information science (ICCIS)* (pp. 4–8).

Tan, K. S., Chong, S.-C., & Lin, B. (2013). Intention to use internet marketing: A comparative study between Malaysians and South Koreans. *Kybernetes, 42*(6), 888–905. https://doi.org/10.1108/K-12-2012-0122.

Tarhini, A., Alalwan, A., Al-Qirim, N., Algharabat, R., & Masa'deh, R. (2018). An analysis of the factors influencing the adoption of online shopping. *International Journal of Technology Diffusion, 9*(3), 68–87. https://doi.org/10.4018/IJTD.2018070105.

Tarhini, A., Hone, K., & Liu, X. (2014a). Measuring the moderating effect of gender and age on E-learning acceptance in england: A structural equation modeling approach for an extended technology acceptance model. *Journal of Educational Computing Research, 51*(2).

Tarhini, A., Hone, K., & Liu, X. (2014b). The effects of individual differences on e-learning users ' behaviour in developing countries : A structural equation model. *Computers in Human Behavior, 41*(1), 153–163. https://doi.org/10.1016/j.chb.2014.09.020.

Tarhini, A., Teo, T., & Tarhini, T. (2015). A cross-cultural validity of the E-learning acceptance measure (ElAM) in Lebanon and england: A confirmatory factor analysis. *Education and Information Technologies, 21*(5), 1269–1282. https://doi.org/10.1007/s10639-015-9381-9.

Teo, T. S., Lim, V. K., & Lai, R. Y. (1999). Intrinsic and extrinsic motivation in Internet usage. *Omega, 27*(1), 25–37. https://doi.org/10.1016/S0305-0483(98)00028-0.

Thakur, R., & Srivastava, M. (2013). Customer usage intention of mobile commerce in India : An empirical study. *Journal of Indian Business Research, 5*(1), 52–72. https://doi.org/10.1108/17554191311303385.

Thomas, T. D., Thakur, D., Jackman, G.-A., Thomas, M., Gajraj, R., Allen, C., et al. (2014). Measurement invariance of the UTAUT constructs in the Caribbean. *International Journal of Education and Development using Information and Communication Technology, 10*(4), 102–127.

Tibenderana, P. K. G., & Ogao, P. J. (2008). Acceptance and use of electronic library services in ugandan universities. *Proceedings of the 8th ACM/IEEE-CS Joint Conference on Digital Libraries*, 323–332. https://doi.org/10.1145/1378889.1378944.

Todd, & Taylor. (1995). Understanding information technology usage: A test of competing models. *Information Systems Research, 6*(1), 144–176.

Toh, C. H. (2013). Assessing adoption of wikis in a Singapore secondary school: Using the UTAUT model. In *Proceedings of the 2013 IEEE 63rd annual conference international council for education Media* (pp. 1–9). ICEM, 2013 https://doi.org/

10.1109/CICEM.2013.6820158.
Touray, A., & Salminen, A. (2013). The impact of moderating factors on behavioral intention towards Internet : A transnational perspective. *International Journal of Computer and Information Technology, 02*(06), 1035–1041.
Vallerand, R. J. (1997). Toward a hierarchical model of intrinsic and extrinsic motivation. In M. Zanna (Ed.), *Advances in experimental social psychology* (Vol. 29, pp. 271–360). New York: Academic Press.
Velarde, V. D. V. (2012). *Determinants of online purchasing behavior: An empirical investigation using an extension of the Theory of Planned Behavior* (pp. 1–91). Aarhus University (November) http://pure.au.dk/portal-asb-student/files/51108023/Master_Thesis_Vania_D_V_Velarde.pdf. Master Thesis.
Venkatesh, V., Morris, M. G., Davis, G. B., Davis, F. D., & Sam. (2003). User acceptance of information technology : toward a unified view. *MIS Quarterly, 27*(3), 425–478.
Venkatesh, V., Thong, J. Y. L., Chan, F. K. Y., Hu, P. J.-H., & Brown, S. a. (2011). Extending the two-stage information systems continuance model: Incorporating UTAUT predictors and the role of context. *Information Systems Journal, 21*(6), 527–555. https://doi.org/10.1111/j.1365-2575.2011.00373.x.
Venkatesh, V., Thong, J. Y. L., & Xu, X. (2012). Consumer acceptance and use of information technology : extending the unified theory of acceptance and use of technology. *MIS Quarterly, 36*(1), 157–178.
Viswanath, V., & Morris, M. G. (2000). Why don't men ever stop to ask for directions? Gender, social influence, and their role in technology acceptance and usage behavior. *MIS Quarterly, 24*(1), 115–139.
Vogiatzi, M. (2015). The use of ICT technologies enhances employees ' performance in the Greek hotel industry. *International Journal of Economics, Finance and Management Sciences, 3*(1), 43–56. https://doi.org/10.11648/j.ijefm.20150301.16.
Wang, Y. S. (2008). Assessing e-commerce systems success: A respecification and validation of the DeLone and McLean model of IS success. *Information Systems Journal, 18*(5), 529–557. https://doi.org/10.1111/j.1365-2575.2007.00268.x.
Wang, J., & Hou, F. (2003). Research on the relationship between the internet usages and the organizational performance in the Taiwanese E-commerce business organizations. *Informing Science, 1*(1), 17–25.
Wang, Y., Hung, Y.-H., & Chou, S.-C. T. (2006). Acceptance of E-government Service : A validation of the UTAUT. In *The 5Th WSEAS international conference on E-ACTIVITIES* (pp. 165–170) (Venice).
Wang, Y.-S., & Liao, Y.-W. (2008). Assessing eGovernment systems success: A validation of the DeLone and McLean model of information systems success. *Government Information Quarterly, 25*(4), 717–733. https://doi.org/10.1016/j.giq.2007.06.002.
Wang, C.-H., Liu, W.-L., Tseng, M.-C., & Tsai, H.-S. (2005). A study of Taiwanese college teachers' acceptance of distance learning. *The International Journal of Oral Implantology, 2*(2), 243–261.
Wang, C.-H., Liu, W.-L., Tseng, M.-C., & Tsai, H.-S. (2010). A study of Taiwanese college teachers' acceptance of distance learning. *The International Journal of Oral Implantology, 3*(2), 243–260 (Online) http://search.proquest.com.ezp.waldenulibrary.org/pqcentral/docview/763161555/14112A4A3367E0681ED/15?accountid=14872%5Cnhttp://media.proquest.com.ezp.waldenulibrary.org/media/pq/classic/doc/2184119651/fmt/pi/rep/NONE?hl=utaut,models,model&cit:auth=Wang.
Wiratmadja, I. I., Govindaraju, R., & Athari, N. (2012). The development of mobile internet technology acceptance model. In *2012 IEEE international conference on management of innovation & technology (ICMIT)* (pp. 384–388). https://doi.org/10.1109/ICMIT.2012.6225836.
World Development Indicators. (2016). *Internet users as percentage of population: Yemen vs. neighbour arab countries*. World Bank.
Wu, Y., Tao, Y., & Yang, P. (2007). Using UTAUT to explore the behavior of 3G mobile communication users. In *2007 IEEE international conference on industrial engineering and engineering management* (pp. 199–203). https://doi.org/10.1109/IEEM.2007.4419179.
Wu, J.-H., & Wang, Y.-M. (2006). Measuring KMS success: A respecification of the DeLone and McLean's model. *Information & Management, 43*(6), 728–739. https://doi.org/10.1016/j.im.2006.05.002.
Xinli, H. (2015). Effectiveness of information technology in reducing corruption in China : A validation of the Delone and mclean information systems success model. *The Electronic Library, 33*(1), 1–23.
Xu, X. (2014). Understanding users ' continued use of online Games : An application of UTAUT2 in social network games. In *MMEDIA 2014: The sixth international conferences on advances in multimedia,(c)* (pp. 58–65).
Yang, S. (2013). Understanding undergraduate students' adoption of mobile learning model: A perspective of the extended UTAUT2. *Journal of Convergence Information Technology, 8*(10), 969–979. https://doi.org/10.4156/jcit.vol8.issue10.118.
Yu-Lung, W., Yu-Hui, T., & Pei-Chi, Y. (2008). The use of unified theory of acceptance and use of technology to confer the behavioral model of 3G mobile telecommunication users. *Journal of Statistics & Management Systems, 11*(5), 919–949. https://doi.org/10.1080/09720510.2008.10701351.
Yueh, H., Huang, J., & Chang, C. (2015). Exploring factors affecting students ' continued Wiki use for individual and collaborative learning : An extended UTAUT perspective. *Australasian Journal of Educational Technology, 31*(1), 16–31.
Yurdakul, I., Ursavas, O. F., & Isciturk, G. B. (2014). An integrated approach for preservice teachers ' acceptance and use of Technology : UTAUT-PST scale. *European Journal of Educational Research*, (55), 21–36.
Yuthas, K., & Young, S. T. (1998). Material matters: Assessing the effectiveness of materials management IS. *Information & Management, 33*(3), 115–124.
Zhou, T. (2008). Exploring mobile user acceptance based on UTAUT and contextual offering. In *2008 international Symposium on electronic Commerce and security* (pp. 241–245). https://doi.org/10.1109/ISECS.2008.10.
Zhou, T. (2013). Understanding continuance usage of mobile services. *International Journal of Mobile Communications, 11*(1), 56–70. https://doi.org/10.1504/IJMC.2013.050995.
Zhou, T., Lu, Y., & Wang, B. (2010). Integrating TTF and UTAUT to explain mobile banking user adoption. *Computers in Human Behavior, 26*(4), 760–767. https://doi.org/10.1016/j.chb.2010.01.013.

Please cite this article as: Isaac, O et al., Antecedents and outcomes of internet usage within organisations in Yemen: An extension of the Unified Theory of Acceptance and Use of Technology (UTAUT) model, Asia Pacific Management Review, https://doi.org/10.1016/j.apmrv.2018.12.003