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Examining the Relationship Between Overall Quality, User Satisfaction and Internet Usage: An Integrated Individual, Technological, Organizational and Social Perspective

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Abstract: For most of us today, the internet has a significant effect on every aspect of our daily life and every facet of the operation of our organizations. Yet, despite its importance and world-wide reach, internet usage in Yemen is one of the lowest among the world's countries. Many scholars have studied and proposed theories and models to predict and explain user behaviour to account for the rapid change in both technology and its environment. In order to further better comprehend internet usage and user satisfaction within organizations, this study has developed and validated a multi-dimensional model, based on three well-known topic in technology management (technology acceptance, task-technology fit and information systems success) within four well-known theories and models, namely Technology Acceptance Model (TAM) Unified Theory of Acceptance and Use of Technology (UTAUT) Task-Technology Fit (TTF) and DeLone and McLean Information Systems Success Model (DMISM) from a perspective which integrates four different dimensions (individual, technological, social and organizational). In addition, a second-order model of overall quality which contains seven first-order constructs (system quality, information quality, service quality, task quality, individual quality, social quality and top management quality) is proposed and validated. A survey questionnaire was used to collect primary data from 530 internet users among employees within thirty government ministries in Yemen. The data analysis start with initial Exploratory Factor Analysis (EFA) followed by Confirmatory Factor Analysis (CFA) and lastly Structural Equation Modelling (SEM) via AMOS. The findings from the descriptive analysis show that the majority of employees surveyed have the awareness of the quality of internet information are dissatisfied with service and top management quality have the confidence to browse the WWW use a search engine and send an e-mail but do not have the confidence to download and upload files. They did agree with the notion that family, friends and coworkers think that using the internet is a good idea. Although, employees find the internet easy to use, flexible, useful and enjoyable, they consider its speed to be very low, it is not secure and its subscription is not reasonably priced. The results show that the data fit the proposed integrated model well. The findings of the multivariate analysis produced three main results. First, overall quality has a strong positive impact on actual usage and user satisfaction. Second, actual usage has a positive influence on user satisfaction. Third, the bootstrapping analysis showed that actual usage mediates the relationship between overall quality and user satisfaction. The theoretical and practical implications are also discussed.

Key words: DeLone and McLean, UTAUT, Yemen, overall quality, system quality, information quality, service quality, user satisfaction

INTRODUCTION

Internet technology is described as most likely the greatest invention of our generation (Hypponen, 2013) significantly affecting every facet of our daily life, education (Aspillera, 2013), communication (Norzaidi and Salwani, 2009), health care (Fox and Duggan, 2013), culture (Rainie *et al*., 2011), politics (Mancini, 2014), economy (PRC, 2013) and organizations (Wang and Hau, 2003; Chen, 2008). Internet usage has more recently come to be considered as one of the basic human rights (Negroponte, 2014). Internet usage is spreading rapidly with around 40% of the world population (3,424,971,237 users) with an internet connection today compared to 14,161,570 in 1993 (ILS, 2016). In the near future, the Internet of Things (IoT)

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where the entire physical world (goods, objects, appliances, buildings, vehicles, animals, people, soil and plants) will be connected through the internet will become a reality and everything will be controllable and manageable. Research firm gartner predicts the IoT will generate $300 bln. in revenue by 2020 with estimates of how many connected devices ranging from 25 to >200 bln. (Butler, 2014) this leaves individuals, organizations, governments and even countries with little choice but to adapt internet or they will all be left behind in terms of development.

Despite the importance of the internet, the rapid increase in world-wide internet usage and its future potential, Yemen has a very low internet penetration and usage of only 24.70% against a world average of 46.40% and is also well behind its Arab neighbours which have a much higher rate of internet penetration and usage such as (Qatar, 97.40%; Bahrain, 92.70%; UAE, 91.90%; Kuwait, 79.9%; Lebanon, 75.90%; Jordan, 73.60%; Oman, 71.10%; Saudi Arabia, 64.70%) and even Palestine (63.20%) (IWS, 2016). Low internet penetration hinders social, economic and political development (Oyedemi, 2012). And lack of technology usage leads to low performance and low productivity (Delone and McLean, 1992, 2003; Norzaidi and Salwani, 2009; Kassim *et al*., 2012; Makokha and Ochieng, 2014). The reason that the focus of this study is technology usage within the public sector in Yemen, rather than private sector is because the available studies and statistics show that there is a gap and decline in technology usage within the public sector in Yemen (change in ranking between 2013 and 2014 in public technology usage = -5) compared to the improvement in technology usage within the private sector (change in ranking between 2013 and 2014 in private technology usage = +6). Venkatesh *et al*. (2003) recommended that future studies on technology usage focus and fill the gap in the context of the public sector and also (Fig. 1) individual and government information technology usage in Yemen ranked is very low.

Change in Information Technology (IT) is one of the most salient and active factors influencing employees and organizations today, growing substantially and itself becoming a driver of further change (Kassim *et al*., 2012) as organizations around the world struggle to keep up to date with emerging technology. One of the main sectors affected by the growth of IT is the public sector. Several theories and models have been developed to investigate and understand the factors affecting technology usage and information system success, seeking to reduce any ambiguity related to technology adoption and related issues. The well-known theories and models that have been using to answer questions related to technology usage issues are: Technology Acceptance Model (TAM) (Davis, 1989) DeLone and McLean Information Systems Success Model (DMISM) (DeLone and McLean, 1992, 2033) and updated model (DeLone and McLean, 2003) Task-Technology Fit (TTF) (Goodhue and Thompson, 1995) and Unified Theory of Acceptance and Use of Technology (UTAUT) (Venkatesh *et al*., 2003).

According to Agarwal (2000), there are four characteristics that influence technology success within an organizations, namely individual, social, technological and organizational characteristics. Most previous studies

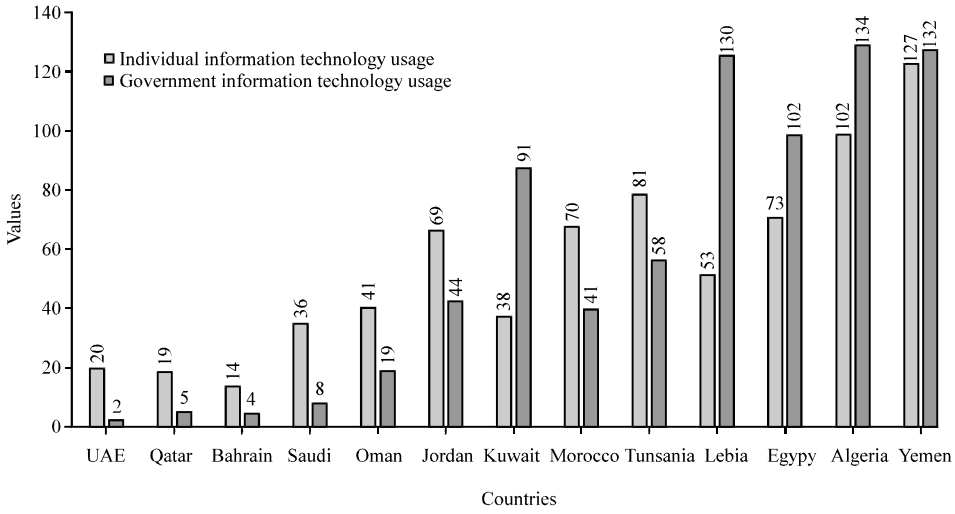

Fig. 1: Individual and government information technology usage: ranking of Arab countries among 143 country; Global Information Technology Report in 2015

have focused on one, two or at most three of these and there is a lack of studies presenting the big picture and a comprehensive perspective of the issues related to technology usage in organizations (Wang and Lai, 2014).

Although, TAM by Davis (1989) is considered the most influential and commonly employed theory for describing an individual's acceptance of information systems (Venkatesh, 2000) it only focuses on technological characteristics by proposing two constructs (usefulness and ease of use) but ignores other significant characteristics which significantly affect technology usage such as individual characteristics (Cheng, 2011) organizational characteristics (Fagan *et al*., 2004; Kim *et al*., 2008) task characteristics (Lu and Yang, 2014; Norzaidi *et al*., 2009) and social characteristics (Cheng, 2011; Lian, 2015). In addition, TAM disregards any focus on evaluating IT such as user satisfaction or performance impact (Shih and Chen, 2013; Shih and Fang, 2014) which are both widely used to measure the success of information systems (Montesdioca and Macada, 2015).

On the other hand, UTAUT by Venkatesh *et al*. (2003) brings together a range of theoretical frameworks and ideas and covers range of characteristics: individual characteristics (performance expectancy, effort expectancy) organizational characteristics (facilitating conditions) and social characteristics (social influence) but it does disregard some of the critical characteristics related to technology usage, system characteristics (system and information quality) which have been shown to play an important role in determining technology usage (Gu *et al*., 2009; Pai and Huang, 2011; Zhou, 2011) and also play a major role in determining satisfaction towards technology usage (Roca *et al*., 2006; Sun *et al*., 2008). UTAUT also neglects to study the output of technology usage such as user satisfaction, Venkatesh *et al*. (2003) do suggest adding system characteristics to the UTAUT model in future work.

Although, TTF (Goodhue and Thompson, 1995) determines the technological, individual and task characteristics as the main antecedence characteristics, it ignores the effect of other important characteristics such as social characteristics (Venkatesh *et al*., 2012) and organizational characteristics (top management quality) (Son *et al*., 2012; Wang and Lai, 2014) which play a major role in technology usage and the success of information systems. Because TTF focuses on fit alone, it does not give adequate attention to the fact that systems must be utilized (used) before they can have any impact on any output factor (Irick, 2008). This means that TTF neglects the role of actual system usage in the model.

DeLone and McLean (1992, 2003)'s DMISM model has widespread acceptance among the models regarding technology adoption and information system success (Petter and McLean, 2009). It proposes three antecedence constructs in the update model (system, information and service quality) but ignores other important constructs such as individual characteristics (Roca *et al*., 2006; Zhao *et al*., 2011) task characteristics (Lee and Kim, 2009; Lu and Yang, 2014) and social characteristics (Cheng *et al*., 2006; Lian, 2015) all of which are considered as an important constructs to determine technology usage and user satisfaction. The popularity of DMISM derives from the comprehensiveness which allows IS scholars to fully integrate their findings (Wang and Lai, 2014).

Although, there are some notable researches which adopt rather more comprehensive models to examine issues related to the context of technology usage (Anandarajan *et al*., 2002; Kang *et al*., 2013; Koh *et al*., 2010; Wixom and Todd, 2005; Lin and Huang, 2009) these studies are inclined to devote limited attention to presenting a multi-dimensional model that includes technological, organizational, individual and social characteristics and how these factors contribute to individual system usage and user satisfaction.

This study fills the gaps by developing an integrated model between the well-known theories and models (TAM, UTAUT, TTF and DMISM) which cover 7 antecedent variables (system, information, top management, service, individual, social and task quality). Actual usage as a mediation variable and user satisfaction as a dependent variable are used to measure the success of internet usage.

As parsimony is one of the objectives of any study and the proposed integrated model of this study is somewhat complex because of the multi-dimensional characteristics that are included in the conceptual framework, this study proposes and validates a higher-order model (second-order model) of overall quality to reduce its complexity. The main reason for capsulation the dimensions/first-order constructs (system, information, service, task, individual, social and top management quality) under higher-order is parsimony. According to Hair *et al*. (2013), the main reasons for the inclusion of a higher-order/second-order is to minimize the number of relationships in the structural model, making the path model more parsimonious and easier to grasp. Table 1 summarizes the research gaps in the previous studies in the context of technology usage and the presents the proposed integrated model which fills these above-mentioned gaps.

Table 1: Knowledge gaps and the proposed integrated model for closing the gaps

	Independent/Antecedent variables/Overall quality								
	Technology characteristics		Organizational characteristics			Individual characteristics	Social characteristics	Mediator variable	Dependent variable
Theory/model and source	System quality	Information quality	Service quality	Task quality	Top management quality	Individual quality	Social quality	Actual usage	User satisfaction
Technology Acceptance Model (TAM) (Davis, 1989)	√	Gap	Gap	Gap	Gap	Gap	Gap	√	Gap
Unified Theory of Acceptance and Use of Technology (UTAUT) (Venkatesh *et al*., 2003)	√	Gap	√	Gap	Gap	Gap	√	√	Gap
Task-Technology Fit (TTF) (Goodhue and Thompson, 1995)	√	√	Gap	√	Gap	√	Gap	Gap	Gap
DeLone and McLean Model of Information Systems success (DMISM) (Delone and Mclean, 1992)	√	√	√	Gap	Gap	Gap	Gap	√	√
Proposed integrated model for closing the gaps	√	√	√	√	√	√	√	√	√

This study looks to achieve the following research objectives: to test and validate the proposed integrated model which includes the higher-order model (second-order model) of overall quality. To examine the effect of overall quality on actual usage. To examine the effect of overall quality on user satisfaction. To examine the effect of actual usage on user satisfaction. To determine whether the construct actual usage mediates the relationship between overall quality and user satisfaction. If the result of this study is that the main proposed variables have a significant impact on user satisfaction, recommendations on how users could use the internet efficiently and effectively will be made. This research will also be a guide in other sectors as long the study is concerned with IT.

Literature review

Overall quality: Quality as an issue of scholarly interest is not a new in the area of Management Information System (MIS). Practitioners are constantly mindful of the necessity to enhance the IS quality function so it can respond to internal and external pressures and react to critical challenges to its survivability and growth (Aladwania, 1999; Wang and Lai, 2014). Further, IS researchers have always been concerned with quality definitions and related issues in the context of IS research (Aladwania and Palvia, 2002; Wu and Wang, 2006; Chien and Tsaur, 2007; Zhou, 2013; Xinli, 2015; DeLone and McLean, 1992, 2003). Scholars have emphasized the positive relationship between quality on one side and usage and satisfaction on the other (Flack, 2016). According to Sun *et al.* (2008), overall internet quality influences user satisfaction while Wang and Liao (2008) found that quality in the context of technology predicts actual usage and Lu and Yang (2014) indicated that quality of tasks has a positive relationship with the task-technology fit. The proposed second-order construct (overall quality) in this study is one of the initiatives to enrich literature regarding quality in the area of MIS with its 7 first-order constructs, namely system and information quality (Delone and Mclean, 1992), service quality (Delone and Mclean, 2003) task and individual quality (Goodhue and Thompson, 1995) social quality (Venkatesh *et al*., 2003) and top management quality (Wang and Lai, 2014).

System quality: Although, Sun *et al.* (2008) defined internet system quality as the degree of satisfied with the speed of the Internet, the quality of communication and ease of going on-line, Wu and Wang (2006) defined it as 'How good a system is in terms of its operational characteristics'. McFarland and Hamilton (2006) defined it as system functionality, performance and interactivity while Fan and Fang (2006) refer to it as user perception of the measuring system in its reliability, flexibility and accessibility. According to Wang and Lai (2014), the definition of system quality is the degree to which the system users are convinced that a system is easy to use, user-friendly, easy to learn, easy to connect and enjoyable to use. Alrajawy and Mutahar investigate the system characteristics through the indicators of easy to use and usefulness.

System quality is considered highly imperative as far as technology usage and user satisfaction are concerned

(Cheng *et al*., 2006, 2008). Several studies have shown that system quality influences usage and user satisfaction. For instance, Wang and Lai (2014) in the context of knowledge management systems, surveyed over 295 employee users and found that system quality positively influenced their usage and user satisfaction. A similar result was observed by Cheng *et al*. (2006, 2008) who studied system quality among 400 business executives using a questionnaire to collect data and found that user satisfaction is influenced by system quality. Makokha and Ochieng (2014) also indicated that system quality affects user satisfaction and usage. There are also a number of studies which have examined system characteristics through the factors of usefulness and ease of use and found that both positively influence system usage (Ramayah *et al*., 2005; Ramayah, 2006; Ramayah and Suki, 2006; Ramayah and Lo, 2007).

Conversely, Sun *et al*. (2008) when investigating on e-Learning among 645 students, found that technology quality and internet quality do not influence user satisfaction, a result confirmed by Chi (2013) noted that system quality indicators (privacy and responsiveness) do not affect user satisfaction. Khayun and Ractham found that system quality has a positive effect on system usage through a quantitative questionnaire distributed to 77 active users while Wang and Liao (2008) using a questionnaire distributed to 119 e-Government users, reported that system quality does not affect usage. Both Sahadev and Purani (2008) and Chakraborty and Sengupta (2014) in their research found that system quality does have a positive effect on user satisfaction.

Information quality: Wu and Wang (2006) defined information quality as how good the system is in terms of the quality of its output content while Fan and Fang (2006) defined it as user perception through measuring system output in terms of reliability, accuracy, completeness and consistency. Mohammadi (2015) regarded information quality as the degree to which system users are convinced that internet information is up-to-date, accurate, relevant, comprehensive and organized. Princely defined it as the degree to which system users are convinced that internet information is understandable, concise, relevant, usable and available. Wang and Lai (2014) considered information quality as the degree to which system users are convinced that internet information is logical, accurate, sufficient, timely and meets needs.

In determining the factors that influence system usage, information quality has become one of the essential ones to deal with it (Wang and Lai, 2014). Various MIS researchers have conducted studies on the relationship between information quality and actual system usage and user satisfaction. For instance, Wang and Lai (2014) found that information quality has a positive effect on both user satisfaction and usage in their quantitative study which questioned 295 employees. Although, Fan and Fang (2006) in the context of ERP system found that information quality predicted user satisfaction in their quantitative study of 202 end-users, Cheng *et al*. (2006, 2008) in a survey of 400 business executives, found the opposite, that information quality does not predict user satisfaction.

According to Wang and Liao (2008) in a survey of 119 e-Government users in the context of e-Government systems both user satisfaction and actual usage were influenced by information quality. This was similar to a study by Cho *et al*. (2015) which indicated that information quality predicts user satisfaction and system usage.

Service quality: Service quality is defined as the degree to which system users are convinced that the necessary resources and technical assistance are available and compatible with other technologies (Lian, 2015; Gonzalez *et al*., 2012; Nistor *et al*., 2014). According to Cheng *et al*. (2006, 2008), Kurniawan (2010) and Nikhashemi *et al*. (2013), service quality plays a major role to determining user satisfaction. Several studies have investigated the influence of the service quality construct on usage and user satisfaction. Khayun and Ractham in a study of 77 active users found that service quality had a positive influence on user satisfaction and usage. Although, Makokha and Ochieng (2014) in the context of ICT indicated that service quality positively affects both user satisfaction and usage, Wang and Liao (2008) in the context of e-Government found the opposite that service quality does not influence both user satisfaction and usage. In the context of knowledge management systems, Wang and Lai (2014) found that service quality positively affects user satisfaction but does not affect system usage. In addition, Lwoga (2013) distributed a questionnaire to 368 undergraduate students and found that user satisfaction is not influenced by service quality.

Task quality: Tasks are broadly defined as actions carried out by individuals to turn input into output (Goodhue and Thompson, 1995). Kim *et al*. (2008) defined task characteristics as the degree to which system users deal with ill-defined job problems and cooperate with other members to accomplish tasks while Lu and Yang (2014) regard it as user needs for research or courseresearch. McFarland and Hamilton (2006) consider task characteristics to be the extent to which a task is non-routine and varied while Norzaidi *et al*. (2007, 2009) see it as the degree to which system users deal with a task

equivocality, task interdependence and task structure. A few studies have shown that task quality influences usage. For instance, in the context of mobile commerce, Lee *et al*. (2005) and Fadare et al. (2013) found that task characteristics positively affect utilization (usage). Although, McFarland and Hamilton (2006) found that task structure significantly predicts usage, in the context of e-Learning systems, Lee *et al*. (2011) found that task equivocality does not influence usage Although, task interdependence does.

Individual quality: Individual quality in the context of IS has been studied through different perspectives. Lai (2008), Kim *et al*. (2008), Lee and Kim (2009) examined individual quality through experience while Cheng *et al*. (2006, 2008), Lu *et al*. (2005) and Liu *et al*. (2010) investigated it through personal innovativeness. Ahmad *et al*. (2010a, b) examined it through skills by Chen (2013) and Chan *et al*. (2010) through awareness. This current study followed by Cheung and Vogel (2013), Shih and Fang (2004) who examined individual quality through self-efficacy and Zhao *et al*. (2011), Torkzadeh *et al*. (2006), Roca *et al*. (2006) and Cheng (2011) who looked at internet self-efficacy in particular. Self-efficacy is defined as the degree to which a user believes that he or she has the confidence to perform a specific task/job using the system (Hsu and Chiu, 2004). In this study, internet self-efficacy defined as an individual's judgment of his/her capability to use the internet (Torkzadeh and Dyke, 2001).

Individual characteristics is considered by Khayun and Ractham to be one of the most imperative factors for determining technology usage. A few studies have shown that individual characteristics influence both usage and user satisfaction. For instance, Lee *et al*. (2005) in a quantitative study within the context of mobile commerce, used a questionnaire to collect data from 110 responses and found that individual characteristics positively affect utilization (usage). Another study found that individual characteristics have a positive effect on actual usage in the context of an e-Learning system (Ghosh, 2016). While Ogara *et al*. (2014) indicate that individual characteristics positively affect user satisfaction in the context of mobile instant messaging, Sun *et al*. (2008) found the opposite, that individual characteristics do not affect user satisfaction in the context of e-Learning among students. Although, Khayun and Ractham in Thailand found that there is a relationship between individual characteristics and usage among students Wang and Lai (2014) found that self-efficacy does not predict usage among employees in the context of knowledge management systems in Taiwan.

Social quality: Social quality is defined as the degree to which a system user perceives that important others (family, friends and colleagues) believe he or she should use the system (Cheung *et al*., 2000; McGill and Klobas, 2009). Ifinedo (2012) defined it as the degree to which a system is compatible with beliefs, values and lifestyle.

According to Chen *et al*. (2012), social quality has become one of the important factors influencing technology usage and a number of studies have conducted on the influence of social characteristics on system usage and user satisfaction. For instance, Ogara *et al*. (2014) surveying 239 students in the context of mobile instant messaging found that social presence and social influence both predict user satisfaction. In the context of the internet and World Wide Web (WWW), Cheung *et al*. (2000) found that there is a relationship between social factors and system usage. Although, in the context of information systems Venkatesh *et al*. (2011) found that social influence positively affects user satisfaction in the context of mobile services, Revels *et al*. (2010) found the opposite that there is no relationship between social quality (image) and user satisfaction. Another study, in the context of IT usage among 143 computer users found that social pressure does not influence user satisfaction but does influence system usage (Anandarajan *et al*., 2002).

Top management quality: Top management quality is defined as the degree to which system users have been encouraged and recognized by top management (Son *et al*., 2012). While, McFarland and Hamilton (2006) defined this as management encouragement and resource support. Lee *et al*. (2011) look at it as the degree to which top management provides system users with useful resources, encouragement and technical assistance.

The top management quality construct is considered highly imperative as far as technology usage studied within an organization (Anandarajan *et al*., 2002). A few studies have shown that the quality of top management does influence technology usage. For example, in a quantitative study that collected data from 295 employees found that top management support positively influenced system usage (Wang and Lai, 2014). Although, McFarland and Hamilton (2006) found that there is a relationship between organizational support and system usage in the context of computer usage, Fagan *et al*. (2004) found that there is no such relationship. A quantitative study conducted by Lee *et al*. (2011) who distributed a questionnaire to 357 respondents revealed that organizational support does not influence actual usage but management support does.

Finally, Anandarajan *et al.* (2002) in a survey of 143 computer users, indicate that there is no relationship between organizational support and user satisfaction or between organizational support and usage. Consequently, the following two hypotheses are proposed:

- H_1: overall quality has a positive effect on actual usage
- H_2: overall quality has a positive effect on user satisfaction

Actual usage: Actual usage is defined as the usage frequency of the technology and usage times (Kim *et al.*, 2008; Fan and Fang, 2006). According to McFarland and Hamilton (2006), there are two self-reported system usage items, namely frequency of use and duration of use. Several studies have been conducted to investigate the influence of the actual usage construct on user satisfaction. For instance, Norzaidi and Salwani (2009) studying 354 undergraduate students, found that internet usage has a greater impact on technology satisfaction than technology satisfaction on internet usage. According to Makokha and Ochieng (2014) in the context of ICT in Kenya user satisfaction is influenced by technology usage. Hou (2012) in the context of ERP system, examined 202 end-users and observed that there is a relationship between usage and user satisfaction. Anandarajan *et al.* (2002) indicated that technology usage predicts user satisfaction. Within the context of smartphone technology in Nigeria, another study found that actual usage positively influences user satisfaction (Iyanda, 2016). Consequently, the following hypothesis is proposed:

- H_3: actual usage has a positive effect on user satisfaction

Although, Ahmed *et al.* (2010a, b) examines the satisfaction construct as a mediating variable, they found that there is a mediation effect of the satisfaction construct in the relationship between service quality and behavioral intention. As far as can be ascertained during this research, no attention has been given to the mediating role of actual usage in the relationship between overall quality and user satisfaction. Consequently, the following hypothesis is proposed:

- H_4: actual usage mediates the relationship between overall quality and user satisfaction

User satisfaction: One of the essential constructs in the context of IS to evaluate the system usage success is user satisfaction (DeLone and McLean, 1992, 2003) and this is widely used to measure the success of IS (Montesdioca and Macada, 2015). Although, Wang (2008) defined user satisfaction as the degree to which system users are satisfied with the decision to use a system and whether it met their expectations (Lin and Wang, 2012) defined it as the degree to which system users are satisfied with the speed, functions, quality and format of the system. Huang (2008) see it as the fulfillment of one's needs regarding ease of use, information delivered, services and acceptable price while Ogara *et al.* (2014) look at it as the perceived affective reactions of a respondent to the communication channel. Wu and Wang (2006) defined it as the sum of one's feelings of pleasure or displeasure regarding the system while according to Fan and Fang (2006), it is a subjective user evaluation of various consequences after using a system and Odel stated that user satisfaction is the extent of a user's (feelings about) prior system use.

A number of studies have shown that user satisfaction is influenced by system, information, service, task, individual, social and top management quality. For example, a survey of 507 users found that user satisfaction is positively influenced by system quality, information quality and service quality (Cho *et al.*, 2015). In addition, Chen *et al.* (2012) in the context of Web 2.0 found that there is a relationship between social quality (subjective norm) and user satisfaction as well as between social quality (image) and user satisfaction. Revels *et al.* (2010) indicate that system quality indicators (usefulness, ease of use, enjoyment and cost) predict user satisfaction while social quality (image) does not while in the context of ICT in Kenya, Makokha and Ochieng (2014) found that system quality, information quality, service quality and usage all positively affect user satisfaction. However, using a questionnaire to collect data from 119 e-Government users, Wang and Liao (2008) in a quantitative study found that service quality does not predict user satisfaction while system quality, information quality and usage do.

MATERIALS AND METHODS

Overview of the proposed research model: Based on the hypotheses presented in the literature review of the study, the proposed conceptual model is developed (Fig. 2) to close the gaps as shown in Table 1. This study integrated a number of well-known theories and models TAM (Davis, 1989) UTAUT (Venkatesh *et al.*, 2003) TTF (Goodhue and Thompson, 1995) and DMISM (Delone and Mclean, 2003, 1992) and developed a multidimensional model to investigate variables simultaneously from a comprehensive picture of technology usage including as

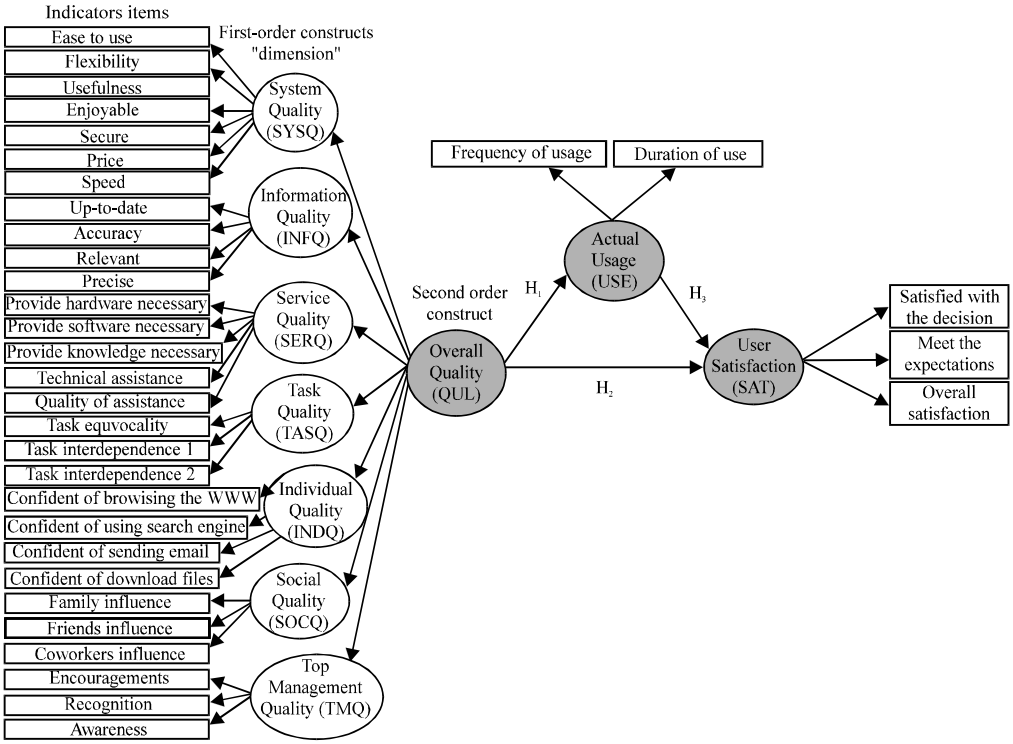

Fig. 2: The integrated research model

antecedent variables: technological characteristics (system and information quality) organizational characteristics (top management, service and task quality) individual characteristics (individual quality) and social characteristics (social quality) all 7 of which become first-order constructs for the second-order construct of overall quality for parsimonious reason (Hair *et al*., 2013). As discussed earlier, actual usage construct is used as a mediating variable and user satisfaction as a dependent variable to measure the success of internet usage.

Development of instrument: A 34 item questionnaire was developed for this study, incorporating the four main constructs of the proposed conceptual model adopted from existing literature and refined to fit with the context of this study. A pre-testing step was conducted before distributing the questionnaire instrument to a wider group. Aboutt 25 questionnaires were distributed to university students from Yemen who are presently studying in Malaysia. Their comments and recommendations were taken into consideration in order to fine-tune the questionnaire, particularly with regards to its length, the question sequence and the resolution of any mistakes or confusing items. The final version was then pilot-tested to examine internal consistency and out of the 60 surveys subsequently distributed among Yemeni employees in the Ministry of Communication and Information Technology, 58 were returned with complete and valid data. Beside the pilot test taking feedback comments into consideration, the validation of the measurement was done using Cronbach's alpha which measures the reliability (internal consistency) of the constructs. For the final questionnaire, all the constructs reliability had acceptable value because the individual Cronbach's alpha coefficients exceeded the recommended value of 0.7 (Nunnally and Bernstein, 1994). This study used a 7-point likert scale, ranging from 1 (strongly disagree) to 7 (strongly agree) to answer the questionnaire items. A likert scale and other types of interval-type scales are extensively used in organizational research since they lend themselves to more sophisticated data analysis. Please refer to Appendix A for the instruments.

Data collection: The targeted population was approximately 6,090 of internet users among Yemeni employees in the head offices of all 30 government ministries (called dwa'win) at the time this study was conducted. The adequate sample size for each ministry was selected based on the total number of employees and the data was collected using a self-administered study questionnaire, distributed personally to employees to motivate them and clarify any doubts. The main reason for

Table 2: Summary of demographic profile of respondents

Demographic item (categories)	Frequency	Percentage
Gender		
Male	412	81.1
Female	96	18.9
Age (year)		
<20	7	1.4
20-29	144	28.3
30-39	274	53.9
40-49	64	12.6
50 and above	19	3.7
Education background		
High school	53	10.4
Diploma	44	8.7
Bachelor degree	367	72.2
Master degree	44	8.7
Marital status		
Single	117	23.0
Married	380	74.8
Divorced	9	1.8
Widowed	2	0.4
Department		
IT department	181	35.6
Not IT department	327	64.4
Time in current position (years)		
<1	29	5.7
1-3	74	14.6
3-5	90	17.7
5 and above	315	62.0
Income (YER)		
<20,000	13	2.6
20,000-39,000	59	11.6
40,000-59,000	95	18.7
60,000-79,000	86	16.9
80,000-99,000	82	16.1
100,000 and above	173	34.1
Internet knowledge		
Very poor	7	1.4
Poor	22	4.3
Moderate	153	30.1
Good	211	41.5
Very good	115	22.6
Duration of internet usage (years)		
<2	41	8.1
2-4	95	18.7
4-6	91	17.9
6-8	77	15.2
8 and above	204	40.2

choosing this method of delivery was that it provides a high predictive value for assessing the efficiency of participants, especially when the target subject under study is related to an individual's perception, belief and opinion (Yalcinkaya, 2007).

A total of 700 questionnaires were distributed and 530 sets were returned of which 508 responses were useful for analysis. The final sample size was considered adequate (Tabachnick and Fidell, 2012; Krejcie and Morgan, 1970). The response rate of this study is 76% which is considered very good (Baruch and Holtom, 2008) by comparison with other studies found in the relevant literature. About 22 returned questionnaires were rejected, 12 because of missing data for >15% of the questions, 4 considered as outliers and 6 straight lining. The demographic profile of the respondents is shown in Table 2. About 81.1% (412) were male and 18.9% (96) female. 1.4% were <20 year s old, 28.3% between 20 and 29 years, 53.9% between 30 and 39, 12.6% between 40 and 49 and 3.7% were 50 years and above. In terms of education background, 10.4% had high school certificate, 8.7% had a diploma, 72.2% had a bachelor degree (the majority of participants) and the remaining 8.7% has finished postgraduate studies.

RESULTS AND DISCUSSION

Data analysis and results: As this study proposes an integrated full model and a second-order model of overall quality which contains the 7 first-order constructs (system, information, service, task, individual, social and top management quality) an Exploratory Factor Analysis (EFA) was first conducted to understand the structure of the variables and determine the correlation among them in the dataset (Field, 2013) followed by a Confirmatory Factor Analysis (CFA) to confirm the factor structure and specify how each construct is measured (Hair *et al*., 2013). Structural Equation Modelling (SEM) via AMOS was then used to specify how the constructs were related to each other in the structural model.

There has long been a debate over the use and merits of EFA and CFA in organizational research, resulting in some extremely energetic exchanges on both the research methods and the structural equation modelling networks (Hurley *et al*., 1997). According to Hair *et al*. (2013), the distinction between EFA and CFA is not always as clear-cut as it seems. CFA is used when testing the hypotheses of existing theories and concepts and EFA when searching in the data for latent patterns in case there is little or no prior knowledge about the factor structure and correlation (Hair *et al*., 2013).

Although, Brannick (1995) and Stone-Romero *et al*. (1995) have mentioned that the use of CFA is increasing while the use of EFA is declining, using EFA, CFA or both in the validation process is still legitimate. According to Nguyen (2010) distinguishing between CFA and EFA is becoming increasingly unclear. Brown (2006) suggests using 'EFA in a CFA framework' as an intermediate step between EFA and CFA. Worthington and Whittaker (2006) advised to start with EFA and follow with CFA but use a different sample while Green *et al*. (2016) recommended not to conduct EFA and CFA on the same data set. Kline (2010) mentioned that there is no need to use both techniques, use either EFA or CFA. Finally, according to Worthington and Whittaker (2006) using EFA followed by CFA is a common procedure for scale validation and development.

This study has followed the recommendation of Worthington and Whittaker (2006) and has carried out EFA by using a different sample size (192) followed by CFA and SEM (508 sample size) because there is a

second-order model proposed in this research as a contribution that needs to ensure the structure of the set of variables in the model reduce a data set to a more manageable size and ensure stability of the factor loading of various constructs. The same procedure using EFA followed by CFA and SEM which the conceptual model includes in the second-order construct has been performed in previous studies (Kafetzopoulos *et al*., 2015). The data analysis began by conducting a descriptive analysis via SPSS 23 in the next study.

Descriptive analysis: Table 3 presents the mean and standard deviation of each variable in the current study. Respondent are asked to indicate their opinion in the context of internet usage, measured on a 7-point scale ranging from 1 (strongly disagree) to 7 (strongly agree) while actual usage used a 5 ranking scale. Information quality records the highest mean score of 5.49 out of 7.0 points with a standard deviation of 1.140 indicating that the respondents have the awareness of the quality of internet information. Top management quality records the lowest mean score of 2.90 out of 7.0 point with a standard deviation of 1.461 indicating that the respondents are dissatisfied with the role of leaders in terms of encouragement and recognition. Moreover, the results indicate the overall respondent's mean score for Internet system quality in the current study to be 4.36 with a standard deviation of 1.094.

Although, the respondents in the study have found the internet easy to use, flexible, useful and enjoyable, the respondents also find the speed of the internet is very low, particularly as provided by organizations and the internet is not secure. They also think that the subscription for better Internet speed is not reasonably priced, if they have to use their own money. Regarding the service quality results, the respondents in this study agreed that they have the hardware, software and knowledge necessary but are not satisfied regarding the technical assistance and the quality of assistance. The results also concluded that the level of individual quality regarding confidence in using the internet is high as is the level of social quality (the influence of family, close friends and coworkers is high). In general, the results indicate the overall respondent's mean score for user satisfaction in the current study is 5.16 with a standard deviation of 1.228. It can be therefore concluded that the level of satisfaction among respondents regarding internet usage is high, indicating that their decision to use the internet was a wise one.

Exploratory Factor Analysis (EFA): Principal axis factoring was conducted on the 34 items with oblique rotation (Promax). There are two types of rotation to use in EFA (orthogonal and oblique). Some scholars argue that oblique rotation is always the appropriate method because factor intercorrelations are the norm in social sciences and if the factors happen to be uncorrelated both orthogonal and oblique yield the same result (Costello and Osborne, 2005). Regarding the significant factor loadings for every item, this study follows the criteria of Hair *et al.* (2010) based on sample size. While the sample size of this study is 192 for the EFA therefore, the significant factor loadings are 0.40. In addition, this study used a fixed number of factors to extract. The results regarding the statistical assumption for EFA are:

Table 3: Mean and standard deviation of variables

Construct/Dimensions	M	SD
QUL		
SYSQ	4.36	1.094
INFQ	5.49	1.140
SERQ	4.94	1.050
TASQ	5.42	0.953
INDQ	5.06	1.340
SOCQ	5.09	1.336
TMQ	2.90	1.461
USE	3.36	1.125
SAT	5.16	1.228

M = Mean; SD = Standard Deviation; QUL: overall Quality; SYSQ: System Quality; INFQ: Information Quality; SERQ: Service Quality; TASQ: Task Quality; INDQ: Individual Quality; SOCQ: Social Quality; TMQ: Top Management Quality; USE: actual Usage and SAT: user Satisfaction

- The sample size is 192 which is enough to conduct EFA (Tabachnick and Fidell, 2012)
- Bartlett's test of sphericity is Sig. ($p<0.001$) (Field, 2013)
- Kaiser-Meyer-Olkin (KMO) value is 0.902 which is marvelous (Kaiser, 1974; Hutcheson and Sofroniou, 1999)
- Communalities value for every item is >0.5 (Field, 2013)
- Total variance explained is 68.04% which is >50% (Podsakoff and Organ, 1986)
- The variance for the first factor is 32.6% which is <50% (Podsakoff and Organ, 1986)

Pattern matrix in Table 4 shows the factor loadings after rotation. The items that cluster on the same components suggest that factor 1 represents a system quality (explained 32.6% of the total variation), factor 2 information quality (8.43%), factor 3 top management quality (6.29 %), factor 4 service quality (5.02 %), factor 5 user satisfaction (4.49%), factor 6 social quality (3.52%), factor 7 individual quality (3.37%) factor 8 task quality (2.24%) and factor 9 actual usage (2.09%). All nine factors explained 68.04% of the total variation. Out of 34 items, six items were removed (SYSQ5, SYSQ6, SYSQ7, SERQ4, SERQ5 and INDQ4) because of the low loading or cross-loadings.

Table 4: Pattern matrix for the full model

	Factors								
Variables	1	2	3	4	5	6	7	8	9
SYSQ1	0.926	-	-	-	-	-	-	-	-
SYSQ4	0.798	-	-	-	-	-	-	-	-
SYSQ3	0.697	-	-	-	-	-	-	-	-
SYSQ2	0.641	-	-	-	-	-	-	-	-
INFQ4	-	0.840	-	-	-	-	-	-	-
INFQ1	-	0.821	-	-	-	-	-	-	-
INFQ3	-	0.762	-	-	-	-	-	-	-
INFQ2	-	0.741	-	-	-	-	-	-	-
TMQ1	-	-	0.911	-	-	-	-	-	-
TMQ3	-	-	0.871	-	-	-	-	-	-
TMQ2	-	-	0.857	-	-	-	-	-	-
SERQ1	-	-	-	0.877	-	-	-	-	-
SERQ3	-	-	-	0.844	-	-	-	-	-
SERQ2	-	-	-	0.840	-	-	-	-	-
SAT3	-	-	-	-	0.901	-	-	-	-
SAT1	-	-	-	-	0.884	-	-	-	-
SAT2	-	-	-	-	0.770	-	-	-	-
SOCQ2	-	-	-	-	-	0.954	-	-	-
SOCQ1	-	-	-	-	-	0.684	-	-	-
SOCQ3	-	-	-	-	-	0.658	-	-	-
INDQ2	-	-	-	-	-	-	0.913	-	-
INDQ1	-	-	-	-	-	-	0.708	-	-
INDQ3	-	-	-	-	-	-	0.635	-	-
TASQ2	-	-	-	-	-	-	-	0.908	-
TASQ3	-	-	-	-	-	-	-	0.736	-
TASQ1	-	-	-	-	-	-	-	0.599	-
USE1	-	-	-	-	-	-	-	-	0.867
USE2	-	-	-	-	-	-	-	-	0.682

Extraction method: principal axis factoring; Rotation method: promax with kaiser normalization; rotation converged in 7 iterations; factor loading <0.4 suppressed

Table 5: Goodness-of-fit indices for the measurement model

Fit index	Cited	Admissibility	Result	Fit (yes/no)
χ^2	-	-	593.213	-
df	-	-	340.00	-
p-value	-	>0.05	0.0000	No
χ^2/df	Kline (2010)	10.00-5	1.7500	Yes
RMSEA	Steiger (1990)	<0.08	0.0380	Yes
SRMR	Hu and Bentler	<0.08	0.0480	Yes
GFI	Joreskog and Sorbom (1993)	>0.90	0.9230	Yes
AGFI	Joreskog and Sorbom (1993)	>0.80	0.9070	Yes
NFI	Bentler and Bonnet (1980)	>0.80	0.9320	Yes
PNFI	Bentler and Bonnet (1980)	>0.05	0.8380	Yes
IFI	Bollen (1990)	>0.90	0.9700	Yes
TLI	Tucker and Lewis (1973)	>0.90	0.9660	Yes
CFI	Byrne (2010)	>0.90	0.9700	Yes
PGFI	James *et al.* (1982)	>0.50	0.7730	Yes

χ^2 = Chi-square; df = degree of freedom; CFI = Comparative-Fit-Index; RMSEA = Root Mean Square Error of Approximation; SRMR: Standardized Root Mean Square Residual; GFI = Goodness-of-Fit; NFI = Normed Fit Index; AGFI = Adjusted Goodness of Fit Index; IFI = the Increment Fit Index; TLI = Tucker-Lewis coefficient Index; PNFI = Parsimony Normed Fit Index; The indexes in bold are recommended since they are frequently reported in literature (Awang, 2014)

Measurement Model Assessment and Confirmatory Factor Analysis (CFA)

Model fit indicators: Table 5 indicates the level of acceptance of the goodness-of-fit indices for the measurement model. In SEM, there are several fitness indexes that reflect how fit the model is to the data at hand. However, there is no agreement among scholars which fitness indexes to use. Hair *et al.* (2010) recommend the use of at least one fitness index from each category of model fit. There are three model fit categories namely parsimonious fit, incremental fit and absolute fit. The absolute fit indices show that the χ^2 is not significant. But despite this, the model still fits because when large samples are used the Chi-square statistic nearly always rejects the model (Bentler and Bonnet, 1980; Joreskog and Sorbom, 1993). The χ^2 is sensitive to sample size >200 (Byrne, 2010) and the sample size for this study is 508. Model fit as reported in RMSEA coefficient is 0.038, indicating a good fit. Other indicators are fit with GFI 0.923 and AGFI 0.907. In addition, incremental fit indices indicate that both tests are fit since the NFI and CFI obtained are 0.932 and 0.970, respectively. Finally, parsimony fit indices also indicate fit, since the PGFI is 0.773 and PNFI is 0.838. Thus, the model fits well. The result shows that the overall fit indices for the full model are acceptable, since absolute fit incremental fit indices and parsimony fit indices are fulfilled. Therefore, the measurement model psychometric properties regarding the construct reliability, indicator reliability, convergent validity and discriminant validity could be evaluated.

Construct reliability: The reliability of a measure is established by testing for both consistency and stability. According to Awang (2014), reliability is the extent of how reliable the measurement model is in measuring the intended latent construct. The assessment for reliability for a measurement model may be made using two criteria: internal reliability: achieved when the Cronbach's alpha value is 0.7 or higher (Nunnally and Bernstein, 1994). Cronbach's alpha is a reliability coefficient that indicates how well the items in a set are positively correlated to one another. Cronbach's alpha is computed in terms of the average intercorrelations among the items measuring the concept. Due to Cronbach alpha's limitations in the population, it is more appropriate to apply a different measure of internal consistency eliability, referred to as composite reliability (Hair *et al.*, 2013).

Composite reliability: The measure of reliability and internal consistency for a latent construct. A value of CR>0.7 is required in order to achieve composite reliability for a construct (Kline, 2010; Gefen *et al.*, 2000). CR is calculated using the given equation:

$$CR = (\Sigma K)^2/((\Sigma K)^2 + (\Sigma 1\text{-}K^2))$$

where, K = factor loading of every item. The composite reliability varies between 0 and 1 with higher values indicating higher levels of reliability. It is generally

interpreted in the same way as Cronbach's alpha. Specifically, composite reliability values of 0.60-0.70 are acceptable in exploratory research while in more advanced stages of research values between 0. 70 and 0.90 can be regarded as satisfactory (Nunnally and Bernstein, 1994). Values above 0.90 (and definitely >0.95) are not desirable because they indicate that all the indicator variables are measuring the same phenomenon and are therefore unlikely to be a valid measure of the construct. Finally, composite reliability values <0.60 indicate a lack of internal consistency reliability (Hair *et al*., 2013).

The results showed that all the individual Cronbach's alpha coefficients of the three constructs (ranging from 0.744-0.903) were greater than the recommended level of 0.7 (Kannana and Tan, 2005; Nunnally and Bernstein, 1994). Additionally, all the CR values (ranging from 0.769-0.903) were higher than the recommended value 0.7 (Hair *et al*., 2010; Kline, 2010; Gefen *et al*., 2000) indicating that the construct reliability is fulfilled. Therefore, the achieved Cronbach's alpha and CR for all constructs were considered as sufficiently error-free (Table 6).

Indicator reliability: High loadings on a construct indicate that the associated indicators have much in common which is captured by the construct (Hair *et al*., 2013). Indicators with very low loadings (below 0.40) should, however, always be eliminated from the scale while indicators with loadings between 0.40 and 0.70 should be considered for removal from the scale only when deleting the indicator leads to an increase in the composite reliability (or the average variance extracted) (Hair *et al*., 2011). The loadings for all items exceeded the recommended value of 0.5 (Hair *et al*., 2010). Since, there is no loading below 0.70 (Table 6) the items are fulfilled the requirements without any elimination from the scale.

Convergent validity: Convergent validity is the extent to which a measure correlates positively with alternative measures of the same construct. To establish convergent validity, researchers consider the Average Variance Extracted (AVE) (Hair *et al*., 2013). An AVE with value equal or >0.50 indicates that, on average, the construct explains more than half of the variance of its indicators. On the contrary, an AVE with value <0.50 indicates that on average, more error remains in the items than the variance explained by the construct (Hair *et al*., 2013). For second-order constructs in the full model assessing the validity of the set of sub-dimensions by the AVE could be calculated by averaging the squared multiple correlations for the first-order indicators (MacKenzie *et al*., 2011). Table 6 shows the result of the convergent validity via AVE. The AVE values for overall quality (0.660) user satisfaction (0.757) and actual usage (0.620) indicate that all AVE values are >0.50 which is acceptable. Convergent validity of the full model construct is fulfilled.

Table 6: Loading, cronbach's alpha, CR and AVE for the full model

Construct/Item	Factor loading (above 0.5)	α (above 0.7)	CR (above 0.7)	AVE (above 0.5)
Overall quality				
SYSQ1: ease of use	0.84	0.901	0.808	0.660
SYSQ2: flexibility	0.83	-	-	-
SYSQ3: usefulness	0.81	-	-	-
SYSQ4: enjoyable	0.75	-	-	-
INFQ5: up-to-date	0.84	-	-	-
INFQ6: accuracy	0.83	-	-	-
INFQ7: relevant	0.81	-	-	-
INFQ8: precise	0.83	-	-	-
SERQ9: provides hardware necessary	0.89	-	-	-
SERQ10: provides software necessary	0.85	-	-	-
SERQ11: provides knowledge necessary	0.81	-	-	-
TASQ12: task equivocality	0.71	-	-	-
TASQ13: task interdependence1	0.84	-	-	-
TASQ14: task interdependence2	0.73	-	-	-
TMQ15: encouragement	0.91	-	-	-
TMQ16: recognition	0.85	-	-	-
TMQ17: awareness	0.86	-	-	-
INDQ18: confident of browsing the WWW	0.71	-	-	-
INDQ19: confident of using a search engine	0.85	-	-	-
INDQ20: confident of sending e-mail	0.73	-	-	-
SOCQ21: family influence	0.74	-	-	-
SOCQ22: friends influence	0.85	-	-	-
SOCQ23: coworkers influence	0.77	-	-	-
Actual usage				
USE1: frequency of usage	0.82	0.744	0.765	0.620
USE2: duration of use	0.74	-	-	-
User satisfaction				
SAT1: satisfied with the decision	0.87	0.903	0.903	0.757
SAT2: meet the expectations	0.87	-	-	-
SAT3: overall satisfaction	0.86	-	-	-

α = Cronbach's alpha; CR = Composite Reliability, AVE = Average Variance Extracted; AVE for the second-order model = averaging the squared multiple correlations for the first-order indicators; All the factor loadings of the individual items are statistically significant (p <0.01); QUL: overall Quality; SYSQ: System quality; INFQ: Information Quality; SERQ: Service Quality; TASQ: Task Quality; INDQ: Individual Quality; SOCQ: Social Quality; TMQ: Top Management Quality; USE: actual Usage and SAT: user Satisfaction

Table 7: Results of discriminant validity by fornell-larcker criterion for the full model

	1	2	3
Construct	QUL	SAT	USE
QUL	0.812	-	-
SAT	0.769	0.870	-
USE	0.480	0.457	0.787

Diagonals represent the square root of the average variance extracted while the other entries represent the correlations; QUL = Overall Quality; SAT = User Satisfaction; USE = Actual Usage

Discriminant validity: Discriminant validity is the extent to which a construct is truly distinct from other constructs by empirical standards because establishing discriminant validity implies that a construct is unique and captures phenomena not represented by other constructs in the model (Hair *et al*., 2013). By using the Fornell and Larcker (1981) criterion, the discriminant validity of the measurement model was checked. As shown in Table 7, the correlations between the three main constructs ranging from 0.457-0.769 are smaller than the square root of the AVE estimates which are in the range of 0.787-0.870. This indicates that the constructs are strongly related to their respective indicators compared to other constructs of the model, thus suggesting a good discriminant validity (Hair *et al*., 2013). In addition, the correlation between exogenous constructs is <0.85 (Awang, 2014). Hence, the discriminant validity of the overall quality construct is fulfilled.

Structural model assessment: The structural equation model is the second main process of SEM analysis. Once the measurement model is validated, representation of the structural model can be made by specifying the relationships among the constructs. According to Hair *et al*. (2010) and Ho (2006) the structural model provides details on the links between the variables. It shows the specific details of the relationship between the independent or exogenous variables and dependent or endogenous variables. The structural model specifies how the constructs are related to each other in the structural model. Assessment of the structural model results enables you to determine how well empirical data support the theory and therefore to decide if your theory has been empirically confirmed (Hair *et al*., 2013). The goodness-of-fit of the structural model was comparable to the previous CFA measurement model. In this structural model, the χ^2/df = 1.745, CFI = 0.970 and RMSEA = 0.038.

These fit indices provided evidence of adequate fit between the hypothesized model and the observed data (Byrne, 2010). The structural model was drawn on the AMOS (Version 21) graphics and Fig. 3 shows the research structural model results.

Table 8: Structural path analysis result

Hypothesis	Dependent/ Independent variables	Estimate B (path coefficient)	SE	CR (t-value)	Decision
H_1	USE<--QUL	0.49	0.090	7.421***	Supported
H_2	SAT<--QUL	0.71	0.110	9.753***	Supported
H_3	SAT<--USE	0.12	0.054	2.224*	Supported

QUL = overall Quality; SAT = user Satisfaction; USE = actual Usage; ***, **, *p<0.001, 0.01; 0.05; SE = Standard Error, CR = Critical Ratio

Table 9: Coefficient of determination result R^2

Exogenous construct	Endogenous construct	R^2	Cohen (1988)	Chin (1998)	Hair *et al*. (2013)
QUL and USE	PER	0.60	Substantial	Substantial	Moderate
QUL	USE	0.24	Substantial	Moderate	Weak

QUL = overall Wuality; SAT = user Satisfaction; USE = actual Usage

Hypotheses tests: The hypotheses of this study were tested using structural equation modeling as presented in Fig. 2. The structural model assessment as shown in Table 8 provides the indication of the hypotheses tests. The results of the three main hypotheses indicate that overall quality is significantly predicting actual usage, hence, H_1 is accepted ($\beta = 0.49$, $p<0.001$). Overall quality as well, significantly predicts user satisfaction. So, H_2 is supported ($\beta = 0.71$, $p <0.001$). Likewise, H_3 is supported as actual usage significantly predicts user satisfaction ($\beta = 0.12$, $p<0.05$).

Coefficient of determination R^2; the variance explained: The R^2-value indicates the amount of variance in dependent variables that is explained by the independent variables. Thus, a larger R^2-values increases the predictive ability of the structural model. The R^2-values should be high enough for the model to achieve a minimum level of explanatory power (Urbach and Ahlemann, 2010). Falk and Miller (1992) recommend that R^2-values should be equal to or >0.10 in order for the variance explained of a particular endogenous construct to be deemed adequate. Cohen (1988) suggests that R^2 is substantial when it is >0.26. With acceptable power above 0.02 and according to Chin (1998) R^2 is substantial when it >0.65 with an acceptable power above 0.19.

On the other hand, Hair *et al*. (2013) recommend that R^2 has to be >0.75 in order to be deemed substantial with an acceptable power above 0.25. Table 9 shows the result of R^2 from the structural model indicating that overall quality and actual usage are able to explain 60% of the variance in user satisfaction. Further, actual usage explains 24% of the variance in user satisfaction.

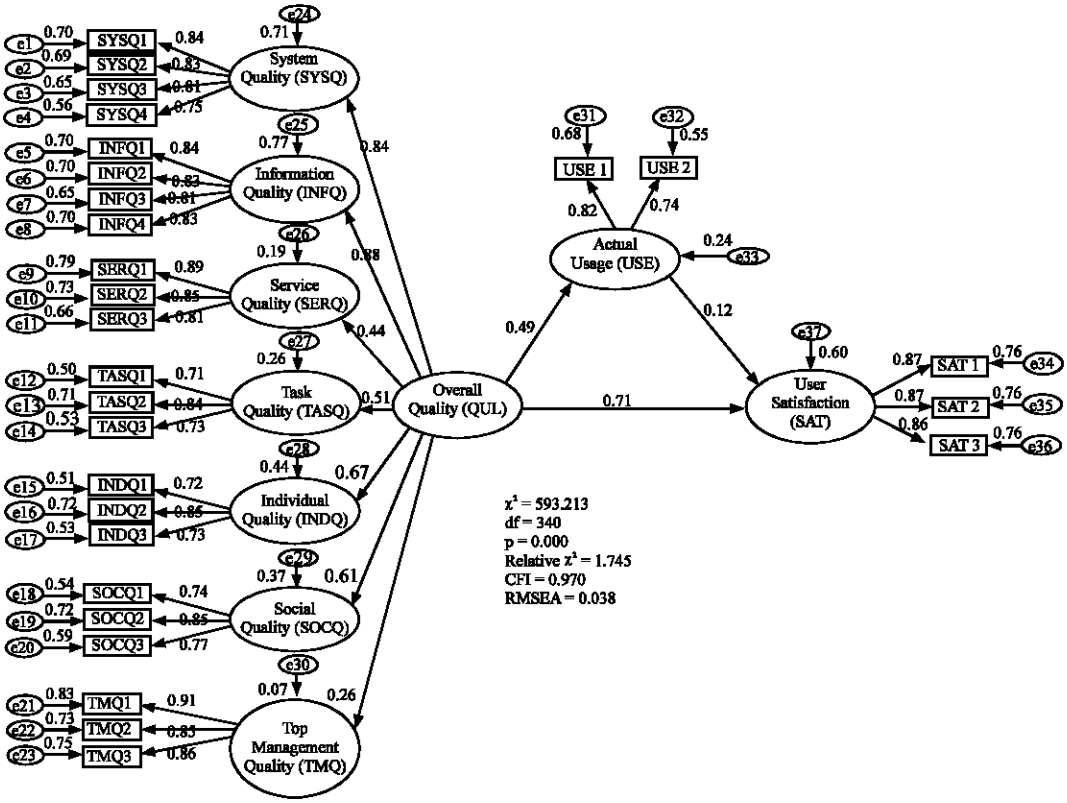

Fig. 3: Research structural model results

Table 10: R^2 and factor loading for the second-order overall quality model

1st order and 2nd constructs	Factor loading	R^2-values
SYSQ<---QUL	0.83	0.69
INFQ<---QUL	0.85	0.73
SERQ<--QUL	0.43	0.18
TASQ<--QUL	0.52	0.27
INDQ<---QUL	0.66	0.44
SOCQ<--QUL	0.61	0.37
TMQ<---QUL	0.21	0.08

QUL = Overall Quality; SYSQ = System Quality; INFQ: Information Quality; SERQ = Service Quality; TASQ = Task Quality; INDQ = Individual Quality; SOCQ = Social Quality; TMQ = Top Management Quality

Table 10 shows the results of R^2 and factor loading for the second-order model overall quality which loads well on 2 sub-constructs system and information quality, loads moderate on 3 sub-constructs (task, individual and social quality) and loads weak on two sub-constructs (service and top management quality). Further, the R^2 for 2 sub-constructs (system and information quality) are substantial, for 3 sub-constructs (task, individual and social quality) are moderate and for 2 sub-constructs (service and top management quality) are weak.

Effect size f^2: Effect size f^2 measures if an independent latent variable has a substantial impact on a dependent latent variable (Gefen and Rigdon, 2011). According to Hair *et al.* (2013) in order to do an assessment for the R^2-values of all endogenous constructs, the change in R^2-value when a particular exogenous construct is omitted from the model can be used to assess whether the omitted construct has a substantial effect on the endogenous constructs. This measure is referred to as the f^2 effect size where (R^2 included) and (R^2 excluded) are the R^2-values of the endogenous construct when a selected exogenous construct is included in or excluded from the model. The change in R^2-values is calculated by estimating the path model twice, first with the exogenous construct included (yielding R^2 included) and second with the exogenous construct excluded (yielding R^2 excluded). f^2 is calculated using the given equation:

$$f^2 = (R^2 \text{ included} - R^2 \text{ excluded})/(1 - R^2 \text{ included})$$

According to Cohen (1988) f^2 of the exogenous latent variable is assessed as 0.02 small, 0.15 medium and 0.35 large. Table 11 shows the results of the effect size f^2 for the two exogenous latent variables (overall quality and actual usage) where overall quality has a large effect size while actual usage has a small effect size.

Table 11: Effect size f^2

Eogenous construct	Edogenous construct	R^2 included	R^2 excluded	f^2	Effect size
QUL	SAT	0.60	0.21	0.98	Large
USE	SAT	0.60	0.59	0.03	Small

QUL = overall Quality; SAT = user Satisfaction; USE = actual Usage; $f^2 = (R^2$ included-R^2 excluded)/(1-R^2 included)

Table 12: Mediation effect of actual usage

Paths	Variables	Estimate B (path coefficient)	SE	CR (t-value)	Results
Path c	SAT<---QUL	0.77	0.112	10.539***	Significant
Path a	USE<---QUL	0.49	0.090	7.421***	Significant
Path b	SAT<---USE	0.12	0.054	2.446*	Significant
Path c'	SAT<---QUL	0.71	0.110	9.753***	Significant

QUL = overall Quality; USE = actual Usage; SAT = user Satisfaction; ***, **, *p<0.000; 0.01; 0.05; SE = Standard Error; CR = Critical Ratio

Mediation assessment: Assessing the indirect relationships between latent variables is another important evaluation of a structural model (Henseler *et al*., 2009). This study tests the mediation hypothesis (H_4) as follows:

- H_4: actual usage mediates the relationship between overall quality and user satisfaction

According to Field (2013) for this hypothesis to be true: overall quality must predict user satisfaction in the first place (path c). Overall quality must predict actual usage (path a). Actual usage must predict user satisfaction (path b). And the relationship between overall quality and user satisfaction should be smaller when actual usage is included in the model than when it isn't. We can distinguish between the direct effect of overall quality on user satisfaction which is the relationship between them controlling for actual usage and the indirect effect which is the effect of overall quality on user satisfaction through actual usage.

Table 12 shows the result of the direct path (c) where the relationship between overall quality and user satisfaction is significant ($\beta = 0.77$, $p<0.001$) suggesting that the direct effect condition is satisfied. Further, the path coefficients in this model indicate that overall quality is positively linked to actual usage ($\beta = 0.49$, $p<0.001$) and the path coefficients in this model indicate that actual usage is positively linked to user satisfaction ($\beta = 0.12$, $p<0.05$). Finally, the findings show the direct (c') relationship between overall quality and user satisfaction ($\beta = 0.71$, $p<0.001$) shrink upon the addition of actual usage to the model but are still significant which indicates that a mediation effect exists. While the path coefficient value decreased, the R^2-value on user satisfaction increased from 0.59 (59%) to 0.60 (60%) when actual usage included in the model.

The second method to test the mediation effect is based on the Preacher and Hayes (2004, 2008) method of bootstrapping the indirect effect. Table 13 shows the result of the bootstrapping analysis, indicating that the indirect effect $\beta = 0.722$ was significant with a t-value of 3.646. Further, Preacher and Hayes (2008, 2004) indicate that the 0.722, 95% Boot CI: (LL = 0.313, UL = 0.527) does not straddle a 0 in between, this indicating there is mediation. Thus, this study can conclude that the mediation effect of the actual usage variable is statistically significant, indicating that H_4 was also supported.

Table 13: Bootstrapping the indirect effect of actual usage

Hypothesis	Relationship	Std. β	SE	t-value	Decision
H_3	QUL→USE→SAT	0.722	0.198	3.646**	Supported

Preacher and Hayes (2004, 2008); QUL = overall Quality; USE = actual Usage; SAT = user Satisfaction; **p<0.01

This study proposed a comprehensive research model which was developed with an integrated perspective of technological, individual, social and organizational characteristics. The model was then investigated in the context of internet usage among employees within government ministries in Yemen. The results indicated that overall quality is a significant factor that positively influences actual usage and user satisfaction that actual usage predicts user satisfaction and actual usage mediates the relationship between overall quality and user satisfaction. This study discusses the findings by revisiting the research objectives.

Findings related to objective 1: The first objective of this study was to test and validate the proposed integrated model. The results show that the data fit the proposed integrated model which contains three core constructs (overall quality, actual usage and user satisfaction) well. Several studies proposed various dimensions to investigate and measure overall quality. Fan and Fang (2006) investigated overall quality through system and information quality, Liu *et al.* (2008) through service and information quality, Cho *et al.* (2015) through system, information and service quality, Zhu *et al.* (2013) through system, information, service and individual quality and finally, Wang and Lai (2014) made a major step by examining overall quality through system, information, service, individual and top management quality. This study moves forward making a new step by including 7 dimensions of overall quality (system, information, service, task, individual, social and top management quality.

This study investigated overall quality through the 7 dimensions and 29 indicators. The finding from the dimensions shows that for any organization, especially any government institutions in Yemen, in order to make full of use of internet technology, the 7 dimensions of overall quality should be considered. Unfortunately, the finding shows that government institutions in Yemen have a major concern and big problems in service quality and top management quality, 2 dimensions which need to put in a lot of effort to improve.

The finding from the system quality indicators shows that Yemeni employees generally agreed that the internet is easy to use, flexibile, enjoyable and useful but they strongly disagree with its security and the speed of the internet which respondents found very low within organizations. They also think that the internet subscription is not reasonably priced. Government institutions and policymakers should use this finding to not promote the notion of internet usefulness in life and research tasks because employees already have this perception but should focus on how to improve issues related to internet security and speed if they want employees to make full use of the internet. Previous studies indicate that speed (Ilias and Razak, 2011) price (Sun *et al*., 2008) and security (Mohammadi, 2015) are important factors to assess success in information system usage as well as the indicators of ease of use flexibility (Sun and Mouakket, 2015) usefulness (Sun *et al*., 2008) and enjoyable (Wang and Lai, 2014).

Based on the result of the information quality indicators, Yemeni employees generally agreed that information on the internet is up-to-date, accurate, relevant and precise. This result could reduce the effort of senior management and policy makers to promote the quality of the knowledge from the internet because Yemeni employees are aware of that notion. According to Cho *et al*. (2015) and Lwoga (2013), information quality indicators are substantial for making full use of technology.

Regarding the service quality indicators, Yemeni employees generally agreed that the organizations do not fairly provide the necessary hardware, software and knowledge to use the internet and they were strongly dissatisfied with quality of technical assistance and technical support when they have difficulties in using the internet and the quality of technical personnel response are very poor. Senior management and policy makers need to focus on and formulate strategies and not ignore these issues. Previous studies have stated the importance of service quality indicators in the context of technology usage within organizations (Wang and Lai, 2014; Wang and Liao, 2008; Cho *et al*., 2015).

Task quality indicators are important to take into account for technology usage within organization (Lee *et al*., 2005; Lee *et al*., 2011). The result of this study shows that regarding to the employees tasks whether they deal with non-routine business problems or whether the employees cooperate with other members to accomplish tasks is not so good and not so bad indicating that senior management need to push more to make employees tasks more non-routine and encourage them to make full of use of internet for research tasks.

The results from the individual quality indicators shows that Yemeni employees generally do not have any confidence problems in browsing the WWW using a search engine or sending e-mail. But they do have a problem with downloading and uploading files from the internet. Senior management should deal with this problem by introducing training sessions regarding this issue. According to Anandarajan *et al*., (2002), Lee *et al*. (2005) and Wang and Lai (2014), individual indicators should take into account how to make full use of internet technology.

The result also found that there are no issues regarding the social quality indicators as Yemeni employees generally agree that family, friends and coworkers think that using the internet is a god idea. Previous literature has mentioned the importance of social indicators in the context of technology usage (Anandarajan *et al*., 2002; Hsu and Lin, 2015).

Regarding to top management quality indicators, the result indicates a major concern and a serious problem for the leadership in government institutions to address. Yemeni employees generally agreed that top management does not encourage them to use the internet for job-related research, does not recognize any efforts to do so. Top management is also not aware of the benefits that can be achieved with the use of internet. Previous studies of Wang and Lai (2014) and Son *et al*. (2012) emphasise the importance of encouragement of leaders to enhance technology usage in order to achieve better performance. Policy makers should use this finding to put effort into resolving the issues of unwise leadership in government institutions.

Findings related to objective 2: The second objective of this study was to examine the effect of overall quality on actual usage and was achieved through testing the hypothesis H_1. This current study found that overall quality does have a positive effect on actual usage of the internet. This finding is consistent with previous studies (Cho *et al*., 2015; Fan and Fang, 2006; Lee *et al*., 2011; Makokha and Ochieng, 2014; McFarland and Hamilton, 2006; Wang and Lai, 2014; Wang and Liao, 2008) and is explained by the fact that when government institutions increase the overall quality (system, information, service, task, Individual, social and top management quality) this leads to increasing the frequency and duration of internet usage by employees for job-related research. Although, many studies support the positive effect of overall quality on actual usage, Wang and Liao (2008) found the opposite, absence of overall system quality influence on actual usage. According to Wang and Lai (2014) also found that there is no relationship between overall service

quality and actual usage and Anandarajan *et al.* (2002) indicated that overall individual quality does not predict actual usage. The contradictory findings suggest that the effect of overall quality on actual usage may be different not only across study settings but also across variables which consider the components of overall quality and their measurements.

Findings related to objective 3: The third objective of this study was to examine the effect of overall quality on user satisfaction and was achieved through testing the hypothesis H_2. This study found that overall quality does have a positive effect on user satisfaction with internet technology. The impact of overall quality on user satisfaction is supported by previous studies (Anandarajan *et al.*, 2002; Chakraborty and Sengupta, 2014; Chen *et al.*, 2012; Fan and Fang, 2006; Kurniawan, 2010; Ogara *et al.*, 2014; Wang and Lai, 2014; Wu and Wang, 2006). The result suggests that prior overall quality (system, information, service, task, Individual, social and top management quality) in the context of internet technology usage by employees among Yemeni government institutions, increases their satisfaction that using the internet for job-related research is a wise decision. However, the result relateing to the positive effect of overall quality on user satisfaction is inconsistent and in conflict by Sun *et al.* (2008) who found that technology quality does not affect user satisfaction. According to Chi (2013) also found that there is no relationship between overall system quality and user satisfaction while according to Cheng *et al.* (2006, 2008) overall information quality does not predict user satisfaction, similar to Wang and Liao (2008) who found that overall service quality has no relationship with user satisfaction.

Findings related to objective 4: The fourth objective of this study was to examine the effect of actual usage on user satisfaction and was achieved through testing the hypothesis H_3. This current study found that actual usage of the internet does have a positive effect on user satisfaction and this impact is supported by previous studies (Hou, 2012; Norzaidi and Salwani, 2009; Wang and Liao, 2008; Makokha and Ochieng, 2014) and explained by the fact that when government institutions increase the actual frequency and duration of internet usage among employees, this leads to increasing their satisfaction.

Findings related to objective 5: The fifth objective of this study was to determine whether the actual usage construct mediates the relationship between overall quality and user satisfaction and was achieved through testing the hypothesis H_4. Of the previous literature on MIS, only a few have studied the actual usage construct or user satisfaction as a mediating variable. Ahmed *et al.* (2010a, b) who examined the satisfaction construct as a mediating variable and found that it has a mediation effect in the relationship between service quality and behavioral intention. Therefore this current study can be considered as one of the first empirical efforts to examine actual usage as a mediating variable, investigating the mediation effect of actual usage in the relationship between overall quality and user satisfaction. This finding highlights that overall quality (system, information, service, task, individual, social and top management quality) is indirectly associated with the output user satisfaction through actual usage. In addition, overall quality and user satisfaction have an indirect effect via actual usage. In other words just having overall quality may compel employees to be satisfied without reflect on their usage.

Implications for research: Regarding technology usage in organizations, the literature is still limited in terms of offering a comprehensive picture (Wang and Lai, 2014). This current study can be considered as one of the few empirical efforts to link three distinct topics (technology acceptance, task-technology fit and information systems success) in management information systems through the integration of four well-known theories and models (TAM, UTAUT, TTF and DMISM). This study has developed and validated a multi-dimensional model to better understand internet usage among employees within the public sector in Yemen, based on an integrated individual, technological, social and organizational perspective. The conceptual model demonstrates the role of prior overall quality with its seven dimensions (system, information, service, task, Individual, social and top management quality) which is argued to have the capability to influence actual internet usage and user satisfaction. This means the more overall quality, the more significantly this affects internet usage and user satisfaction, leading to better performance impact (Delone and Mclean, 1992; Delone and Mclean, 2003; Norzaidi and Salwani, 2009; Makokha and Ochieng, 2014). The model of this study could be adopted for explaining topics of a similar nature and context. Moreover, the model could be used, not only for explaining technology related to the internet but also other technology applications as well, for instance mobile learning, ERP system and PC usage.

As parsimony is one of the main objectives of any study and the proposed integrated model of this study tends to be complex because of its multi-dimensional model that includes in the conceptual framework, this study contributes to the existing body of knowledge by proposing a higher-order model (second-order model) to

reduce the complexity. This study also contributes to the existing body of knowledge by testing the mediation effect of the actual usage construct in the relationship between overall quality and user satisfaction, finding that actual usage has a significant mediation effect.

Implication for practice: Yemen has a long-term strategy to develop a reliable and efficient administration and government by improving and reforming its ministries and institutions in order to deliver better public services for all citizens and gain recognition for this around the world. However, there are still problems facing the government reform plans including an inflated bureaucracy, a lack of collaboration between ministries and agencies and no direct vision of the future of the country. In its attempt to overcome these problems, the government of Yemen has launched a reform project using information technology to implement e-Government and this is leading to increased collaboration between governmental agencies and the development of integrated databases that can be accessed by any agency any time and thereby deliver rapid and efficient service to the public (Alsohybe, 2007). The findings of this study provides significant insights for policy makers and top managers with regard to identifying strategies to improve the utilization of the internet within their organizations.

The implications of the key findings indicate significant benefits that can be achieved not only for individual employees but also to the Yemeni public sector and the country at large, if information technology is fully utilised. Incorporated in the findings are a number of practical implications that can be addressed such as encouraging employees to make full use of the internet in their research and improving professional practice, professional development and research quality. Significantly, using the proposed integrated model which provides an understanding of the relationships of key determinants and usage behavior will help promote internet usage within government ministries and may also be applied to all public sectors in the country.

If senior officials in government institutions understand and utilize this information to proactively design interventions targeted at populations of users that may be less inclined to use the internet in their research, in order to prepare employees to gain more knowledge, skills and experience of using the internet, not only will this help employees to adopt more professional practices but will also help government institutions to achieve their strategic goals. The results suggest that information technology could serve to improve employee satisfaction, leading to better performance by providing a medium in which every employee could add value to his or her research. The finding of this study could assist government institutions in the implementation or deployment of new information technology methods. Organizations can now develop clear and effective implementation plans that take into consideration the factors that will most likely concern their employees.

This research seemed to be not only at the right time but also in the right place. It is expected that key findings will help support Yemeni government and national policies, especially the policy to increase ICT usage as part of the job process at all levels of organizations and also the national policy of e-government.

CONCLUSION

The development in both information and communication technology has made linkages between the two more readily transferable. As the world becomes in a sense one village because of the internet revolution, it is natural that the free interflow of knowledge will change Yemeni perceptions, expectations, professional practices and even their quality of life. The main objective of this study was to determine factors influencing the internet technology usage among employees within the public sector in Yemen. Despite various constraints, the results have been encouraging and the study has managed to throw some light on new ideas. The research proposed a multidimensional model to better understand internet technology usage from an integrated technological, individual, social and organizational Theory of Acceptance and Use of Technology (Utaut) Task-Technology Fit (TTf) and Delone and Mclean Model of Information Systems Success (DMISM)). As such, this research has added to the understanding of technology usage within the theories of technology acceptance, information systems success and task-technology fit.

In summary, there is a second-order model of overall quality which contains seven important factors that influence internet technology usage within organizations. These are system, information, service, task, individual, social and top management quality. Thus, practitioners should put the right amount of resources into these factors to maximize the chance of a better return on satisfaction and lead to better performance. These seven factors play a major role in increasing individual satisfaction. The factor of overall quality is found to significantly influence actual usage and user satisfaction. Moreover, user satisfaction of Yemeni employees is found to be significantly influenced by actual usage and actual usage is found to significantly mediating the relationship between overall quality and user satisfaction.

LIMITATIONS

The population involved in this study are Yemeni employees within public sector which the three parts of the public sector (Yemeni prime minister department, Yemeni ministries and government agencies). This study focuses only on those employees in Yemeni Ministries. According to Zikmund *et al.* (2010) systematically conducting research takes time and it is impossible for the researcher to include all major players in the public sector in Yemen. Therefore, the focus was centred on government ministry head offices (called Dwa'win). The study initially planned to collect data using both qualitative and quantitative methods so that the data gathered would be more varied and rich. However, due to the current situation in Yemen, such an approach was not feasible. In other words, the conflict that currently exists in Yemen prevented the researcher from conducting interviews with the target sample (senior government officials). However, the study did succeed in obtaining valid findings by using a quantitative method to achieve the objectives. The investigation was conducted using a specific form of technology, in this case the internet and the research needs to be replicated to investigate the robustness of the findings across a wider range of technology solutions and samples.

SUGGESTIONS

This study expects that the suggestions and recommendations included herein can help public sector organizations improve their internet implementation effort. It is also expected that the findings will serve as a guide to other industries on the pre-requisites needed when implementing a new technology. There are areas that future researches can explore from different perspectives; for instance, the proposed integrated model in the study might apply to similar task structures in other sectors and instead of measuring output based on the user satisfaction, future researchers could investigate output based on individual or organizational performance. Researchers may also need to examine the moderating role of numerous other variables (e.g. demographic variables or experience) between the overall quality construct and user satisfaction, in order to enhance the predictive power of the research model.

APPENDIX

Appendix A: Instrument for varibles

Varibles	Item and measure	Rating scale	Source
System quality	Ease of use: I find it easy to use the internet to find what I want Flexibility: I find the Internet to be flexible to interact with Usefulness: I think using the internet is useful to me Enjoyable: I think using the internet is enjoyable Secure: I think using the internet is secure Price: Internet subscription is reasonably priced Speed: I think the Internet speed is satisfactory	7-point Likert scale: 1 strongly disagree to 7 strongly agree	Venkatesh and Morris (2000), Kim *et al.* (2008), Zhao *et al.* (2011) and Sun *et al.* (2008) Cheng *et al.* (2006), Yu (2012)
Information quality	Up-to-date: Internet provides up-to-date information Accuracy: Internet provides accurate information Relevant: Internet provides relevant information Precise: Internet provides the precise information I need	7-point Likert scale: 1 strongly disagree to 7 strongly agree	Lederer *et al.* (2000), Cheng *et al.* (2006, 2008), Wang and Liao (2008) and Lin *et al.* (2011)
Service quality	Provides hardware necessary: Organization provides the hardware necessary to use internet Provides software necessary: Organization provides the software necessary to use internet Provides Knowledge necessary: Organization provides the knowledge necessary to use the internet Technical Assistance: If I have technical difficulties in using internet, the technical support personnel will be easy to reach at any time Quality of assistance: If I have technical difficulties in using internet, the technical support personnel will provide a satisfying response	7-point Likert scale: 1 strongly disagree to 7 strongly agree	Pai and Huang (2011), Lee and Kim (2009), Lian (2015), Nistor *et al.* (2014), Khechine *et al.* (2014) and Ifinedo (2012)
Task quality	Task equivocality: I frequently deal with ad-hoc, non-routine business problems Task interdependence1: I usually have to cooperate with other members to accomplish my tasks Task interdependence2: The way I perform my job will have obvious effects on the performance of other members	7-point Likert scale: 1 strongly disagree to 7 strongly agree	Kim *et al.* (2008), Lee *et al.* (2011), Lee and Kim (2009) and Norzaidi *et al.* (2007, 2009)
Individual quality	Confident of browsing the WWW: I feel confident browsing the World Wide Web (WWW) Confident of using a search engine: I feel confident finding information by using a search engine (e.g. Google) Confident of sending e-mail: I feel confident sending and receiving e-mail messages	7-point Likert scale: 1 strongly disagre to 7 strongly agree	Zhao *et al.* (2011)

Appendix A: Continue

Varibles	Item and measure	Rating scales	Sources
	Confident of download files: I feel confident downloading and uploading files from the Web		
Social quality	Family influence: My family thinks that using the internet is a good idea Friends influence: My close friends think that using the internet is a good idea Coworkers influence: My coworkers think that using the internet is a good idea	7-point Likert scale: 1 strongly disagree to 7 strongly agree	Venkatesh *et al.* (2012), Cheng *et al.* (2006, 2008) and Cheng (2011)
Top management quality	Encouragement: Top management is encouraging me to use internet for job-related work Recognition: Top management recognizes my efforts in using internet for job-related work Awareness: Top management is aware of the benefits that can be achieved with the use of internet	7-point Likert scale: (1) Strongly disagree to (7) Strongly agree	Son *et al.* (2012), Wang and Lai (2014)
Actual usage	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? <1, 1-2, 3-4 and >5 h	5-point scale	Shih and Fang (2004)
User satisfaction	(Satisfied with the decision): My decision to use the internet was a wise one Meet the expectations: The internet has met my expectations Overall satisfaction: Overall, I am satisfied with the internet	7-point Likert scale: (1) Strongly disagree to (7) Strongly agree	Wang and Liao (2008), Wang (2008) and Roca *et al.* 2006)

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