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Internet Usage and Net Benefit among Employees Within Government Institutions in Yemen: An Extension of Delone and Mclean Information Systems Success Model (DMISM) with Task-Technology Fit

[1]Osama Isaac, [1]Zaini Abdullah, [2]T. Ramayah and [1]Ahmed M. Mutahar
[1]Faculty of Business and Management, University Teknologi MARA, Selangor, Malaysia
[2]School of Management, University Sains Malaysia, Penang, Malaysia

Abstract: Yemen is facing a number of economic challenges and the performance of its government institutions is inefficient. However, internet technology usage can help redress some of this and play an important role in encouraging economic growth, improving institutional efficiency and enhancing employee performance. Many theories and models have been developed and proposed in the Information System (IS) context in order to predict and explain user behavior with technology. In this respect, DeLone and McLean Information Systems Success Model (DMISM) is one robust model for evaluating Information Technology (IT) through user satisfaction and net benefits and it has become widely used to measure the success of information systems. However, while DMISM is both robust and effective it neglects to focus on task-technology fit construct the degree to which the system fits with tasks and needs. In the context of technology usage within organizations, actual usage and user satisfaction are not enough to provide a full picture without taking into consideration whether the technology fit with tasks or not, something considered highly imperative when studying technology usage within organizations. So, this study applies DMISM as the underpinning theory but extends it with a construct task-technology fit. It also takes s further step forward in order to increase the power of explaining the model's output by examining the net benefit construct through four different variables, namely process, knowledge acquisition, communication quality and decision quality. A survey questionnaire was used to collect primary data from 530 internet users among employees within all 30 government ministries in Yemen. An analysis was conducted to examine the relationship between the variables of the proposed model including Confirmatory Factor Analysis (CFA) and Structural Equation Modeling (SEM) via. AMOS. The results of the data analysis showed that the data fit the extended DMISM model well while the findings of the multivariate analysis demonstrated four main results: first, system quality and information quality have a great influence on actual usage, user satisfaction and task-technology fit; second, actual usage has a positive impact on user satisfaction, process, knowledge acquisition and communication quality; third, user satisfaction positively influences process, knowledge acquisition, communication quality and decision quality and fourth, task-technology fit significantly influences process, knowledge acquisition and communication quality. The proposed model explained 72% of the variance in the process, 45% of the variance in knowledge acquisition, 46% of the variance in communication quality and 15% of the variance in decision quality. The theoretical and practical implications are discussed and this study concludes by discussing the limitations of the study which should be addressed in any future research.

Key words: Internet usage, net benefit, user satisfaction, task-technology fit, DeLone and McLean, Yemen

INTRODUCTION

Yemen faces an number of economic challenges and has one of the lowest GDP per capita among the world countries (IMF, 2015). The performance of its government institutions is inefficient compared to neighbouring Arab countries (Fig. 1) and technology usage within public sector industry in Yemen is declining, as shown by a change in ranking between 2013 and 2014 (= -5) (Fig. 2). Lack of technology usage leads to low performance and low productivity (Delone and Mclean, 1992; Norzaidi and Salwani, 2009; Kassim *et al*., 2012 Makokha and Ochieng, 2014) and the evidence is mounting that the economy of Yemen is suffering, its government institutions are inefficient and technology usage in the public sector is in decline. With such a situation a far-reaching solution is needed to enhance performance in government institutions. However, internet technology, perhaps the greatest invention of this generation may offer some hope.

While 3,366,261,156 is the number of internet users in the world today and the world average of internet usage

Corresponding Author: Osama Isaac, Faculty of Business and Management, University Teknologi MARA, Selangor, Malaysia

is 46.4%, Yemen has one of the lowest internet usage rates at 24.7%. With a total population of 27,477,600, Yemen has only 6,773,228 internet users. Although, internet usage has dramatically increased in the last decade (Fig. 3). Studies have shown that the internet

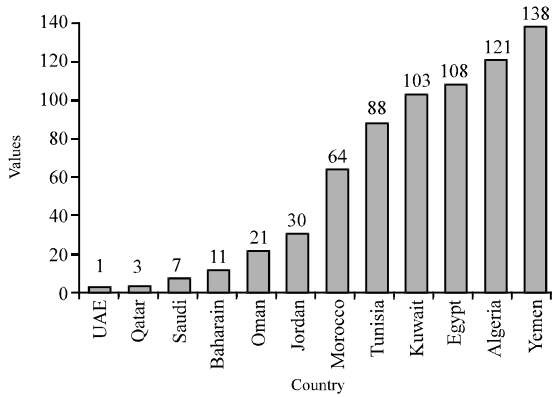

Fig. 1: Government institutions efficiency: Ranking of Arab countries among 143 country; (Global Competitiveness Report, 2015)

technology has the potential to improve all aspects of our social, economic and cultural life and it is linked to national income (PRC, 2013). There is a significant impact of internet usage on organizational performance, its usage positively influences individual performance (Simsim, 2011). Therefore, internet usage can play a major role in encouraging economic growth, improving government efficiency and enhancing employee performance in Yemeen.

Regardless of the state of the country's economy, organizations want to ensure that their investment in the IS is successful and since top management will make such investments to address a business need or opportunity it is therefore important to identify whether the systems will meet the organization's requirements (DeLone and McLean, 2004). Many theories and models have been developed and proposed in the IS context in order to predict and explain user behavior with technology. Besides the DeLone and McLean Model of Information Systems Success (DMISM) (Delone and Mclean, 1992; Delone and Mclean, 2003) other well-known theories and models exist including Technology Acceptance Model (TAM) (Davis, 1989), Diffusion of Innovation Theory

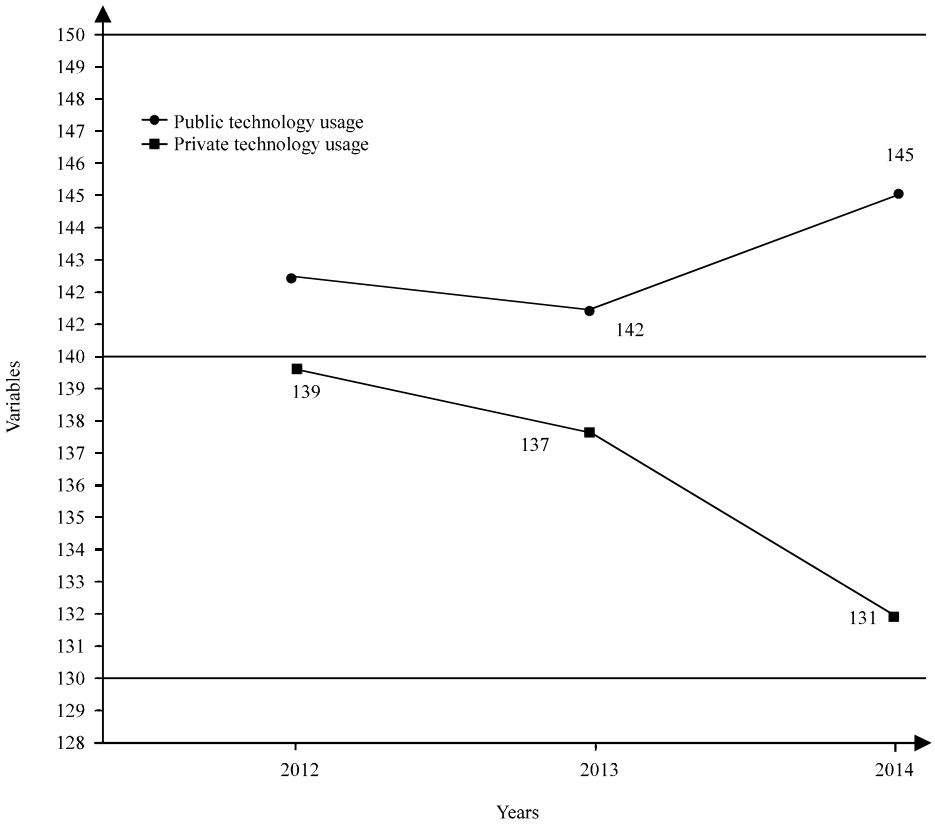

Fig. 2: Public vs. private sector technology usage in Yemen (ranking out of 148 countries); Networked Readiness Index in 2014

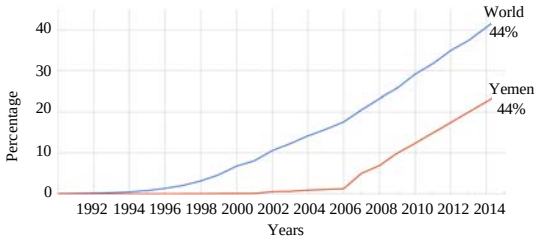

Fig. 3: Internet users as percentage of population: Yemen vs. world average, world development indicator data from world bank: last updated: Jun 2, 2016

(DOI) (Rogers, 1995), Theory of Reasoned Action (TRA) (Ajzen *et al*., 1980) Theory of Planned Behavior (TPB), (Ajzen, 1985), Model of PC Utilization (MPCU) Chang and Cheung (2001), Unified Theory of Acceptance and Use of Technology (UTAUT). However, these have neglected to focus on evaluating IT usage such as user satisfaction and net benefits and only been concerned with usage behaviour as an output factor. DMISM evaluates IT through user satisfaction and net benefits and has become widely used to measure the success of IS (Montesdioca and Macada, 2015). Also, in the IS context there are still scholars who debate on which are the appropriate variables to measure IS success (Wang and Liao, 2008).

Delone and Mclean (1992) developed DMISM and concluded that there are six important variables to measures IS success: information quality, system quality, user satisfaction, IS usage, individual impact and organization impact. They reviewed studies done from 1992 and revised their original model to produce an updated one (Delone and Mclean, 2003) in which performance impacts were replaced with net benefits to account for benefits at multiple levels of analysis and to allow researchers to apply the model to any intended level of analysis (Petter *et al*., 2008) and add service quality as a new construct. According to Delone and Mclean (2003) the variables system quality and information quality are considered to be on the system development level while actual usage user satisfaction and perceived net benefit are considered to be on the effectiveness-influence level. In the DeLone and McLean model more system usage leads to higher user satisfaction and because of user satisfaction and system usage the occurring of net benefit is certain. The practical application of the DMISM is naturally dependent on how it is used within organizations and the selection of particular success dimensions and specific metrics are dependent on the nature and purpose of the system being evaluated. However, Delone and Mclean (2003) mentioned that there are some difficulties for scholars to determine and clearly define the measures of net benefit because of the variety of stakeholders and contexts. A diversity of stakeholders may have diverse perspectives on what net benefit means to them (Seddon *et al*., 1999). Since, this study focuses on measuring internet usage success from the perspective of employees, net benefit in this study will refer to employee perceived net benefit evaluation of a specific internet usage.

DMISM has become one of the robust models in the context of IS for several reasons. First, many studies have obtained empirical support for the DMISM model across a variety of contexts, making DMISM appear to be a most widely accepted and used theory among researchers studying system usage and acceptance behavior:

- North American: Eom (2012), Chong *et al*. (2010), Wu (2007) and Jennex *et al*. (1998)
- South American: Montesdioca and Maçada (2014)
- Europe: Bossen *et al*. (2013), Sorum *et al*. (2012), Sharkey *et al*. (2010), Xu *et al*. (2010) and Bernroider (2008)
- Asia: Kim *et al*. (2016), Hsu *et al*. (2014), Wang and Lai (2014), Wang and Liao (2008), Chien and Tsaur (2007)
- Sub-Saharan Africa: Rotich *et al*. (2016)
- Oceania: Ghandour *et al*. (2010)
- Middle East and North Africa: Mohammadi (2015) Baraka *et al*. (2013) Almutairi and Subramanian (2005)

Second, the diversity of applications supports the effectiveness of DMISM to predict user behaviour and evaluate the success of IS for instance; internet banking (Balasubramanian *et al*., 2014), e-Government (Lin *et al*., 2011), e-Commerce (Delone and Mclean, 2004) e-Service (Xu *et al*., 2010) human resource information systems (Davarpanah and Mohamed, 2013), virtual learning (Halonen *et al*., 2009) wiki (Trkman and Trkman, 2009), online group-buying (Hsu *et al*., 2014), information security (Montesdioca and Maçada, 2014) and virtual learning (Halonen *et al*., 2009).

Although, DMISM shows the robust and effectiveness of the model (Petter and McLean, 2009) It neglects to focus on task-technology fit construct the degree to which the system fits with tasks and needs. In the context of technology usage within organizations, actual usage and user satisfaction are not enough to give a full picture without taking into consideration whether the technology fits with tasks or not (Goodhue and Thompson, 1995). Also, task-technology fit is considered highly imperative as far as technology usage studied within organizations (D'Ambra *et al*., 2013). This study applied DMISM as an underpinning theory and extended it with the construct task-technology fit which proposed by Goodhue and Thompson (1995). Moreover, while theories and models of technology usage do not serve

equally across contexts (Al-Qeisi, 2009; Kripanont, 2007; Straub *et al*., 1995) this study is probably one of few that applied DMISM in the context of Yemen.

This study attempts to achieve the following research objectives to examine the effect of system quality on user satisfaction, actual usage and task-technology fit in the internet context among employees. To examine the effect of information quality on user satisfaction, actual usage and task-technology fit in the internet context among employees. To examine the effect of actual usage on process, knowledge acquisition, communication quality, decision quality and user satisfaction in the internet context among employees. To examine the effect of user satisfaction on process, knowledge acquisition, communication quality and decision quality in the internet context among employees. To examine the effect of task-technology fit on process, knowledge acquisition, communication quality and decision quality. If the result of this study find that the main proposed variables have a significant impact on user satisfaction and net benefits, recommendations on how users could use the internet efficiently and effectively will be made. This research will also give guidance in the study of IT in other sectors.

Literature review

System quality: System quality factor plays a major role in the technology context and IS success (Glood *et al*., 2016) and is defined as the degree to which internet users are convinced by internet flexibility, ease of use, usefulness, enjoyment, security, price and speed (Kim *et al*., 2001; Sun *et al*., 2008; Zhao *et al*., 2011). According to the literature, system characteristics have been widely studied through different indicators such as adaptability, reliability, integration and accessibility (Sun and Mouakket, 2015), speed and price (Sun *et al*., 2008), security (Salisbury *et al*., 2001) and ease of use and usefulness (Ramayah, 2006; Ramayah and Lo, 2007; Ramayah *et al*., 2005).

There have been numerous studies conducted on the influence of system quality on user satisfaction. According to Wang and Lai (2014) a positive relationship between system quality and user satisfaction seems to exist in the context of knowledge management systems within organizations. There are also many studies which have emphasized that system quality positively influences user satisfaction (Delone and Mclean, 1992; Delone and Mclean, 2003; Cheng *et al*., 2008, 2010; Son *et al*., 2012; Nikhashemi *et al*., 2013; Chakraborty and Sengupta, 2014; Sahadev and Purani, 2008; Wang and Liao, 2008; Wu and Wang, 2008; Cho *et al*., 2015; Lwoga, 2013; Makokha and Ochieng, 2014) although there are studies which obtained an opposite result that system quality does not influence user satisfaction (Sun *et al*., 2008; Chi, 2013; Khayun and Ractham, 2011). Consequently, the following hypothesis is proposed:

- H_{1a}: system quality has a positive effect on user satisfaction

The relationship between system quality and actual usage has also been studied through the IS literature. For instance in the context of ERP system in Taiwan found that system quality has a significant influence on actual usage. This concurs with Wang and Lai (2014) who studied whether there is a relationship between the two variables within organizations and found that system quality predicts actual usage. Other studies also support the existence of a relationship between system quality and actual usage (Cho *et al*., 2015; Makokha and Ochieng, 2014; Khayun and Ractham, 2011). However, some have found that system quality does not affect actual usage (Wang and Liao, 2008). Consequently, the following hypothesis is proposed:

- H_{1b}: system quality has a positive effect on actual usage

The influence of system quality on task-technology fit has been proven through previous studies such as; (Norzaidi *et al*., 2007) who studied in the context of the intranet within organizations in Malaysia and found that technology characteristics in general have a great impact on task-technology fit. Also D'Ambra and Wilson (2011) found a positive impact of technology characteristics on task-technology fit in the context of world wide web (www) usage. A significant number of studies have proven that technology characteristics have the ability to predict and influence task-technology fit (Lu and Yang, 2014; D'Ambra *et al*., 2013). Consequently the following hypothesis is proposed:

- H_{1c}: system quality has a positive effect on task-technology fit

Information quality: Information quality is one of the fundamental antecedents of user satisfaction (Wu and Wang, 2006, 2008). It is defined as the degree to which the internet users are convinced that internet information is up-to-date, accurate, relevant and precise (Cheng *et al*., 2013; Lederer *et al*., 2000). A previous study by Wang and Liao (2008) showed that information quality has a positive influence on user satisfaction within the context of e-government systems in Taiwan and this agrees with the finding of numerous studies that information quality is able to predict user satisfaction

(Delone and Mclean, 1992; Delone and Mclean, 2003; Wang and Lai, 2014; Wu and Wang, 2006; Fan and Fang, 2006; Khayun and Ractham, 2011; Cho *et al*., 2015; Lwoga, 2013; Makokha and Ochieng, 2014). However, Cheng *et al*. (2006, 2008) found no relationship between information quality and user satisfaction. Therefore the hypothesis is proposed as follows:

- H_{2a}: information quality has a positive effect on user satisfaction

In determining factors that influence system usage, information quality has become one of essential factors to deal with it (Wang and Lai, 2014). A number of IS researchers have conducted studies on the relationship between information quality and actual usage. For instance, Cho *et al*. (2015) studied the impact of information quality on actual system usage within the context of information systems usage and found a positive relationship between the two variables. A study regarding ICT usage in Kenya found that information quality has a positive effect on actual usage (Makokha and Ochieng, 2014). The claim that information quality seems to have a positive effect on actual usage is also supported by a number of earlier studies (Wang and Lai, 2014; Wang and Liao, 2008). However, in contrast, Khayun and Ractham (2011) found that information quality does not influence system actual usage. Therefore the hypothesis is proposed as follows:

- H_{2b}: information quality has a positive effect on actual usage

Technology characteristic as a part of information quality has been linked to task-technology fit relating to IS within organizations. For instance, Glowalla and Sunyaev (2014) conducted a study in Germany in the context of ERP system and found that technology characteristic significantly impacts task-technology fit. This was similar to Lee *et al*. (2005) who indicated that technology characteristic within a mobile commerce context can predict task-technology fit. This is similar to considerable number of studies which found a positive relationship between technology characteristic and task-technology fit (Daud, 2008; Lee *et al*., 2005). Therefore, the hypothesis is proposed as follows:

- H_{2c}: information quality has a positive effect on task-technology fit

Actual usage: Actual usage is defined as the usage frequency of technology and usage times (Kim *et al*., 2008). Many studies in the context of IS have measured the actual usage through frequency of usage and duration of use (Sun and Mouakket, 2015; Mohammadi, 2015; Kim *et al*., 2008; Chiu *et al*., 2007; Porter and Donthu, 2006; Shih and Fang, 2004; Cheung *et al*., 2000). One of the most important directions for future research in the topic of technology usage is to investigate the impact of system usage on IS success factors such as user satisfaction and performance (Venkatesh *et al*., 2003). A few studies have contributed to filling the gap by addressing the link between actual usage and net benefits (Hou, 2012; Norzaidi *et al*., 2007; Norzaidi and Salwani, 2009; Son *et al*., 2012).

Notable studies on the influence of actual usage on performance and net benefits such as Makokha and Ochieng (2014) who found that higher system usage leads to higher net benefits. Similarly, Norzaidi and Salwani (2009) in a quantitative study found that actual usage influences performance. Yuthas and Young (1998) found that system usage has an association with the decision effectiveness and Burton-Jones and Straub (2006) found the actual usage has a significant correlation with task performance. Although there have been studies in the IS context emphasizing that actual usage positively influences performance and net benefits (Makokha and Ochieng, 2014; D'Ambra *et al*., 2013; Hou, 2012; D'Ambra and Wilson, 2011; Wang and Liao, 2008; Norzaidi *et al*., 2007; Fan and Fang, 2006; Lee *et al*., 2005) other studies have found the opposite that actual usage does not influence performance and net benefits (Cho *et al*., 2015; Khayun and Ractham, 2011; Wu and Wang, 2006). Further, this current study has made a step forward by examining the net benefit construct, not as one construct as in previous studies but through four different variables, namely process, knowledge acquisition, communication quality and decision quality in order to increase the power of explaining the output by the model. Hence, it is hypothesized as follows:

- H_{3a}: actual usage has a positive effect on the process
- H_{3b}: actual usage has a positive effect on knowledge acquisition
- H_{3c}: actual usage has a positive effect on communication quality
- H_{3d}: actual usage has a positive effect on decision quality

Few studies have investigated the impact of actual usage on user satisfaction while more have examined the inverse relationship which is the impact of user satisfaction on actual usage (Petter *et al*., 2008b). A previous study has shown that actual usage has a positive influence on user satisfaction within the context of Internet technology in Malaysia (Norzaidi

and Salwani, 2009) and there are studies which found that actual usage predicts user satisfaction (Hou, 2012; Khayun and Ractham, 2011; Anandarajan *et al*., 2002). Hence, it is hypothesized as follows:

- H_{3e}: actual usage has a positive effect on user satisfaction

User satisfaction: User satisfaction is one of the essential factors which researchers should take it into consideration when examining technology usage (Delone and Mclean, 2003). Moreover, evaluating IT through user satisfaction is widely used to measure the success of IS (Montesdioca and Macada, 2015). User satisfaction in this study is defined as the degree to which internet users are satisfied with the decision to use the internet and the internet meet thir expectations (Wang, 2008; Wang and Liao, 2008; Roca and Gagne, 2006). Empirical results have shown a strong association between user satisfaction and system benefits (Fan and Fang, 2006; Makokha and Ochieng, 2014; Norzaidi and Salwani, 2009; Son *et al*., 2012; Wang and Liao, 2008). Additionally, Guimaraes and Igbaria (1997) found that user satisfaction has a positive impact on a user's job, improves effectiveness and productivity (Halawi *et al*., 2007) and enhance decision-making (Vlahos *et al*., 2004). However, some studies have found that there is no relationship between user satisfaction and performance or net benefits (Daud, 2008). Thus, it is hypothesized that:

- H_{4a}: user satisfaction has a positive effect on process
- H_{4b}: user satisfaction has a positive effect on knowledge acquisition
- H_{4c}: user satisfaction has a positive effect on communication quality
- H_{4d}: user satisfaction has a positive effect on decision quality

Task-technology fit: Task-technology fit is defined as the degree to which the system matches one's interests, fits (suits) with tasks and meet one's needs (Lin and Wang, 2012). Lu and Yang defined the task-technology fit as the degree to which a technology assists users in performing their work or coursework. In addition, Lu and Yang defined the task-technology fit as the degree to which the system is suitable for helping, enough to complete tasks and fit for the requirements of tasks. For comprehensive picture of the issues related to technology usage within organizations, task-technology fit, along with actual usage and user satisfaction has to be proposed to enhance the predictive power of a research model (Goodhue and Thompson, 1995). According to D'Ambra *et al*. (2013) task-technology fit is considered fundamental as far as studying technology usage within organizations and notable studies have been conducted to investigate the positive influence of task-technology fit on IS success factors such as performance impact and net benefits. These are supported by several studies (Glowalla and Sunyaev, 2014; Lee and Lehto, 2013; D'Ambra *et al*., 2013; D'Ambra and Wilson, 2004; McGill and Klobas, 2009; Larsen *et al*., 2009; Daud, 2008; Norzaidi *et al*., 2007; Lee *et al*., 2005). Therefore the hypotheses are proposed as follows:

- H_{5a}: task-technology fit has a positive effect on process
- H_{5b}: task-technology fit has a positive effect on knowledge acquisition
- H_{5c}: task-technology fit has a positive effect on communication quality
- H_{5d}: task-technology fit has a positive effect on decision quality

Net benefits: Net benefits is defined as the extent to which information systems are contributing to the success of individuals, groups, organizations industries and nations for example, improved decision-making, greater productivity, increased sales, cost reductions, better profits, greater market efficiency, heightened consumer welfare, job creation and economic development (DeLone and McLean, 2016). There are numerous studies in the literature in the context of IS which focus on system usage as an output construct (Lee *et al*., 2009) but neglect to examine the consequences of that actual usage through its impact on performance or net benefits (Shih and Chen, 2013) which recommend as a measure for information systems success (Montesdioca and Maçada, 2014). However there are few notable studies which focus on performance or net benefits as an output variable in the context of IS (Hou, 2012; Norzaidi and Salwani, 2009; Son *et al*., 2012). This study contributes to the body of knowledge and fills a gap by addressing the link between actual usage and individual net benefits within organizations. In this study, net benefits is defined as the degree to which the system usage effect the job process, knowledge acquisition, communication quality and decision quality (Khayun and Ractham, 2011).

In the context of IS studies, performance and net benefits are defined and measured through different indicators; Wu and Wang (2006) defined output performance as the degree to which system usage improves the quality of decision-making, enhances job

efficiency, improves communication quality and the acquistion of new knowledge and innovative ideas, enhances job effectiveness, helps accomplish tasks quickly and improves job performance and the quality of work life. Norzaidi *et al.* (2007) defined net benefits as the degree to which system usage helps to accomplish a task quickly, improves the quality of work, improves job performance, enables control over work, eliminates errors and enhance effectiveness on the job. According to Di-Benedetto *et al.* (2003) the net benefits can be measured through the following indicators: improved efficiency, enhanced effectiveness and increased productivity and problem identification.

One of the contributions of this study relates to the examination of the net benefits. While previous studies have evaluated net benefits and performance as one construct with multiple indicators (Hou, 2012; McGill and Klobas, 2009; Norzaidi *et al.*, 2007) this study has made a step forward to deal with net benefits construct as four separate constructs process, knowledge acquisition, communication quality and decision quality. Each of the four variables has multiple indicators. This step is made in order to increase the power of explaining the output by the model.

MATERIALS AND METHODS

Overview of the proposed research model: This study proposes a comprehensive model based on the four constructs of Delone and Mclean (1992), namely system quality, information quality, actual usage and user satisfaction and the updated (Delone and Mclean, 2003) for the construct of net benefits, along with task-technology fit as proposed by Goodhue and Thompson (1995) which suggests that the mentioned six constructs are success variables in the internet technology context among employees of Yemeni government institutions. Further, this study contributes to the body of IS knowledge by examining the net benefits construct through four separate constructs (process, knowledge acquisition, communication quality and decision quality) in order to increase the power of explaining the output by the model. The proposed extended model of DMISM has five main hypotheses and nineteen sub-hypotheses to test as Fig. 4 shows.

Development of instrument: A 30-item questionnaire was developed for this study. Because the respondents were Arab-speakers it was imperative that the questionnaire be accurately translated from English to Arabic. Back

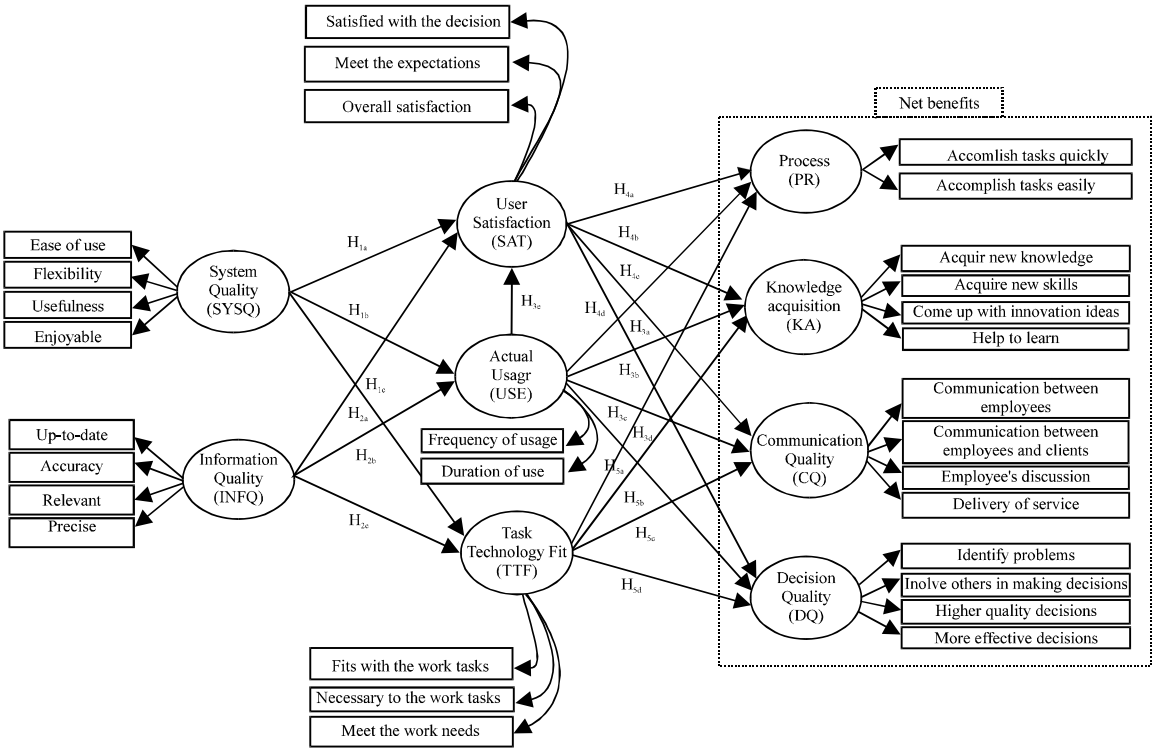

Fig. 4: Proposed research model

translation was used, a procedure commonly used in cross-cultural surveys to test the accuracy of the translation (Brislin, 1970). Individual scale items are listed in Appendix A Table 1-5 and Fig. 1. This study applied multi-item Likert scales which are widely used in questionnaire-based perception studies (Lee *et al*., 2009). Unlike actual usage which measures using 5-point ranking scale, other variables are subjectively measured using the 7-point likert scale with 7 being 'Strongly Agree' and 1 being 'Strongly Disagree'. The likert scale and other types of interval-type scales are extensively used in organizational research since they lend themselves to more sophisticated data analysis. This study undertook a pre-testing among 25 university students from Yemen to solve any ambiguity associated with wording or measurement. The items were then pilot-tested to examine their internal consistency. Out of the 60 surveys given to Yemeni employees in the ministry of communication and information technology, 58 were returned with complete and valid data. In the final questionnaire all the items had acceptable reliability as the individual Cronbach's alpha coefficients of the constructs were greater than the recommended value of 0.7 (Nunnally and Bernstein, 1994).

Data collection: The targeted population was approximately 6.090 internet users among Yemeni employees in head offices (called Dwa'win) of all 30 government ministries at the time this study was conducted. The adequate sample size for each ministry was selected based on the total number of employees. The data for this study was collected using a self-administered paper questionnaire, distributed to employee in-person to motivate them and clarify any doubts. The main reason for choosing to deliver the questionnaire in-person is because this provides high predictive value when assessing the efficiency of the individuals in the society being measured, especially when the target subject under study is related to individual perception, belief and opinion.

The 700 questionnaires were distributed and 530 sets were returned of which 508 were useful for analysis. The final sample size was considered adequate (Tabachnick and Fidell, 2012; Krejcie and Morgan, 1970). The response rate 76% is considered very good (Baruch and Holtom, 2008) by comparison with other studies found in the relevant literature. Of the 22 inadequate questionnaires 12 were removed because of the missing data for >15% of the questions, 4 were considered as outliers and 6 contained straight lining. The demographic profile of the respondents is shown in Table 1. The 412 (81.1%) were male and 96 (18.9%) female. 1.4% were <20 years old, 28.3% between 20 and 29 year, 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% had completed postgraduate studies.

Table 1: Summary of demographic profile of respondents

Demographic item/Categories	Frequency	Percentage (%)
Genders		
Male	412	81.1
Female	96	18.9
Age (years)		
<20		
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
Internet connection in house		
Yes	352	69.3
No	156	30.7

RESULTS

Data analysis and results

Descriptive analysis: Table 2 and 3 presents the mean and standard deviation of each variable in the current study. Respondents were asked to indicate their opinion in the context of internet usage based on the measurement of a 7-point scale ranging from 1 (strongly disagree) to 7 (strongly agree). Information quality recorded the highest mean score of 5.49 out of 7.0 with a standard deviation of 1.140 indicating that the respondents were aware of the quality of internet information. System quality recorded mean score of 5.24 out of 7.0 with a standard deviation of 1.094 thus indicating that the respondents seem to find that the internet is easy to use, flexible, useful and enjoyable. Communication quality recorded mean score of 5.20 out of 7.0 point with a standard deviation of 1.506, indicates that the employees strongly agreed that using the internet helped in communication quality. Mean scores for Process (4.93), knowledge acquisition (4.41) and decision quality (4.59) out of 7.0 points with standard deviations of 1.572, 1.614 and 1.106, respectively, indicate that employees agree that using the internet helped improve their task process, knowledge acquisition and decision quality. The results also indicated the overall respondent mean score for user satisfaction in the current study was 5.16 with a standard deviation of 1.228 this indicates a high level of satisfaction among respondents regarding the decision

Table 2: Goodness-of-fit indices for the measurement model

Fit index	Cited	Admissibility	Result	Fit (yes/no)
χ^2	-	-	737.906	-
df	-	-	369.000	-
p-value	-	>0.05	0.000	No
χ^2/df	Kline (2010)	1.00-5.00	2.000	Yes
RMSEA	Steiger (1990)	<0.08	0.044	Yes
SRMR	Hu and Bentler	<0.08	0.034	Yes
GFI	Joreskog and Sorbom (1993)	>0.90	0.912	Yes
AGFI	Joreskog and Sorbom (1993)	>0.80	0.889	Yes
NFI	Bentler and Bonnet (1980)	>0.80	0.942	Yes
PNFI	Bentler and Bonnet 1980)	>0.05	0.799	Yes
IFI	Bollen (1990)	>0.90	0.970	Yes
TLI	Tucker and Lewis (1973)	>0.90	0.964	Yes
CFI	Byrne (2010)	>0.90	0.970	Yes
PGFI	James *et al.* (1982)	>0.50	0.724	Yes

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

Table 3: Loading, Cronbach's alpha, CR and AVE

Construct	Items	Loading (>0.5)	M	SD	α (>0.7)	CR (>0.7)	AVE (>0.5)
SYSQ	SYSQ1: Ease of use	0.84	5.24	1.094	0.881	0.881	0.650
	SYSQ2: Flexibility	0.83					
	SYSQ3: Usefulness	0.81					
	SYSQ4: Enjoyable	0.75					
INFQ	INFQ1: Up-to-date	0.84	5.49	1.140	0.897	0.897	0.686
	INFQ2: Accuracy	0.83					
	INFQ3: Relevant	0.81					
	INFQ4: Precise	0.84					
USE	USE1: Frequency of usage	0.86	3.36	1.125	0.744	0.766	0.622
	USE2: Duration of use	0.71					
SAT	SAT1: Satisfied with the decision	0.86	5.16	1.228	0.903	0.903	0.756
	SAT2: Meet the expectations	0.87					
	SAT3: Overall satisfaction	0.87					
TTF	TTF1: Fits with the work tasks	0.91	4.86	1.485	0.911	0.918	0.789
	TTF2: Necessary to the work tasks	0.90					
	TTF3: Meet the work needs	0.85					
PR	PR1: Accomplish tasks quickly	0.89	4.93	1.572	0.871	0.871	0.771
	PR2: Accomplish tasks easily	0.86					
KA	KA1: Acquire new knowledge	0.87	4.41	1.614	0.930	0.932	0.774
	KA2: Acquire new skills	0.93					
	KA3: Come up with innovative ideas	0.89					
	KA4: Help to learn	0.82					
CQ	CQ1: Communication between employees	0.85	5.20	1.506	0.916	0.916	0.731
	CQ2: Communication between employees and clients	0.85					
	CQ3: Employee's discussions	0.85					
	CQ4: Delivery of service	0.87					
DQ	DQ1: Identify problems	0.90	4.59	1.106	0.921	0.921	0.745
	DQ2: Involve others in making decisions	0.83					
	DQ3: Higher quality decisions	0.85					
	DQ4: More effective decisions	0.87					

to use the internet. The task technology fit result shows a mean score of 4.86 with a standard deviation of 1.485 indicating that the majority of employees surveyed agree that the internet fits with work tasks.

Measurement model assessment and Confirmatory Factor Analysis (CFA): As shown in Table 2, all the goodness-of-fit indices exceed their respective common acceptance levels as suggested by previous research, thus demonstrating that the measurement model exhibited a fairly good fit with the data collected (χ^2/df = 2.000, CFI = 0.970, RMSEA = 0.044, GFI = 0.912, AGFI = 0.889, NFI = 0.942, TLI = 0.964, IFI = 0.970, PNFI = 0.779 and PGFI = 0.724). Therefore, we could proceed to evaluate the psychometric properties of the measurement model in terms of construct reliability indicator reliability, convergent validity and discriminant validity. For construct reliability this study tested the individual cronbach's alpha coefficients to measure the reliability of each of the nine variables in the measurement model. The results indicate that all the individual cronbach's alpha coefficients of the nine constructs ranging from 0.744-0.930 were greater than the recommended level of 0.7 (Kannana and Tan, 2005; Nunnally and Bernstein, 1994). Additionally, for testing construct reliability all the Composite Reliability (CR) values ranging from 0.766-0.932

Table 4: Results of discriminant validity by fornell-larcker criterion for the model

	1	2	3	4	5	6	7	8	9
Factors	DQ	SYSQ	INFQ	USE	SAT	TTF	PR	KA	CQ
DQ	0.863	-	-	-	-	-	-	-	-
SYSQ	0.319	0.806	-	-	-	-	-	-	-
INFQ	0.392	0.753	0.828	-	-	-	-	-	-
USE	0.224	0.325	0.411	0.789	-	-	-	-	-
SAT	0.417	0.687	0.674	0.455	0.870	-	-	-	-
TTF	0.293	0.506	0.488	0.576	0.551	0.888	-	-	-
PR	0.388	0.562	0.576	0.634	0.726	0.768	0.878	-	-
KA	0.347	0.443	0.414	0.556	0.538	0.619	0.750	0.880	-
CQ	0.315	0.498	0.486	0.472	0.667	0.532	0.682	0.688	0.855

Diagonals represent the square root of the average variance extracted while the other entries represent the correlations: SYSQ = System Quality; INFQ = Information Quality; USE = Actual Usage; SAT = User Satisfaction; TTF = Task-Technology Fit; PR = Process; KA = Knowledge Acquisition; CQ = Communication Quality; DQ = Decision Quality

were higher than 0.7 (Kline, 2010; Gefen *et al*., 2000) which adequately indicates that construct reliability is fulfilled as shown in Table 3. Therefore, the achieved Cronbach's Alpha and CR for all constructs were considered to be sufficiently error-free.

Factor loading was used to test indicator reliability. High loadings on a construct indicate that the associated indicators seem to have much in common which is captured by the construct (Hair *et al*., 2013). Factor loadings >0.50 were considered to be very significant (Hair *et al*., 2010). The loadings for all items exceeded the recommended value of 0.5 as shown in Table 3. The loading for all items in the model have therefore fulfilled all the requirements without being eliminated from the scale.

This study used the Average Variance Extracted (AVE) to test convergent validity and it indicated that all AVE values were higher than the recommended value of 0.50 (Hair *et al*., 2010) ranging from 0.622-0.789. The convergent validity for all constructs has been successfully fulfilled and adequate convergent validity exhibited as Table 3 shows.

The discriminant validity of the measurement model was checked using fornell-larcker criterion. As shown in Table 4 the correlations between the factors ranging from 0.224-0.768 are smaller than the square root of the average variance extracted estimates which are in the range of 0.789-0.888. This indicates that the constructs are strongly related to their respective indicators compared to other constructs of the model (Fornell and Larcker, 1981) 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 constructs is fulfilled.

Structural model assessment: The goodness-of-fit of the structural model was comparable to the previous CFA measurement model. In this structural model the values are recorded as χ^2/df = 3.275, CFI = 0.928 and RMSEA = 0.067. These fit indices provide evidence of adequate fit between the hypothesized model and the observed data (Byrne, 2010). Thus, we could proceed to examine the path coefficients of the structural model.

Hypotheses tests: The hypotheses of this study were tested using structural equation modeling via AMOS as presented in Fig. 5. The structural model assessment as shown in Table 5 provides the indication of the hypotheses tests. 17 out of the 19 sub-hypotheses are supported. System quality is significantly predicting user satisfaction, actual usage and task-technology fit, hence, H_{1a}, H_{1b} and H_{1c} are accepted ($\beta = 0.45$, $p<0.001$), ($\beta = 0.12$, $p <0.05$) and ($\beta = 0.34$, $p<0.001$) respectively. Information quality as well, significantly predicts user satisfaction, actual usage and task-technology fit, so, H_{2a}, H_{2b} and H_{2c} are supported ($\beta = 0.37$, $p<0.001$), ($\beta = 0.37$, $p<0.001$) and ($\beta =0.31$, $p<0.001$) respectively. Likewise, H_{3a}, H_{3b}, H_{3c} and H_{3e} are supported as actual usage significantly predict process, knowledge acquisition, communication quality and user satisfaction ($\beta = 0.30$, $p<0.001$), ($\beta = 0.34$, $p<0.001$), ($\beta = 0.22$, $p<0.001$) and ($\beta = 0.21$, $p<0.001$), respectively. These are similar to user satisfaction which found significantly influence process, knowledge acquisition, communication quality, decision quality, so, H_{4a}, H_{4b}, H_{4c} and H_{4d} are supported ($\beta = 0.38$, $p<0.001$), ($\beta = 0.22$, $p<0.001$), ($\beta = 0.47$, $p<0.001$) and ($\beta = 0.33$, $p<0.001$) respectively. Moreover, task technology fit significantly predicts process, knowledge acquisition and communication quality hence, H_{5a}, H_{5b} and H_{5c} are accepted ($\beta = 0.48$, $p<0.001$), ($\beta = 0.37$, $p<0.001$) and ($\beta = 0.19$, $p<0.001$) respectively. However, H_{3d} and $_{H5d}$ are rejected. Note that the standardized path coefficient indicates the strength of the relationships between the independent and dependent variables, so the direct effects of task-technology fit on process and knowledge acquisition is much stronger than actual usage and user satisfaction as evident from the values of path coefficient. And the direct effect of user satisfaction on communication quality is much stronger than actual usage and task-technology fit. User satisfaction is the only

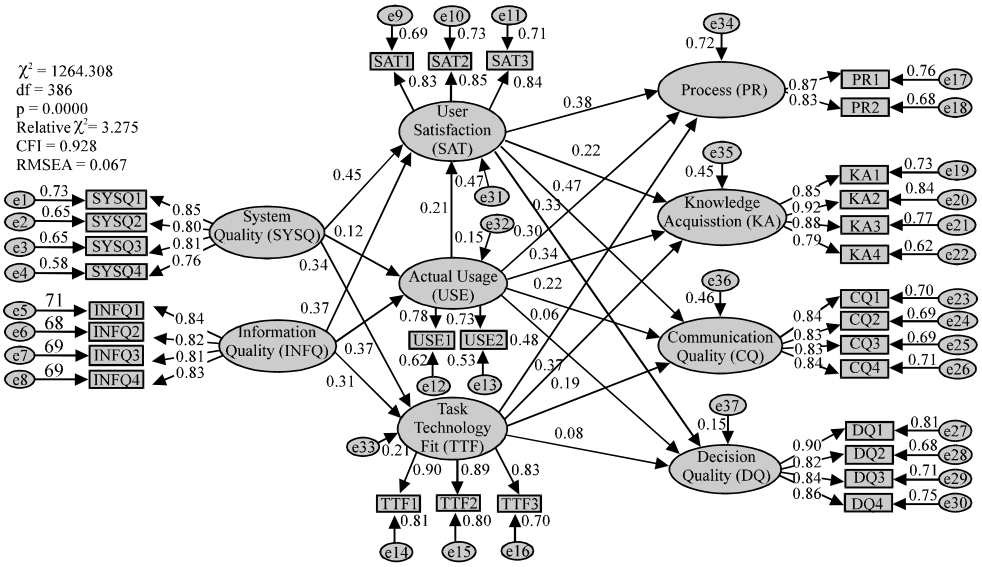

Fig. 5: Research structural model results

Table 5: Structural path analysis result

Hypothesis	Dependent variables	Independent variables	Estimate b (path coefficient)	SE	CR (t-value)	Decision
H_{1a}	SAT	SYSQ	0.45	0.042	10.251***	Supported
H_{1b}	USE	SYSQ	0.12	0.047	2.243*	Supported
H_{1c}	TTF	SYSQ	0.34	0.061	7.373***	Supported
H_{2a}	SAT	INFQ	0.37	0.043	8.003***	Supported
H_{2b}	USE	INFQ	0.37	0.048	6.850***	Supported
H_{2c}	TTF	INFQ	0.31	0.059	6.825***	Supported
H_{3a}	PR	USE	0.30	0.059	6.392***	Supported
H_{3b}	KA	USE	0.34	0.073	6.430***	Supported
H_{3c}	CQ	USE	0.22	0.069	4.392***	Supported
H_{3d}	DQ	USE	0.06	0.060	1.005	Not supported
H_{3e}	SA	USE	0.21	0.054	4.169***	Supported
H_{4a}	PR	SAT	0.38	0.053	8.727***	Supported
H_{4b}	KA	SAT	0.22	0.063	4.604***	Supported
H_{4c}	CQ	SAT	0.47	0.066	9.339***	Supported
H_{4d}	DQ	SAT	0.33	0.056	5.884***	Supported
H_{5a}	PR	TTF	0.48	0.035	12.082***	Supported
H_{5b}	KA	TTF	0.37	0.041	8.541***	Supported
H_{5c}	CQ	TTF	0.19	0.039	4.663***	Supported
H_{5d}	DQ	TTF	0.08	0.035	1.699	Not supported

***, **, *p<0.001, 0.01, 0.05; SE = Standard Error, CR = Critical Ratio; SYSQ = System Quality, INFQ = Information Quality, USE = Actual Usage, SAT = User Satisfaction, TTF = Task-Technology Fit, PR = Process, KA = Knowledge Acquisition, CQ = Communication Quality, DQ = Decision Quality

construct that significantly influences decision quality. In addition, it is evident that information quality has more influence on actual usage than system quality.

Coefficient of determination R^2: the variance explained: The R^2 value indicates the amount of variance of dependent variables which is explained by the independent variables. Hence, a larger R^2 value increases the predictive ability of the structural model. It is crucial to ensure that 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) recommended that the R^2 values should be equal to or greater than 0.10 in order for the explained variance of a particular endogenous construct to be deemed adequate. Cohen (1988b) suggested that R^2 is substantial when it is greater than 0.26. with acceptable power above 0.02 and according to Chin (1998) R^2 is substantial when it is greater than 0.65 with acceptable power above 0.19.

Conversely, Hair *et al.* (2013) recommended that R^2 has to be larger than 0.75 in order to be deemed substantial with acceptable power above 0.25. Table 6 shows the result of R^2 from the structural model and indicates that all the R^2 values are high enough for the model to achieve an acceptable level of explanatory power. Note that the highest variance explained in endogenous construct is found in the process (72%) by exogenous constructs actual usage, user satisfaction and task-technology fit. This is followed by the variance explained in user satisfaction (47%) for system quality, information quality and actual usage.

Table 6: Coefficient of determination result R^2

Exogenous construct	Endogenous construct	R^2	Cohen (1988b)	Chin (1998)	Hair *et al.* (2013)
SYSQ, INFQ and USE	SAT	0.47	Substantial	Moderate	Moderate
SYSQ and INFQ	USE	0.15	Moderate	Weak	Weak
SYSQ and INFQ	TTF	0.21	Moderate	Weak	Weak
SAT, USE and TTF	PR	0.72	Substantial	Substantial	Substantial
SAT, USE and TTF	KA	0.45	Substantial	Moderate	Moderate
SAT, USE and TTF	CQ	0.46	Substantial	Moderate	Moderate
SAT, USE and TTF	DQ	0.15	Moderate	Weak	Weak

SYSQ = System Quality, INFQ = Information Quality, USE = Actual Usage, SAT = User Satisfaction, TTF = Task-Technology Fit, PR = Process, KA = Knowledge Acquisition, CQ = Communication Quality, DQ: Decision Quality

DISCUSSION

The aim of this research is to improve the understanding of the antecedents of internet usage within organizations and its influence on employee net benefits and thus offer useful and practical implications for government institutions wishing to successfully implement the internet system and realize performance gains. This study has developed an extended model of DMISM by adding the task-technology fit factor. This section discusses each segment in the light of the main objectives and empirical results.

Findings related to objective 1: The first objective of this study was to examine the effect of system quality on user satisfaction, actual usage and task-technology fit. This objective was achieved through testing the hypothesis H_{1a}, H_{1b} and H_{1c} respectively. Firstly, this study showed that system quality had a significant effect on user satisfaction regarding internet usage. The results support prior research (Delone and Mclean, 1992; Delone and Mclean, 2003; Cheng *et al*., 2013; Son *et al*., 2012; Chakraborty and Sengupta, 2014; Cho *et al*., 2015; Lwoga, 2013; Makokha and Ochieng, 2014) and indicate that if the internet system is easy to use, flexible, useful and enjoyable, it will lead to a higher level of user satisfaction among employees within the public sector. However, this finding contradicts the study of Sun *et al.* (2008), Chi (2013) and Khayun and Ractham (2011) which found that there is no relationship between system quality and user satisfaction. Secondly, this study provides better support for the effect of system quality on actual usage of the internet. This finding is in agreement with other works (Cho *et al*., 2015; Makokha and Ochieng, 2014; Khayun and Ractham, 2011) and the result suggests that the more employees perceive the internet as easy to use, understandable, enjoyable and flexible the more their actual usage of internet (frequency of usage and duration of use). However, this result contradicts Wang and Liao (2008) who found that there is no relationship between system quality and system usage. Thirdly, system quality was found to significantly affect task-technology fit and this is compatible with previous studies (Lu and Yang, 2014; D'Ambra *et al*., 2013; D'Ambra and Wilson, 2011; Norzaidi *et al*., 2007) and indicates that the more system quality is perceived as ease of use, flexibility and usefulness the better the internet fit with work tasks and meet work needs.

Findings related to objective 2: The second objective of this study was to examine the effect of information quality on user satisfaction, actual usage and task-technology fit. This objective was achieved through testing the hypotheses H_{2a}, H_{2b} and H_{2c}, respectively. Firstly, information quality was found to positively affect user satisfaction and the results are consistent with prior research (Delone and Mclean, 1992; Delone and Mclean, 2003; Wang and Lai, 2014; Wu and Wang, 2006; Fan and Fang, 2006; Khayun and Ractham, 2011; Cho *et al*., 2015; Lwoga, 2013; Makokha and Ochieng, 2014). This study supports the hypothesis indicating that if the information is perceived as up-to-date, accurate, relevant and precise it will lead to a higher level of internet usage satisfaction among users. However, it contradicts some other studies such as Cheng *et al.* (2013). Secondly, this current study found that the information quality has a positive effect on actual usage of internet technology. This finding is consistent with previous studies (Makokha and Ochieng, 2014; Wang and Lai, 2014; Wang and Liao, 2008) and explained by the fact that when employees perceive the information on the internet as up-to-date, accurate, relevant and precise this leads to increasing their frequency and duration of internet usage. However, this result contradicts Khayun and Ractham (2011) who found that information quality does not influence system actual usage. Thirdly, information quality was found to have a significant effect on task-technology fit, supporting prior results (Lee *et al*., 2005; Daud, 2008; Lee *et al*., 2005). The finding revealed that the more information on internet is perceived as high quality, the more employees found the internet fit with work tasks and met work needs.

Findings related to objective 3: The third objective of this study was to examine the effect of actual usage on process, knowledge acquisition, communication quality, decision quality and user satisfaction. This objective was

achieved through testing the hypotheses H_{3a}-H_{3e}. Firstly, this study showed that actual internet usage had significant effects on process, knowledge acquisition and communication quality the results support prior research (Makokha and Ochieng, 2014; D'Ambra and Wilson, 2011; Wang and Liao, 2008; Norzaidi *et al*., 2007; Fan and Fang, 2006; Lee *et al*., 2005), confirming that when the employees increase their frequency and duration of internet usage within government institutions, this leads to accomplishing tasks quickly and easily, improved knowledge acquisition and communication quality. Secondly, actual internet usage was found to not significantly influence decision quality. Although, this finding contradicted previous studies (D'Ambra *et al*., 2013; Hou, 2012), it is consistent with the results of Cho *et al*. (2015), Khayun and Ractham (2011) and Wu and Wang, 2006) who found that actual usage does not influence performance and net benefits. The problem of inconsistent results here may be resolved when it is realized that models of technology usage do not serve equally across context (Al-Qeisi, 2009; Kripanont, 2007; Straub *et al*., 1997) and this study is probably one of the first initiatives to examine the extended DMISM in the context of Yemen. Thirdly, this current study found that actual internet usage has a positive effect on user satisfaction. This finding is consistent with previous studies (Norzaidi and Salwani, 2009; Hou, 2012; Khayun and Ractham, 2011; Anandarajan *et al*., 2002) and confirms that when actual usage of the internet increases among employees within government institutions this leads to increasing employee satisfaction.

Findings related to objective 4: The fourth objective of this study was to examine the effect of user satisfaction on process, knowledge acquisition, communication quality and decision quality. This objective was achieved through testing the hypotheses H_{4a}-H_{4d}. This current study found that user satisfaction has a positive effect on process, knowledge acquisition, communication quality and decision quality. These findings corroborate the results of previous studies (Fan and Fang, 2006; Makokha and Ochieng, 2014; Norzaidi and Salwani, 2009; Son *et al*., 2012; Wang and Liao, 2008), suggest that prior user satisfaction in the context of internet technology usage by employees among government institutions, increases their net benefits in four dimensions improves their task process (accomplish tasks quickly and accomplish tasks easily), enhances knowledge acquisition (acquire new knowledge and skills, come up with innovative ideas, help to learn), improves communication quality (communication between employees, communication between employees and clients, employee discussions and delivery of service) and improves decision quality (identify problems, involve others in making decisions and higher quality decisions). However, the result of this study which relates to the positive effect of user satisfaction on net benefits is inconsistent and conflicts with the Daud (2008) who found that user satisfaction does not affect performance impact.

Findings related to objective 5: The fifth objective of this study was to examine the effect of task-technology fit on process, knowledge acquisition, communication quality and decision quality. This objective was achieved through testing the hypotheses H_{5a}-H_{5d} Firstly, this current study found that the task-technology fit has a positive effect on process, knowledge acquisition and communication quality and this is compatible with previous studies (D'Ambra *et al*., 2013; D'Ambra and Wilson, 2011; Daud, 2008; Glowalla and Sunyaev, 2014; Larsen *et al*., 2009; Lee and Lehto, 2013; Norzaidi *et al*., 2007) indicating that prior internet fits with employee work tasks leads to increased performance in three dimensions improves their task process (accomplish tasks quickly and accomplish tasks easily), enhances knowledge acquisition (acquire new knowledge and skills, come up with innovative ideas, help to learn) and improves communication quality (communication between employees, communication between employees and clients, employee discussions and delivery of service). Secondly, task-technology fit was found to not significantly influence decision quality. This finding contradicted previous studies (Lee *et al*., 2005; McGill and Klobas, 2009). The contradictory finding suggest that the effect of task-technology fit on decision quality may be different across study settings and technology applications.

CONCLUSION

Organizations increase spending on IT and budgets continue to rise (Kanaracus, 2008) as the internet becomes one of the essential IT tool for the growth and prosperity of individuals, organizations and nations. As Delone and Mclean (2003) and Rai *et al*. (2002) mentioned that IS success models face a continue challenge and need to test and validate in different contexts. This study has contributed to the body of IS knowledge by testing the IS success model in the context of internet usage among employees within Yemeni government institutions. The main objective of this study was to determine the antecedents and consequences of internet usage among employees within those institutions. It extended the DeLone and McLean information systems success model with a task-technology fit construct, empirically validated the model and tested the relationships between variables.

The determinants of internet success in this study are system quality, information quality, actual usage, user satisfaction, task-technology fit and net benefits (process, knowledge acquisition, communication quality and decision quality). The data analysis started with Confirmatory Factor Analysis (CFA), followed by Structural Equation Modelling (SEM) via AMOS. In summary this research found that both system and information quality are important factors for measuring internet usage among employees within organizations because they significantly impact actual usage, user satisfaction and task-technology fit. Moreover, net benefits through improving process, knowledge acquisition and communication quality are positively influenced by important factors namely actual usage, user satisfaction and task-technology fit. User satisfaction is the only variable which significantly predicts decision quality. The implications of this present study from the perspective of academics and practitioners have been discussed, along with its limitations and some directions for future research

LIMITATIONS

One of the limitations of this study is that data gathered was cross-sectional rather than longitudinal in nature. Therefore, there is ambiguity on whether usage is affected by expectations or vice versa. The longitudinal method might improve the understanding of the associations and the causality between variables of internet usage and system success. As Straub *et al.* (1995) mentioned there are biases when the researcher uses self-reported measures of usage because they are generally found to differ from the true score of system usage. There are 30 ministries in Yemen, plus minister and government agencies. Only ministries were investigated in this study and future research shouldinvestigate and analyze data from the other two parts of government institutions. Moreover, this study only investigated the output net benefits from the perspective of individual employees and future research should take this a step forward by investigating the net benefits from an organizational perspective. Actual usage and task-technology fit were not found to have a significant impact on decision quality and therefore, future research should investigate this by conducting cross-cultural empirical.

IMPLICATIONS

This study provides strong support that DMISM predicts internet technology usage among employees in organizations. The present findings also add to the existing body of IS research by extending the DMISM with task-technology fit, a construct which has been useful in providing an additional explanation that is a strong predictor of employee net benefits. Further, one the major contributions of this study is the investigation of the net benefit construct through four different variables (process, knowledge acquisition, communication quality and decision quality) in order to increase the power of explaining the output by the model. The proposed extended model could be adopted by other researchers in related domains such as online learning and can also applied in the private sector.

Implication for practice: This study provides significant implications for internet usage research and management. Based on the proposed model, perceived net benefit should occur if the formation of perceived quality, system use, user satisfaction and task-technology fit is appropriately managed. Thus, top management should put more fruitful effort into the development of these psychological and behavioral processes. In order to raise employee perception of net benefits (process, knowledge acquisition, communication quality and decision quality), they should focus on information and system quality which in turn will increase the frequency and the duration of employee internet usage, raise employee satisfaction and make the internet both fit with work tasks and meet work needs, thereby achieving corresponding and perceivable net benefits.

The determinants of internet success in this study are system quality, information quality, actual usage, user satisfaction, task-technology fit and net benefits. The findings of this study distinctly point out that the total effects of information quality on actual usage is greater than that of system quality. Thus, in the context of internet usage among employees within Yemeni government institutions, beliefs about the quality of information have a more dominant impact on actual usage than beliefs about the quality of the system. Consequently, top management should put more effort into promoting the quality of information on internet technology in order to increase actual internet usage.

According to Delone and Mclean (2003), the variables of information quality and system quality are considered to be on the system development level while actual usage, user satisfaction and perceived net benefit are considered to be on the effectiveness-influence level. If top management within Yemeni government institutions initiate strategies to enhance only the variables within the effectiveness-influence level without considering the variables on the development level this will leads to an incomplete strategy.

The findings of this study can be used by professionals in the public sector to measure the success of internet usage in enhancing employee job done

efficiently and also help to manage resources effectively. As such they should be very useful, not only at the individual and the organizational level but also to the Yemeni government by presenting the importance of the effect of information technology on professional practice, professional development and the quality of working life. Therefore, the information from these findings should encourage and support the formation of future policy not only at organizational level but also at the national level. This study is deemed to be not only at the right time but also in the right place. It is expected that key findings especially the proposed integrated model will help support government and national policies, especially the policy to increase ICT usage as part of the job process at all levels of organizations and the national policy of e-Government.

APPENDIX

Appendix A

Table 1: Instrument for system quality

Item	Measure of description	Rating scale	Scales of measure	Source
SYSQ1	(Ease of use) I find it easy to use the Internet to find what I want	7-point Likert scale: (1) strongly disagree to (7) strongly agree	Interval scale	Kim *et al.* (2007), Zhao *et al.* (2011), Sun *et al.* (2008) Cheng *et al.* (2006), Yu (2012)
SYSQ2	(Flexibility) I find the Internet to be flexible to interact with			
SYSQ3	(Usefulness) I think using the Internet is useful to me			
SYSQ4	(Enjoyable) I think using the Internet is enjoyable			

Table 2: Instrument for information quality

Item	Measure of description	Rating scale	Scales of measure	Source
INFQ1	(Up-to-date) Internet provides up-to-date information.	7-point Likert scale: from (1) strongly disagree to (7) Strongly agree	Interval scale	Lederer *et al.* (2000), Cheng *et al.* (2013), Wang and Liao (2008). Lin *et al.* (2011)
INFQ2	(Accuracy) Internet provides accurate information			
INFQ3	(Relevant) Internet provides relevant information			

Instrument for actual usage:

- Items measure of this variable as follow adapted from (Shih and Fang, 2004):
- 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, >5 h

Table 3: Instrument for user satisfaction

Item	Measure of description	Rating scale	Scales of measure	Source
SAT1	(Satisfied with the decision) My decision to use the Internet was a wise one	7-point Likert scale: from (1) strongly disagree to (7) strongly agree	Interval scale	Wang and Liao SAT2 (2008), Wang (2008), Roca *et al.* (2006)
	(Meet the expectations) The Internet has met my expectations			
SAT3	(Overall satisfaction) Overall, I am satisfied with the internet			

Table 4: Instrument for task-technology fit

Item	Measure of description	Rating scale	Scales of measure	Source
TTF1	(Fits with the work tasks) Internet services fits with the way I accomplish my work tasks	7-point Likert scale: (1) Strongly disagree To (7) Strongly agree	Interval scale	Lee and Lehto (2013), Larsen *et al.* (2009), Lu and Yang (2014)
TTF2	(Necessary to the work tasks) Internet services are necessary to my work work tasks			
TTF3	(Meet the work needs) Internet services meet my work needs			

Table 5: Instrument for net benefit

Items	Measure of description	Rating scale	Scales of measure	Source
PR1	(Accomplish tasks quickly) Internet helps me to accomplish my tasks more quickly.	7-point Likert scale: (1) Strongly disagree To (7) Strongly agree`	Interval scale	Hou (2012) Norzaidi *et al.* (2007), Norzaidi *et al.* (2009), McGill and Klobas (2009), Princely (2014) and Lwoga (2013)
PR2	(Accomplish tasks easily) Using Internet make it easier to complete my tasks			
KA1	(Acquire new knowledge); Internet helps me acquire new knowledge			
KA2	(Acquire new skills) Internet helps me acquire new skills			
KA3	(Come up with innovative ideas). Internet helps me to come up with innovative ideas			
KA4	(Help to learn) Internet helps me to learn			
CQ1	(Communication between employees). The use of Internet improves communication between employees			
CQ2	(Communication between employees and clients) The use of Internet improves communication between the employees and the clients			

Table 5: Continue

Items	Measure of description	Rating scale	Scales of measure	Source
CQ3	(Employee's discussions). The use of Internet improves employee's discussions			
CQ4	(Delivery of service). The use of Internet improves the delivery of service			
DQ1	(Identify problems). Internet helps me identify problems			
DQ2	(Involve others in making decisions). Internet helps me involve others in making decisions			
DQ3	(Higher quality decisions). Internet helps me make higher quality decisions			
DQ4	(More effective decisions). Internet helps me make more effective decisions			

Appendix B

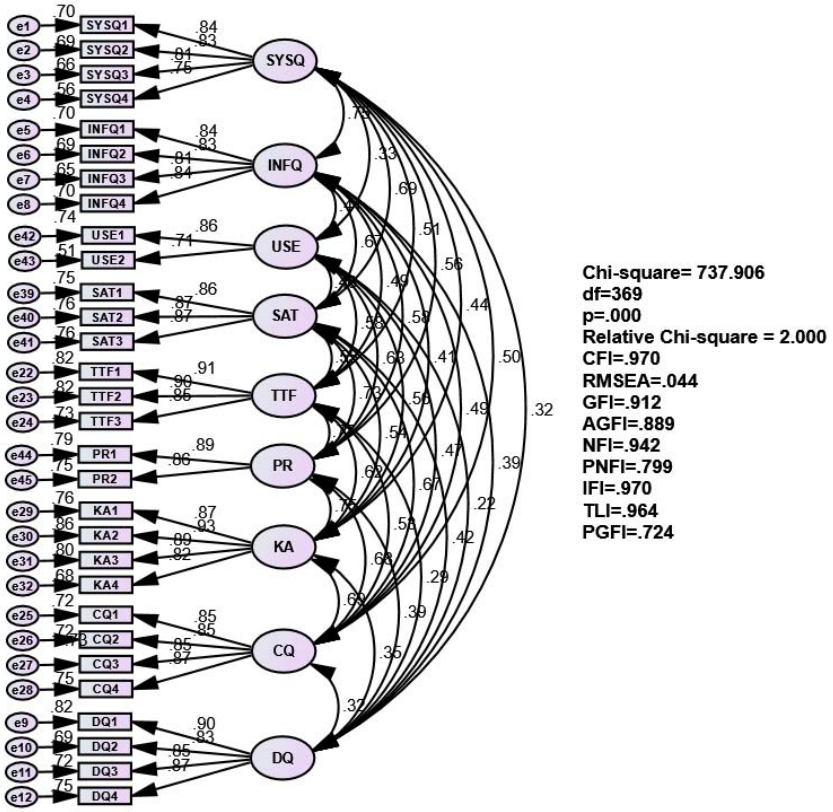

Fig. 1: Final result of CFA

REFERENCES

Ajzen, I., 1985. From Intentions to Actions: A Theory of Planned Behavior. In: Action Control: From Cognition to Behavior, Kuhl, J. and J. Beckmann (Eds.). Springer-Verlag, New York, USA., ISBN: 978-3-642-69748-7, pp: 11-39.

Ajzen, I., H.R. Louis, M. Fishbein and L.C. Thurow, 1980. Understanding Attitudes and Predicting Social Behaviour. 3rd Edn., Prentice Hall, Upper Saddle River, New Jersey, USA., ISBN:9780139364358, Pages: 278.

Al-Qeisi, K.I., 2009. Analyzing the use of UTAUT model in explaining an online behaviour: Internet banking adoption. Ph.D. Thesis, Brunel University.

Almatari, A.Y., N.A. Iahad and A.S. Balaid, 2013. Factors influencing studentspoiuyt intention to use M-learning. J. Inf. Syst. Res. Innovation, 5: 1-8.

Almutairi, H. and G.H. Subramanian, 2005. An empirical application of the DeLone and McLean model in the Kuwaiti private sector. J. Comput. Inform. Syst., 45: 113-122.

Anandarajan, M., M. Igbaria and U. Anakwe, 2002. IT acceptance in a less-developed country: A motivational factor perspective. Int. J. Inform. Manage., 22: 47-65.

Awang, Z., 2014. Structural Equation Modeling Using AMOS. Universiti Teknologi MARA Publication Center, Shah Alam, Malaysia.

Baraka, H.A., H.A. Baraka and I.H. EL-Gamily, 2013. Assessing call centers' success: A validation of the DeLone and Mclean model for information system. Egypt. Inform. J., 14: 99-108.

Baruch, Y. and B.C. Holtom, 2008. Survey response rate levels and trends in organizational research. Hum. Relat., 61: 1139-1160.

Bentler, P.M. and D.G. Bonnett, 1980. Significance tests and goodness-of-fit in theanalyses of covariance structures. Psychol. Bull., 88: 588-606.

Bernroider, E.W.N., 2008. IT governance for enterprise resource planning supported by the DeLone-McLean model of information systems success. Inform. Manage., 45: 257-269.

Bollen, K.A., 1990. Overall fit in covariance structure models: Two types of sample size effects. Psychol. Bull., 107: 256-259.

Bossen, C., L.G. Jensen and F.W. Udsen, 2013. Evaluation of a comprehensive EHR based on the DeLone and McLean model for IS success: Approach, results and success factors. Int. J. Med. Inform., 82: 940-953.

Brislin, R.W., 1970. Back-translation for cross-cultural research. J. Cross Cult. Psychol., 1: 185-216.

Byrne, B.M., 2010. Structural Equation Modeling with AMOS: Basic Concepts, Applications and Programming. 2nd Edn., Routledge, New York, USA., ISBN-13: 9780805863734, Pages: 396.

Chakraborty, S. and K. Sengupta, 2014. Structural equation modelling of determinants of customer satisfaction of mobile network providers: Case of Kolkata, India. IIMB. Manage. Rev., 26: 234-248.

Chang, K.M. and W. Cheung, 2001. Determinants of the intention to use internet at work: A confirmatory study. Inform. Manage., 39: 1-14.

Chen, C.C., 2008. Study on application of E-commerce and organizational performance in Taiwanese professional sports event promotion organizations. J. Hum. Resour. Adult Learn., 4: 66-73.

Cheng, D., G. Liu, C. Qian and Y.F. Song, 2008. Customer acceptance of Internet banking: Integrating trust and quality with UTAUT Model. Proceedings of the IEEE International Conference on Service Operations and Logistics and Informatics, IEEE/SOLI 2008, Vol. 1, October 12-15, 2008, IEEE, New York, USA., ISBN:978-1-4244-2012-4, pp: 383-388.

Cheng, T.C.E., D.Y.C. Lam and A.C.L. Yeung, 2006. Adoption of internet banking: An empirical study in Hong Kong. Decis. Support Syst., 42: 1558-1572.

Cheung, W., M.K. Chang and V.S. Lai, 2000. Prediction of internet and world wide web usage at work: A test of an extended Triandis model. Decision Support Syst., 30: 83-100.

Chi, N.T.M., 2013. Factors Affecting Customer Satisfaction in Group Buying in Vietnam. University of Economics, Ho Chi Minh, Vietnam.

Chien, S.W. and S.M. Tsaur, 2007. Investigating the success of ERP systems: Case studies in three Taiwanese high-tech industries. Comput. Ind., 58: 783-793.

Chin, W.W., 1998. Commentary: Issues and opinion on structural equation modeling. MIS Q., 22: 7-16.

Chiu, C.M., C.S. Chiu and H.C. Chang, 2007. Examining the integrated influence of fairness and quality on learners' satisfaction and web-based learning continuance intention. Inform. Syst. J., 17: 271-287.

Cho, K.W., S.K. Bae, J.H. Ryu, K.N. Kim and C.H. An et al., 2015. Performance evaluation of public hospital information systems by the information system success model. Healthcare Inf. Res., 21: 43-48.

Chong, H., D. Cates and R. Rauniar, 2010. Validity of delone and mclean's E-commerce model in b2c student loan industry. J. Intl. Technol. Inf. Manage., 19: 75-97.

Cohen, J., 1988. Statistical Power Analysis for the Behavioral Sciences. 2nd Edn., Lawrence Erlbaum, Hillsdale, New Jersey, USA., ISBN: 0-8058-6283-5, Pages: 128.

D'Ambra, J. and C.S. Wilson, 2004. Explaining perceived performance of the World Wide Web: Uncertainty and the task-technology fit model. Internet Res., 14: 294-310.

D'Ambra, J., C.S. Wilson and S. Akter, 2013. Application of the task-technology fit model to structure and evaluate the adoption of E-books by Academics. J. Assoc. Inf. Sci. Technol., 64: 48-64.

Daud, N.M., 2008. Factors determining intranet usage: An empirical study of middle managers in Malaysian port industry. Ph.D. Thesis, Multimedia University, Malaysia.

Davarpanah, A. and N. Mohamed, 2013. Human Resource Information Systems (HRIS) success factors in a public higher education institution context. Proceedings of the 2013 International Conference on Research and Innovation in Information Systems (ICRIIS), November 27-28, 2013, IEEE, Kuala Lumpur, Malaysia, ISBN:978-1-4799-2488-2, pp: 79-84.

Davis, F.D., 1989. Perceived usefulness, perceived ease of use and user acceptance of information technology. MIS Quart., 13: 319-340.

DeLone, W.D. and E.R. McLean, 2003. The DeLone and McLean model of information systems success: A ten-year update. J. Manage. Inform. Syst., 19: 9-30.

DeLone, W.H. and E.R. McLean, 1992. Information systems success: The quest for the dependent variable. Inform. Syst. Res., 3: 60-95.

DeLone, W.H. and E.R. McLean, 2004. Measuring e-commerce success: Applying the DeLone and McLean information systems success model. Int. J. Electron. Comm., 9: 31-47.

Di Benedetto, C.A., R.J. Calantone and C. Zhang, 2003. International technology transfer model and exploratory study in the people`s Republic of China. J. Int. Market. Rev., 20: 446-462.

Eom, S., 2012. Testing the delone-mclean model of information system success in an E-learning context: Implications for evaluating mandatory DSS. Front. Artif. Intell. Appl., 238: 15-26.

Falk, R.F. and N.B. Miller, 1992. A Primer for Soft Modeling. The University of Akron Press, Akron, Ohio, ISBN-13: 9780962262845, Pages: 103.

Fan, J.C. and K. Fang, 2006. ERP implementation and information systems success: A test of DeLone and McLeans model. Proceedings of the PICMET 2006 Conference on Technology Management for the Global Future 2006, Vol. 3, July 8-13, 2006, IEEE, Taipei, Taiwan, ISBN:1-890843-14-8, pp: 1272-1278.

Fornell, C. and D.F. Larcker, 1981. Evaluating structural equation models with unobservable variables and measurement error. J. Market. Res., 18: 39-50.

Gefen, D., D.W. Straub and M.C. Boudreau, 2000. Structural equation modeling and regression: Guidelines for research practice. Commun. Assoc. Inform. Syst., 4: 1-77.

Ghandour, A., G.L. Benwell and K.R. Deans, 2010. Measuring E-commerce website success. Interdiscip. J. Contemp. Res. Bus., 1: 21-41.

Glood, S.H., W.R.S. Osman and M.M. Nadzir, 2016. The effect of civil conflicts and net benefits on m-government success of developing countries: A case study of Iraq. J. Theor. Appl. Inf. Technol., 88: 541-552.

Glowalla, P. and A. Sunyaev, 2014. ERP system fit an explorative task and data quality perspective. J. Enterp. Inf. Manage., 27: 668-686.

Goodhue, D.L. and R.L. Thompson, 1995. Task-technology fit and individual performance. MIS Q., 19: 213-236.

Guimaraes, T. and M. Igbaria, 1997. Client/server system success: Exploring the human side. Decis. Sci., 28: 851-876.

Hair, J.F., G.T.M. Hult, C.M. Ringle and M. Sarstedt, 2013. A Primer on Partial Least Squares Structural Equation Modeling (PLS-SEM). SAGE Publication, Thousand Oaks, CA., USA., ISBN-13: 978-1452217444, Pages: 328.

Hair, Jr. J.F., W.C. Black, B.J. Babin and R.E. Anderson, 2010. Multivariate Data Analysis. 7th Edn., Prentice Hall, Upper Saddle River, NJ., ISBN-13: 9780138132637, Pages: 785.

Halawi, L.A., R.V. Mccarthy and J.E. Aronson, 2007. An empirical investigation of knowledge-management system's success. J. Comput. Inform. Syst., 48: 121-135.

Halonen, R., T. Acton, W. Golden and K. Conboy, 2009. Delone and McLean success model as a descriptive tool in evaluating a virtual learning environment. Proceedings of the International Conference on Organizational Learning Knowledge and Capabilities (OLKC 2009), April 26-28, 2009, ARAN - Access to Research at NUI Galway, Amsterdam, The Netherlands, pp: 1-17.

Hou, C.K., 2012. Examining the effect of user satisfaction on system usage and individual performance with business intelligence systems: An empirical study of Taiwan's electronics industry. Intl. J. Inf. Manage., 32: 560-573.

Hsu, M.H., C.M. Chang, K.K. Chu and Y.J. Lee, 2014. Determinants of repurchase intention in online group-buying: The perspectives of DeLone & McLean IS success model and trust. Comput. Hum. Behav., 36: 234-245.

ILS., 2016. Internet users in the world. Internet Live Stats, New York, USA. http://www.internetlivestats.com/internet-users/.

IMF., 2015. GDP per capita: Yemen vs. neighbor Arab countries. International Monetary Fund, Washington, D.C., USA.

James, L.R., S.A. Muliak and J.M. Brett, 1982. Causal Analysis: Models, Assumptions and Data. Sage, Beverly Hills, California.

Jennex, M., L. Olfman, P. Panthawi and Y.T. Park, 1998. An organizational memory information systems success model: An extension of DeLone and McLean's I-S success model. Proceedings of the 31st Hawaii International Conference on System Sciences 1998, Vol. 1, January 9-9, 1998, IEEE, New York, USA., ISBN:0-8186-8255-8, pp: 157-165.

Jones, A.B. and D.W. Straub, Jr, 2006. Reconceptualizing system usage: An approach and empirical test. Inf. Syst. Res., 17: 228-246.

Joreskog, K.G. and D. Sorbom, 2002. LISREL 8: Structural Equation Modeling with the SIMPLIS Command Language. Scientific Software International, Chicago, IL., USA., Pages: 226.

Kanaracus, C., 2008. Gartner: Global IT spending growth stable. IDG, California, USA. http://www.infoworld.com/article/2651482/techology-business/gartner--global-it-spending-growth-stable.html

Kannan, V.R. and K.C. Tan, 2005. Just in time, total quality management and supply chain management: Understanding their linkages and impact on business performance. Omega, 33: 153-162.

Kassim, N., T. Ramayah and S. Kurnia, 2012. Antecedents and outcomes of human resource information system (HRIS) use. Int. J. Product. Perform. Manage., 61: 603-623.

Khayun, V. and P. Ractham, 2011. Measuring e-excise tax success factors: Applying the Delone and McLean information systems success model. Proceedings of the 44th Hawaii International Conference on System Sciences (HICSS) 2011, January 4-7, 2011, IEEE, California, USA., ISBN:978-1-4244-9618-1, pp: 1-10.

Kim, B.G., S.C. Park and K.J. Lee, 2008. A structural equation modeling of the internet acceptance in Korea. Electron. Commerce Res. Appl., 6: 425-432.

Kim, C., S. Kim and W. Park, 2016. A study on the effects of information systems quality and emotional labors on the organizational performance for the airline call centers. Intl. J. Hybrid Inf. Technol., 9: 43-50.

Kline, R.B., 2010. Principles and Practice of Structural Equation Modeling. 3rd Edn., The Guilford Press, New York, USA., ISBN-13: 9781606238769, Pages: 427.

Krejcie, R.V. and D.W. Morgan, 1970. Determining sample size for research activities. Educ. Psychol. Meas., 30: 607-610.

Kripanont, N., 2007. Examining a technology acceptance model of internet usage by academics within Thai Business Schools. Ph.D. Thsis, Victoria University, Melbourne, Australia.

Larsen, T.J., A.M. Sorebo and O. Sorebo, 2009. The role of task-technology fit as user's motivation to continue information system use. Comput. Hum. Behav., 25: 778-784.

Lederer, A.L., D.J. Maupin, M.P. Sena and Y. Zhuang, 2000. The technology acceptance model and the world wide web. Dec. Support Syst., 29: 269-282.

Lee, B.C., J.O. Yoon and I. Lee, 2009. Learners acceptance of e-learning in South Korea: Theories and results. Comput. Educ., 53: 1320-1329.

Lee, D.Y. and M.R. Lehto, 2013. User acceptance of YouTube for procedural learning: An extension of the technology acceptance model. Comput. Edu., 61: 193-208.

Lee, K.C., S. Lee and J.S. Kim, 2005. Analysis of mobile commerce performance by using the task-technology fit. Proceedings of the IFIP TC8 Working Conference on Mobile Information Systems, September 15-17, 2004, Springer, Oslo, Norway, pp: 135-153.

Lin, F., S.S. Fofanah and D. Liang, 2011. Assessing citizen adoption of e-Government initiatives in Gambia: A validation of the technology acceptance model in information systems success. Govt. Inform. Q., 28: 271-279.

Lin, W.S. and C.H. Wang, 2012. Antecedences to continued intentions of adopting e-learning system in blended learning instruction: A contingency framework based on models of information system success and task-technology fit. Comput. Edu., 58: 88-99.

Lu, H.P. and Y.W. Yang, 2014. Toward an understanding of the behavioral intention to use a social networking site: An extension of task-technology fit to social-technology fit. Comput. Hum. Behav., 34: 323-332.

Lwoga, T.E., 2013. Measuring the success of library 2.0 technologies in the African context: The suitability of the DeLone and McLean's model. Campus Wide Inf. Syst., 30: 288-307.

Makokha, M.W. and D.O. Ochieng, 2014. Assessing the success of ICT's from a user perspective: Case study of coffee research foundation, Kenya. J. Manage. Strategy, 5: 46-54.

McGill, T.J. and J.E. Klobas, 2009. A task-technology fit view of learning management system impact. Comput. Educ., 52: 496-508.

Mohammadi, H., 2015. Investigating users perspectives on e-learning: An integration of TAM and IS success model. Comput. Hum. Behav., 45: 359-374.

Montesdioca, G.P.Z. and A.C.G. Macada, 2015. Measuring user satisfaction with information security practices. Comput. Secur., 48: 267-280.

Nikhashemi, S.R., L. Paim, F. Yasmin and A. Yousefi, 2013. Critical factors in determining customer satisfaction toward internet shopping in Malaysia. Intl. J. Bus. Manage. Invention, 2: 44-51.

Norzaidi, D.M., C.S. Choy, R. Murali and S.M. Intan, 2007. Intranet usage and managers' performance in the port industry. Ind. Manage. Data Syst., 107: 1227-1250.

Norzaidi, M.D. and M.I. Salwani, 2009. Evaluating technology resistance and technology satisfaction on student's performance. Campus-Wide Inf. Syst., 26: 298-312.

Norzaidi, M.D., S.C. Chong, R. Murali and M.I. Salwani, 2009. Towards a holistic model in investigating the effects of intranet usage on managerial performance: A study on Malaysian port industry. Maritime Policy Manage., 36: 269-289.

Nunnally, J.C. and I.H. Bernstein, 1994. Psychometric Theory. 3rd Edn., McGraw-Hill, New York, USA., ISBN-13: 978-0070478497, Pages: 736.

PRC., 2013. Emerging nations embrace internet, mobile technology. Pew Research Center, Washington, D.C., USA.http://www.pewglobal.org/2014/02/13/emerging-nations-embrace-internet-mobile-technology/

Petter, S. and E.R. McLean, 2009. A meta-analytic assessment of the DeLone and McLean IS success model: An examination of IS success at the individual level. Inform. Manage., 46: 159-166.

Petter, S., W. DeLone and E. McLean, 2008. Measuring information systems success: Models, dimensions, measures and interrelationships. Eur. J. Inform. Syst., 17: 236-263.

Petter, S., W. DeLone and E. McLean, 2008. Measuring information systems success: Models, dimensions, measures and interrelationships. Eur. J. Inform. Syst., 17: 236-263.

Porter, C.E. and N. Donthu, 2006. Using the technology acceptance model to explain how attitudes determine Internet usage: The role of perceived access barriers and demographics. J. Business Res., 59: 999-1007.

Rai, A., S.S. Lang and R.B. Welker, 2002. Assessing the validity of IS success models: An empirical test and theoretical analysis. Inform. Syst. Res., 13: 50-69.

Ramayah, T. and M.C. Lo, 2007. Impact of shared beliefs on perceived usefulness and ease of use in the implementation of an enterprise resource planning system. Manage. Res. News, 30: 420-431.

Ramayah, T., 2006. Course website usage does prior experience matter?. Wseas Trans. Inf. Sci. Appl., 3: 299-306.

Ramayah, T., J. Ignatius and B. Aafaqi, 2005. PC usage among students in a private institution of higher learning: The moderating role of prior experience. Educators Educ. J., 20: 131-152.

Roca, J.C. and M. Gagne, 2008. Understanding e-learning continuance intention in the workplace: A self-determination theory perspective. Comput. Human Behav., 24: 1585-1604.

Rogers, E.M., 1995. Diffusion of Innovations. 4th Edn., Free Press, New York, USA., ISBN-13: 9780029266717, Pages: 518.

Rotich, A.J., J. Kosgey and S.K. Kimutai, 2016. IT best practices for implementing E-learning: The case of rift valley technical training institute. Afr. J. Tech. Vocational Educ. Training, 1: 93-100.

Sahadev, S. and K. Purani, 2008. Modelling the consequences of e-service quality. Market. Intell. Plann., 26: 605-620.

Salisbury, W.D., R.A. Pearson, A.W. Pearson and D.W. Miller, 2001. Perceived security and World Wide Web purchase intention. Ind. Manage. Data Syst., 101: 165-177.

Seddon, P.B., S. Staples, R. Patnayakuni and M. Bowtell, 1999. Dimensions of information systems success. Communic. AIS., Vol. 2,

Sharkey, U., M. Scott and T. Acton, 2010. The influence of quality on the success of e-commerce systems. Intl. J. E-Bus. Res., 6: 1-12.

Shih, Y.Y. and C.Y. Chen, 2013. The study of behavioral intention for mobile commerce: Via integrated model of TAM and TTF. Qual. Quantity, 47: 1009-1020.

Shih, Y.Y. and K. Fang, 2004. The use of a decomposed theory of planned behavior to study Internet banking in Taiwan. Int. Res., 14: 213-223.

Simsim, M.T., 2011. Internet usage and user preferences in Saudi Arabia. J. King Saud Univ. Eng. Sci., 23: 101-107.

Son, H., Y. Park, C. Kim and J.S. Chou, 2012. Toward an understanding of construction professionals acceptance of mobile computing devices in South Korea: An extension of the technology acceptance model. Autom. Constr., 28: 82-90.

Sorum, H., R. Medaglia, K.N. Andersen, M. Scott and W. DeLone, 2012. Perceptions of information system success in the public sector: Webmasters at the steering wheel? Transform. Govt.: People Process Policy, 6: 239-257.

Steiger, J.H., 1990. Structural model evaluation and modification: An interval estimation approach. Multivariate Behav. Res., 25: 173-180.

Straub, D., M. Keil and W. Brenner, 1997. Testing the technology acceptance model across cultures: A three country study. Inform. Manage., 33: 1-11.

Straub, D., M. Limayem and E. Karahanna-Evaristo, 1995. Measuring system usage: Implications for IS theory testing. Manage. Sci., 41: 1328-1342.

Sun, P., R. Tsai, G. Finger, Y. Chen and D. Yeh, 2008. What drives a successful e-learning? An empirical investigation of the critical factors influencing learner satisfaction. Comput. Educ., 50: 1183-1202.

Sun, Y. and S. Mouakket, 2015. Assessing the impact of enterprise systems technological characteristics on user continuance behavior: An empirical study in China. Comput. Ind., 70: 153-167.

Tabachnick, B.G. and L.S. Fidell, 2012. Using Multivariate Statistics. 6th Edn., Pearson Education, Boston, MA., ISBN-13: 9780205849574, Pages: 983.

Trkman, M. and P. Trkman, 2009. A wiki as intranet: A critical analysis using the Delone and McLean model. Online Inf. Rev., 33: 1087-1102.

Tucker, L.R. and C. Lewis, 1973. A reliability coefficient for maximum likelihood factor analysis. Psychometrika, 38: 1-10.

Urbach, N. and F. Ahlemann, 2010. Structural equation modeling in information systems research using partial least squares. J. Inform. Technol. Theory Applic., 11: 5-40.

Venkatesh, V., M.G. Morris, G.B. Davis and F.D. Davis, 2003. User acceptance of information technology: Toward a unified view. MIS Quart., 27: 425-478.

Vlahos, G.E., T.W. Ferratt and G. Knoepfle, 2004. The use of computer-based information systems by german managers to support decision making. Inf. Manage., 41: 763-779.

Wang, W.T. and Y.J. Lai, 2014. Examining the adoption of KMS in organizations from an integrated perspective of technology, individual and organization. Comput. Hum. Behav., 38: 55-67.

Wang, Y.S. and Y.W. Liao, 2008. Assessing eGovernment systems success: A validation of the DeLone and McLean model of information systems success. Govt. Inform. Quart., 25: 717-733.

Wang, Y.S., 2008. Assessing e-commerce systems success: A respecification and validation of the DeLone and McLean model of IS success. Inform. Syst. J., 18: 529-557.

Wu, J.H. and Y.M. Wang, 2006. Measuring KMS success: A respecification of the DeLone and McLean's model. Inform. Manage., 43: 728-739.

Wu, J.W., 2007. Extending the delone and mclean information systems success model for e-commerce website success. Master Thesis, University of Nevada, Reno, Nevada.

Xu, J., I. Benbasat and R.T. Cenfetelli, 2010. Does live help service matter? An empirical test of the DeLone and McLean's extended model in the E-service context. Proceedings of the 43rd Hawaii International Conference on System Sciences (HICSS) 2010, January 5-8, 2010, IEEE, Vancouver, British Columbia, Canada, ISBN:978-1-4244-5509-6, pp: 1-10.

Yu, C.S., 2012. Factors affecting individuals to adopt mobile banking: Empirical evidence from the UTAUT model. J. Electron Commerce Res., 13: 104-121.

Yuthas, K. and S. Young, 1998. Material matters: Assessing the effectiveness of materials management IS. Inform. Manage., 33: 115-124.

Zhao, L., Y. Lu, B. Wang and W. Huang, 2011. What makes them happy and curious online? An empirical study on high school students internet use from a self-determination theory perspective. Comput. Educ., 56: 346-356.