

Top Management Support Accelerates the Acceptance of Information Technology

¹Sami Al Haderi, ²Noor Abdul Rahim and ³Hasan Bamahros

¹College of Business (COB), University of Utara Malaysia (UUM), Changl, Malaysia

²Graduate School of Business, University Sains Malaysia, Penang, Malaysia

³University of Aden, Aden, Yemen

Abstract: Organizations around the world are looking for the development and keep up to date with emerging technology. Thus, they pay more intention to develop their technology infrastructure to improve productivity, effectiveness or to adopt e-Government. However, in reality not all companies adopt and use effectively or even use information technology. And in reality not all employees in organizations accept, adopt and use effectively or even use, information technology. When this happens, there is a gap between the ideal and the reality of the actual usage of information technology. As a result, there is need to study and understand the factors affecting the acceptance of technologies. This study aims to test the success of the technology acceptance model in Yemen culture. In addition, This study aims to investigate the factors influencing the acceptance of technology in Yemen public sector. This study developed a framework based on two theories, TAM 2 and UTAUT Models. survey questionnaire was distributed to 53 government utilities and 357 cases were used in the analysis. Structural equation modeling AMOS 18 was used for the analysis of the proposed model, from a total 14 hypothesis, 11 were supported and three hypothesis were rejected. This study has provided empirical evidence for the effects of new technology determinants in the government sector. In particular it has successfully revealed that top management support and information quality are important determinants in influencing the adoption of technologies. The findings confirmed the theory of TAM and showed its potential capability in the Middle East, particularly in Yemen.

Key words: Technology acceptance model, national culture, government sector, structural equation modeling, Yemen, capability

INTRODUCTION

Information Technology (IT): Before the study starts to go farther in the next section of the actual usage of the information technology, the study provided some definitions for IT to facilitate the understanding of the actual usage of the technology. There are many definitions of IT from different perspectives depending on the focus of each study.

According to Watson IT includes hardware, software and telecommunication equipment which is used to capture, process, store and distribute information. Another study was conducted by Bryne (2010) defined IT as Office, computing machines, communications equipment, instruments, photocopiers and related equipment and software and related services. According to Ajiferuke and Olatokun IT referred to any equipment or interconnected system or subsystem of equipment that is used in the automatic acquisition, storage, manipulation, management, movement, control, display, switching, interchange and transmission.

According to US Bureau of Economic Analysis (BEA) IT refers to Office Computing and Accounting

Machinery (OCAM) which consists primarily of computers. Some researchers look specifically at computer capital while others consider the BEA's broader category as Information Processing Equipment (IPE). IPE includes communications equipment, scientific and engineering instruments, photocopiers and related equipment. Besides, software and related services are sometimes included in the IT capital.

Based on the above definitions, the present study defines IT as office, computing machines, hardware, software, instruments, photocopiers, telecommunication equipment, related services which are used by employees to capture, process, store and distribute information.

Actual usage: Actual use is the need for data and information requirements for planning and management functions by implementing processes supported by extensive data collection and analysis capacity (Sliuzas, 2001). Also, definition for the system actual usage such as system actual usage is the formal, information-based routines and procedures managers use to manage or maintain or alter patterns in organizational activities (Simmons, 2000). The actual usage for the information

technology define in this study as the implementation for the needed data and information requirements for managing n maintaining the patterns and functions in the organization activities by using scientific and engineering instruments, software, photocopiers, communications equipment and related internet services equipment (Sliuzas, 2001; Bryne, 2010 and Yang, 2007).

Behavioral intention to use (dependant variable):

Behavioral intention refers to the intention of end-user to make use of the new information technology (Seymour *et al.*, 2007). Behavioral intention refers to the degree to which a person has formulated conscious plans to perform or not perform some specified future behaviour (Davis *et al.*, 1989). Behavioral intention can also be defined as it is an indication of an individual's readiness to perform a given behavior. It is assumed to be an immediate antecedent of behaviour (Ajzen, 2002). This study defines behavioral intention as it is how hard people are willing to try and of how much an effort they are planning to exert, in order to perform the behaviour (Ajzen and Fishbein, 2000).

According to several researchers (Davis *et al.*, 1989; Yi and Hwang, 2003; Kiraz and Ozdemir, 2006; Eastin and LaRose, 2000; Phua and Gan, 2000), Technology Acceptance Model TAM consists of four main factors as major determinants of technology acceptance. These factors are perceived ease of use, perceived usefulness, attitudes towards usage and behavioral intention to use the frequency of use of technology. In his study, Chang (2004) found strong positive relations among perceived usefulness, perceived ease of use and user's attitudes towards the use the technology. Attitude was found to have a strong relation with user intention to use. Intention to use was found to have a strong relation with actual usage, confirming the positive significant relation in TAM and its constructs in predicting user acceptance of technology.

However, empirical findings on the validity of TAM are varied and mixed. The study conducted by Almutairi (2007) which aimed to examine TAM applicability in the Kuwaiti ministries revealed findings which did not support the relationship between the variables in TAM. In other words, the study did not find any relation between ease of use and usefulness and it did not also find any relation between ease of use and usefulness and actual usage. In a different study, Shih and Huang (2009) examined the effect of behavioral intention on actual usage of ERP implementation based TAM. The study found that perceived ease of use does not have a positive direct effect on perceived usefulness. However, perceived ease of use has a positive

direct effect on intention. In addition, perceived usefulness was found to have a positive and direct effect on behavioral intention. Due to the fact that there were mixed findings, there is a need to investigate the factor intention to use towards the actual usage for the technology in different cultural and organizational settings. In addition, there is a need to investigate the factors that affecting on intention behavior to use the technology, from these factors perceived ease of use and perceived usefulness.

Perceived ease of use and perceived usefulness (mediators):

Perceived ease of use and perceived usefulness are considered as belief factors that mediate the relation between actual usage of IT and the external variables that affect technology acceptance. According to TAM, employees accept to use new software after they perceive it to be useful and easy to use (Davis *et al.*, 1989). Perceived usefulness refers to the degree of which the user believes that the use for a particular system will support his work. On the other hand, perceived ease of use refers to the degree of the user's belief that the usage for a particular system will be out of effort (Davis *et al.*, 1989).

Most studies conducted on technology acceptance confirmed the importance of these factors in explaining the acceptance of technology usage. However, some studies found both perceived usefulness and perceived ease of use as having the same affect on technology acceptance (Almutairi, 2007; Kishore and McLean, 2001; Venkatesh and Morris, 2000) while some found that perceived ease of use has more effect than perceived usefulness (Klopping and McKinney, 2004). Meanwhile, some other studies found perceived usefulness as having more effect than perceived ease of use (Pikkariainen *et al.*, 2004; Klopping and McKinney, 2004).

System characteristics: According to the study conducted by Agarwal (2000) individual characteristics, institutional characteristics and social characteristics are not the only factors that interact with each other to influence technology acceptance. But they even interact with technology (system) characteristics to influence technology acceptance. This proposition was supported by who found that individual characteristics interacted with technology characteristics to influence technology acceptance.

Information quality: According to the study conducted by Ahn *et al.* (2007) information quality (output quality) is considered an important determinant of technology (system) characteristics which can provide an in depth

understanding of technology acceptance. Information quality has been defined as the type, level of detail and variety of information which are determined during the system design and development phase while the timeliness, accuracy and reliability result from the system operations (Ahn *et al.*, 2007). Information quality also refers to the report content which is considered as a measurement of user perceived effectiveness for the quality of the information (Srinivasan, 1985; Ahn *et al.*, 2007). The information content includes accuracy, relevance, adequacy and understandability of report contents while form includes quality of format, timeliness of reports, manner of presentation and result of information (Srinivasan, 1985).

Most of the studies conducted regarding technology acceptance found that information quality is an important factor of technology acceptance. But some studies considered information quality as being important from the vendor's perspective while other studies considered information quality as being important from the user's perspective. Among the studies which considered information quality as being important to facilitate the acceptance of the technology from the vendor's perspective are the one conducted in Malaysia by Mohd *et al.* (2005). They examined the relation between information quality and the acceptance of doctors of Electronic Medical Record System (EMR) in one Malaysian hospital. The study found that information quality has a significant impact on perceived usefulness and perceived ease of use toward using the system. The study concluded that it is important for system designers to communicate effectively with the end users about the information quality factors.

From the user's perspective by Chismar and Patton (2003) conducted a study among physicians to examine their intention to adopt internet-based health applications by using the applicability of the TAM2 in Hawaii. The study found that the important factor for predicting the intention to use the system is the usefulness of the technology and the sufficiency of the output quality for their daily work. Similar result was reported by Al-Gahfani (2004), who aimed to enhance understanding of the acceptance of technology in different cultures. The study found that information quality, relative advantage, compatibility, observed ability and trial ability have a positive significant relation with the end user's acceptance while complexity was to have a negative effect on computer acceptance.

Ahn *et al.* (2007) conducted a study that aimed at testing the relationship between web quality factors and user acceptance behavior with a focus on service quality. They also investigated the effect of playfulness on user

acceptance of online retailing. This study supported the result of previous studies (Chismar and Patton, 2003; Mohd *et al.*, 2005) in which information quality has a positive impact on perceived ease of use and usefulness of a website. Information quality refers to as having these characteristics: various, complete, detailed, accurate, timely, relevant and reliable. The same study found that system quality, information quality and service quality had significant effects on playfulness, ease of use and usefulness and this effect increases when mediated by ease of use. Even service quality, system quality and information quality were found to have significant effects on intention of behavior to use. The quality of the web has a significant affect on intention behavior to use, mediated by playfulness, ease of use, usefulness and attitude which are considered as user substantial beliefs.

Due to the fact that there were agreement in the previous studies concern the important of the effect of information quality on the usage of the technology. Based on the existing empirical evidence, this study considers information quality as an important determinant of the user's acceptance of the IT. Therefore, there is a need to investigate the effect of information quality on perceived ease of use and perceived usefulness towards the intention to use technology in different cultural and organizational settings, specially in the public sector.

Institutional characteristic: Institutional factors refer to the aspects within the organization related to work and the instrument to facilitate in the accomplishment of the work. For example organizational support and rewards influence worker's beliefs in using technology to accomplish the work (Lewis *et al.*, 2003). These institutional characteristic such as top management support was explained in details in the nest sections.

Top management support: Top management support refers to the degree to which the top management understands the importance of IS function and the content to which it is involved in the activities (Ragu-Nathan *et al.*, 2004). Organizational facilitation or facilitating conditions are defined as the degree to which an employee perceives that an organizational and technical infrastructure exists to support use of the technology (Seymour *et al.*, 2007; Venkatesh *et al.*, 2003).

Top management support in the organization has either positive or negative effects on technology acceptance. Several studies have found that when top management fails to manage and support the usage of the technology at work, technology acceptance would not

materialize (Ragn-Nathan *et al.*, 2004). Furthermore, lack of government support organization support and computer training facilities could prevent end-users from using a particular system as revealed by Wang and Chen (2006) in his study to examine the quality recognition of medical information systems in Tzu-chi Hospital in Taiwan and to explore the factors that make the physicians refuse to use the medical information system.

Vonk *et al.* (2007) explored ways to improve the effectiveness of strategies for the diffusion of geo-IT in public planning organization. The study revealed that the adoption of the system is caused by various failure categories such as the negative attitudes of the managers, social disorganization of the users and unawareness of the potential and the implementation support by the organization.

Conversely, if management support exists in the organization, technology acceptance would materialize. In a study by Wu *et al.* (2008) that integrated variables upsetting trust and management support into the model to investigate what determines acceptance of adverse event reporting systems by healthcare professional users, they found that management support had a direct effect on perceived ease of use, perceived usefulness and subjective norm.

Management support also comes in the form of designing appropriate strategy to learn the technology and to make the information easier to find and easier to understand so that, the adoption of IT system is successful. Brown (2002) confirmed in their study that management support to increase the abilities of the users to use the system and reduce their anxiety from using the system help in the acceptance of technology. Similar finding was reported by Shih and Huang (2009) who found that top management support has a positive direct effect on self-efficacy and perceived usefulness and perceived ease of use, using TAM.

Management support may also be in the form of overcoming obstacles in learning to use the technology through the availability of assistance as revealed in a study conducted by Lewis *et al.* (2003). In their study to examine the factors that influence key individual beliefs about technology use, they demonstrated that individual factor of personal innovativeness and institutional factor of top management commitment and support have significant relationships with perceived usefulness and ease of use. Moreover, the institutional factor of top management commitment has positive influence on usefulness beliefs and a significant relationship between top management commitment and ease of use exists which is attributed to the individual's assessment of the resource allocation

implications of top management commitment and support. Therefore, the current study supports the notion that top management support has positive effects on technology acceptance and without its support the organization will face problems in developing, planning and usage of IT. Therefore, the study tests the effects of top management support on technology acceptance through its effects on the individual beliefs toward the actual usage of technology.

The theories: The Technology Acceptance Model (TAM) has been widely used to predict user acceptance and use based on perceived usefulness and ease of use. Davis *et al.* (1989) developed the TAM by adapting the Theory of Reasoned Action (TRA) (Fishbein and Ajzen, 1975) to understand the causal chain linking external variables to IT usage intention and actual use in the organizations. IT researchers have used TAM and TRA as a theoretical foundation to conduct research on those factors that affect the user acceptance of IT.

Predictive power and the parsimony of TAM has earned the model reputation but parsimony has also been sighted as the model's constraint (Venkatesh *et al.*, 2003). Wu *et al.*, 2008) believes that TAM is predictive but its generality does not provide sufficient understanding from the standpoint of providing system designers with the information necessary to create user acceptance of new systems.

An individual's decision to accept IT is a conscious act that can be sufficiently explained and therefore predicted by his/her behavioral intention. Due to the fact that there is difficulty in identifying determinants of individual intention towards the acceptance of technology, Technology Acceptance Model (TAM) is used in the current study. TAM is an established model in explaining IT acceptance behavior and provides a framework to investigate the impact of external variables on IT use.

There are a number of technology acceptance models and frameworks to explain factors influencing user adoption. Three frequently used models in the literature are as follows:

- Theory of Reasoned Action (TRA) (Fishbein and Ajzen 1975)
- Technology Acceptance Model (TAM) (Davis *et al.*, 1993)
- Technology Acceptance Model TAM2 (Venkatesh and Morris, 2000) (Fig. 1)
- The Unified Theory of Acceptance and Use of Technology (UTAUT) (Venkatesh *et al.*, 2003)

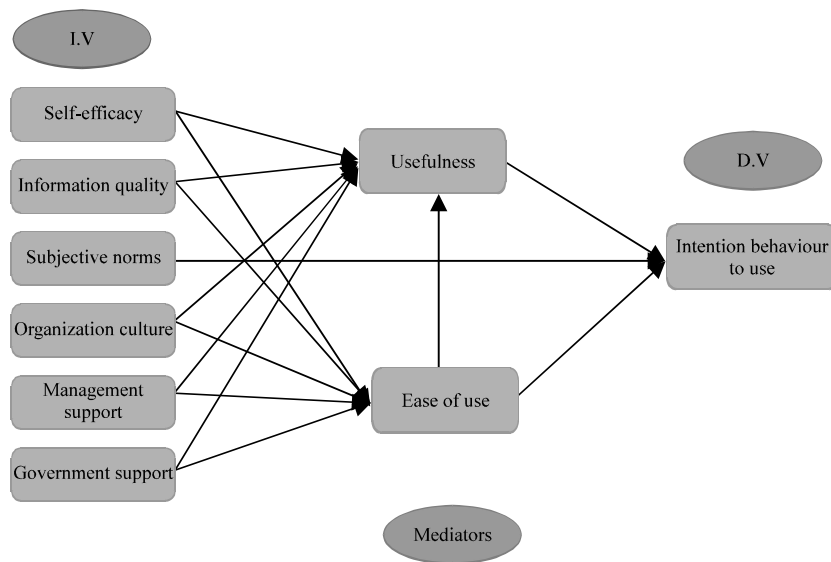


Fig. 1: Proposed frame work of this study using TAM 2

MATERIALS AND METHODS

Operational definition of variables, hypotheses and instruments

Intention to use: Intention to use is a variable which refers to the intention of an end-user to use the new technology (Seymour *et al.*, 2007). In other words, it is the probability of using a particular system. Technology Acceptance Model (TAM) proposes that intention to use affects and causes actual use of a new system. Similarly by Aversano (2005)'s study that used TPB confirmed that intention to behave determines actual usage. So, the intention to use the technology determines the relations of actual use of the system. However, latest studies confirmed that intention to use technology is merely a mediating factor (Vankatesh and Morris, 2000; Yalcinkaya, 2007). The use for these instruments was due to the high responses in the previous studies such as Yalcinkaya (2007). These items are measured on a five-point scale with, "strongly disagree", "disagree" "neither agree or disagree" "agree" and "strongly agree". The five items are:

- Assuming I have access to the system, I intend to use it
- Given that I have access to the system, I predict that I would use it
- In my resaerch, if I have access to the system, I want to use it as much as possible
- I prefer to use the system even though I can do my work with other tools

Perceived ease of use and perceived usefulness: In TAM, perceived ease of use is defined as the degree to which an individual believes that using a particular system is free of effort (Davis *et al.*, 1989). In this study, this variable can be defined as the manager's and employee's perceptions about the lack of effort when using the new system. Perceived ease of use has an effect on both intention to use and perceived usefulness, despite the fact that some studies found that perceived ease of use has no influence on intention to use (Vankatesh and Morris, 2000; Yalcinkaya, 2007). Some studies found that perceived ease of use has a significant effect on intention to use the system (Pikkarainen *et al.*, 2004). This study assumes that managers and employees perceive the system is useful when they perceive it to be easy to use. So, for this reason, the following is hypothesized:

- H₁: perceived ease of use has a positive effect on the intention to use the system
- H₂: perceived ease of use has a positive effect on perceived usefulness of the system
- H₃: perceived usefulness has a positive effect on intention to use the system

The adoption for these instruments was due to the high responses in the previous study Kiraz and Ozdemir (2006) which adopt these instruments from. Ten questions were used to ask perceived usefulness of technology and seven questions perceived ease of use. These items are measured on a five-point scale with "strongly disagree"

“disagree”, “neither agree or disagree”, “agree” and “strongly agree”. The items to measure perceived usefulness are as follows:

- Computers enhance my work effectiveness
- Computers increase my performance in my work
- Computers increase my productivity in my work
- Overall, I found computers to be useful in my work
- Computers enable me to accomplish tasks more quickly
- Computers make my work easier
- Computers give me greater control over my work
- Computers improve the quality of the work I do
- Computers support the critical aspects of my work
- Computers allow me to accomplish more work than otherwise possible

The items to measure perceived ease of use are as follows:

- My interaction with the computers is clear and understandable
- Interacting with the computers is often frustrating
- Learning to operate computer applications is easy for me
- I find it easy to get the computers to do what I want to do
- Overall, I find computers easy to use
- It is easy for me to remember how to perform tasks using the computers
- The computers are rigid and inflexible to interact with

System characteristics of information quality:

Information quality is the type, level of detail and variety of information which are determined by the system’s design and development phase while timeliness, accuracy and reliability result from the system operations. In other words, information quality refers to the content and form of report. While content includes accuracy, relevance, adequacy and understandability of report contents, form includes quality of format, timeliness of reports, manner of presentation and result of information (Ahn *et al.*, 2007; Staples *et al.*, 2002).

Information quality provided good explanatory power for the new software usage. Their result was confirmed by Staples *et al.* (2002) who examined the effects of the implementation of a new system on its users with a focus on the relationship between pre-implementation expectations and their perceived benefits based on post-implementation experience. The study’s finding confirmed that system usefulness, ease of use and information quality have strong relations to information system success and user satisfaction. So, the hypothesis is:

- H₆: information quality has a positive relationship with perceived ease of use of the system
- H₇: information quality has a positive relationship with perceived usefulness of the system

These items were adopted in many previous studies such as Aladwani and Palvia, Barnes and Vidgen, Jarvenpaa and Todd and Palmer. The 4 IS experts were asked to evaluate these items and make changes to eliminate any repetitive. Besides that, these items scored high factor loading in those previous study. These items are measured on a five-point scale with “strongly disagree”, “disagree”, “neither agree or disagree”, “agree” and “strongly agree”. The items are as follows:

- Has a sufficient content where I expect to find information
- Provides complete information
- Provides site-specific information
- Provides accurate information
- Provides timely information
- Provides reliable information
- Communicates information in an appropriate format

Institutional characteristics of top management support:

Management support refers to the degree of understanding top management has on the importance of IS function and of its involvement in the activities (Masrek *et al.*, 2007; Ragu-Nathan *et al.*, 2004). Another definition is the degree to which an individual believes that an organization and technical infrastructure exists to support use of the system (Venkatesh *et al.*, 2003). This study adopts both definitions. Hence, top management support comprises the degree to which the top management understands the importance of the technology and the degree of organizational and technical support for the use of the system. So, the following hypotheses are presented:

- H₁₁: top management support for a particular system has a positive effect on perceived ease of use of that system
- H₁₂: top management support for a particular system has a positive effect on perceived usefulness of that system

The instrument to measure top management support was adopted from Ragu-Nathan *et al.* (2004). This study used these instruments because it focuses in the usage of the system inside the organization and for its clarity to be understood. It has seven items measured on a five-point

scale with “strongly disagree”, “disagree”, “neither agree or disagree”, “agree” and “strongly agree”. The items are as follows:

- Top management involvement with IS function is strong
- Top management is interested in IS function
- Top management understands the importance of IS
- Top management supports the IS function
- Top management considers IS as a strategic resource
- Top management understands IS opportunities
- Top management keeps the pressure on operating units to work with IS

Population and sampling: The sample was drawn from managers and employees in government organizations who are currently using computers or whose work is related to software or system. To draw a sample that represents the population, stratified random sampling was used. The usage of this method is justified by the fact that it is more efficient and helpful for the assessment of the needed data which related to the information technology to achieve representativeness of the sample were employed (Sekaran, 2006). Then, simple random sampling was used to select samples from the managers and employees in the government utilities.

To this effect, the target population of this study is managers and employees working in 57 government utilities in the Republic of Yemen. A survey was carried out among managers and employees located at the ministry headquarters in Sana’a. According to the Civil Ministry, there were 34,261 government employee in 2010, out of which 22,101 were male and 12,160 female. According to Sekaran (2006) with 34,261 as the size of the population, the target sample size is 380. Such sample size is enough to administer a reliable analysis in structural equation modeling. For more details about the population. Because of possible low response rate due to use of surveys, the researcher decided to distribute 760 questionnaires instead of 380. The questionnaires were distributed in the government utilities which located in the capital Sana’a.

The function of the stratified random sampling was that dividing the total number of the employees in each government utility in the total number of the employees in the government in order to get the rate of the employees in each utility and then multiply the rate of each government utility in the total number of the target distributed questionnaires in order to get the number of questionnaires that should distribute in each utility, the the distribution of questionnaires in various government departments in Sana’a and the total employees number in each utility. Right after that, simple random sampling was

used to choose the subjects (managers and employees) in the sample randomly; all the subjects in the sample have the same probability to be chosen.

RESULTS AND DISCUSSION

Response rate: The response rate and descriptive statistics were run as the first stage of analysis. As mentioned earlier, all in all 760 questionnaires were distributed. Of these, 585 were returned, yielding a response rate of 77% which is considered very good (Cable and DeRue, 2002) in comparison to other studies found in the relevant literature. Also, 160 cases with missing value and 68 cases outliers were deleted from 585 questionnaires were returned. Therefore, the data were ready for the analysis are 357 cases.

Causal Model: In this model, we looked at the full Structural Equation Model (SEM). The postulated causal relations among all variables in the hypothesized model must be grounded in theory or empirical research. This model is grounded under Technology Acceptance Model TAM2 and TAM3 (united theories). In the measurement and structural models, the focus was in the factorial validity of the measuring instruments. However, in the causal model, the focus was in formulation of the indicators in each construction by formulating appropriate combination of items to comprise item parcels. Therefore, in the causal model, 22 item parcel variables were used to measure the causal model. All indicator’s validity and reliability were assessed as shown previously in the measurement model.

The result of the model seems that the model achieved the good of fitness in that the Chi-square (χ^2 /degrees of freedom) with value 1.326 is smaller than the recommended value of <2.00 Hair *et al.* (2010). Goodness of Fit (GFI) with value 0.943 exceeded the recommended value of >0.90. Even, the Adjusted Goodness of Fit (AGFI), Normed Fit Index (NFI) and Comparative Fit Index (CFI) with values 0.919, 0.938 and 0.984 respectively, exceeded the recommended value of >0.90 (Byrne, 2010; Hair *et al.*, 2010). Root Mean Square Residual (RMR) with value 0.020 is smaller than the recommended value of 0.050. The Root Mean Square Error of Approximation (RMSEA) with value 0.030 is smaller than the recommended value of <0.080 (Byrne, 2010). Finally, the p-value for the probability is 0.002 which exceeded the recommended value of p<0.001 (Byrne, 2010; Hair *et al.*, 2010) (Fig. 2).

In addressing the final result of the whole model, this model examined the paths coefficient between the latent variables (exogenous variables and endogenous variables) to explain the usage of information technology

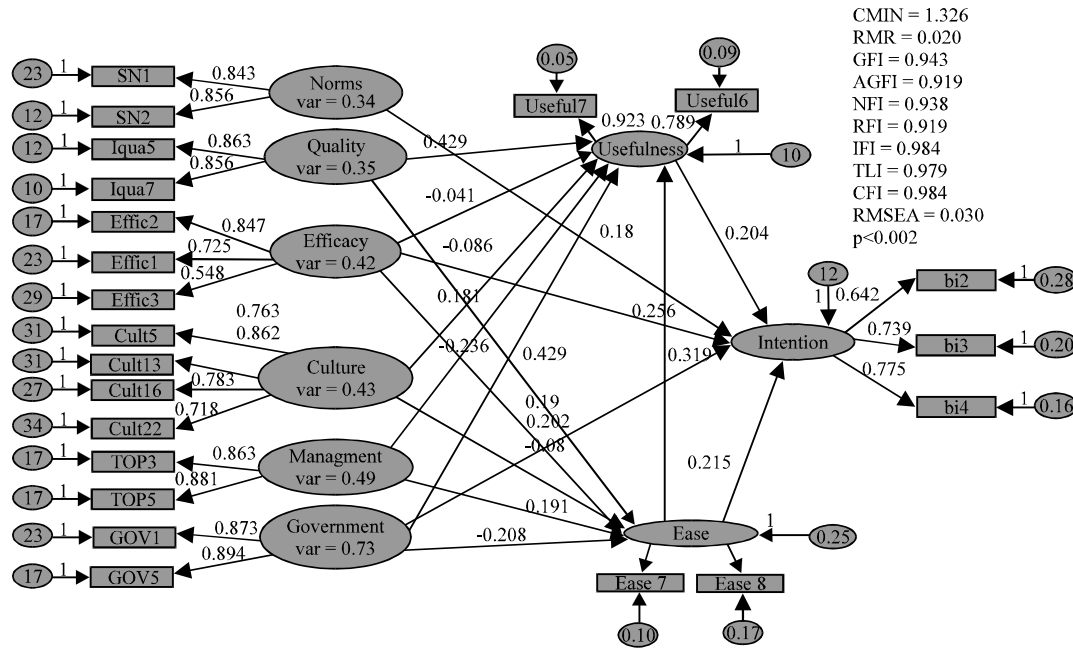


Fig. 2: The confirmatory factor analysis and the good of fitness for the casual model

Table 1: Confirmatory factor analysis for the causal model

Fit index	Recommended criteria	Result of model
Chi-square (χ^2 /degrees of freedom)	<2.00	1.326
Goodness of Fit (GFI)	>0.90	0.943
Adjusted Goodness of Fit (AGFI)	>0.90	0.919
Non-Normed Fit Index (NNFI)	>0.90	0.938
Comparative Fit Index (CFI)	>0.90	0.984
Root Mean Square Residual (RMR)	<0.05	0.020
Root Mean Square Error of Approximation (RMSEA)	<0.08	0.030

p<0.001-0.002

in the Yemeni government sector. Table 1 shows that all factors path coefficients are significant except for organization culture with perceived ease of use and perceived usefulness ($Y = 0.08$, $t = 1.038$; $Y = 0.09$, $t = 1.192$, respectively). Self-efficacy with perceived usefulness is non-significant ($Y = 0.041$, $t = 0.679$). However, the coefficients show that the data support all hypotheses except three hypotheses that are rejected. Moreover, there are more explanations for Table 2 in the hypotheses evaluation section.

Hypotheses evaluation

H₁: perceived ease of use has a positive effect on the intention behavior to use a particular system: From the result, perceived ease of use has a significant positive effect on the intention behavior to use ($Y = 0.215$, $t = 2.84$, $p < 0.002$) exceeding the recommended $t = 1.96$ of the significant relation (Byrne, 2010). This means that for every increase in perceived ease of use (the latent

Table 2: Path coefficients and the result of the hypotheses

Structural path	Standardized coefficient	t-values	Hypothesis direction	Hypothesis result
Efficacy-ease	0.190	2.918	+	Supported
Efficacy-usefulness	-0.041	-0.679	+	Rejected
Efficacy-intention	0.256	3.829	+	Supported
Quality-ease	0.429	6.228	+	Supported
Quality-usefulness	0.402	5.410	+	Supported
Culture-ease	-0.080	-1.038	-	Supported
Culture-usefulness	-0.086	-1.192	-	Supported
Management-ease	0.191	2.081	+	Supported
Management-usefulness	0.181	2.044	+	Supported
Government-ease	-0.208	-2.427	-	Rejected
Government-usefulness	-0.236	-2.852	-	Rejected
Government-intention	0.202	3.249	+	Supported
Ease-usefulness	0.319	4.544	+	Supported
Ease-intention	0.215	2.840	+	Supported
Norms-intention	0.180	2.785	+	Supported
Usefulness-intention	0.204	2.916	+	Supported

endogenous variable) by one, the intention of use (latent endogenous variable) increases by 0.215 standard points. In other words, perceived ease of use is a significant predictor for employees and manager's intention to use the information technology system.

This result seems to be consistent with previous studies (Almutairi, 2007; Chung *et al.*, 2008; Kishore and McLean, 2001; Tarcan *et al.*, 2010; Venkatesh and Morris, 2000). However, this study did not find support for that by Li *et al.* (2009) who found that perceived ease of use did not have a significant direct relationship with intention but it had an indirect relationship through its impact on perceived usefulness.

H₂: perceived ease of use has a positive effect on perceived usefulness of a particular system: From the result, perceived ease of use has a significant positive effect on perceived usefulness ($Y = 0.319$, $t = 4.544$, $p < 0.002$) exceeding the recommended $t = 1.96$ of the significant relation (Byrne, 2010). This means that for every increase in perceived ease of use (the latent endogenous variable) by one, perceived usefulness (the latent endogenous variable) increases by 0.319 standard point. In other words, perceived ease of use is a significant predictor of perceived usefulness. Perceived ease of use has a stronger effect on perceived usefulness ($Y = 0.319$, $t = 4.544$) than on behavioral intention to use ($Y = 0.215$, $t = 2.84$). This result is thus consistent with previous studies that found perceived ease of use has a significant relation with perceived usefulness (Almutairi, 2007; Chung *et al.*, 2008; Tarcan *et al.*, 2010). However, this study did not provide support for Shih and Huang (2009)'s study which found that perceived ease of use does not have a positive direct effect on perceived usefulness.

H₃: perceived usefulness has a positive effect on behaviour intention to use a particular system: The result provides support for the positive effect perceived usefulness has on behaviour intention to use ($Y = 0.204$, $t = 2.916$, $p < 0.002$). For every increase in perceived usefulness (the latent endogenous variable) by one, behaviour intention to use (the latent endogenous variable) increases by 0.204 standard point which means that the employees and the managers in the government sector perceive the information system to be useful. As expected, perceived usefulness is a significant predictor of behavioral intention to use. The result is consistent with previous studies (Chung *et al.*, 2008; Li *et al.*, 2009; Tarcan *et al.*, 2010). However, this study did not lend support to several previous studies by Goeke (2006) and Pikkarainen *et al.* (2004) which found that usefulness was stronger than ease of use in affecting the intention to use.

H₄: information quality has a positive relationship with perceived ease of use toward the system usage: As expected, the result supports the hypothesis and information quality was found to have a significant positive effect on perceived ease of use ($Y = 0.429$, $t = 6.228$, $p < 0.002$). For every increase in information quality by one, the intention of use increases by 0.429 standard point. This result is consistent with that reported in previous studies (Al-Gahtani, 2004; Ahn *et al.*, 2007; Mohd *et al.*, 2005; Saeed and Abdinnour-Helm, 2008) which found that information quality has a significant impact on perceived usefulness and perceived ease of use toward using the system.

H₅: information quality has a positive relationship with perceived usefulness toward the system usage: The result supports the hypothesis and information quality was found to have a significant positive effect on perceived usefulness ($Y = 0.402$, $t = 5.41$, $p < 0.002$). For every increase in information quality by one, the intention of use increases by 0.429 standard points. This result is consistent with that in previous studies (Al-Gahtani 2004; Ahn *et al.*, 2007; Mohd *et al.*, 2005; Saeed and Abdinnour-Helm, 2008) which found that information quality has a significant impact on perceived usefulness and perceived ease of use toward using the system. The study found that information quality has more effect on perceived ease of use ($Y = 0.429$, $t = 6.228$) than perceived usefulness ($Y = 0.402$, $t = 5.41$).

H₁₁: top management support for particular system has a positive effect on perceived ease of use among government employees and managers toward using information technology: The hypothesis was supported as top management support was found to have a significant positive effect on perceived ease of use ($Y = 0.191$, $t = 2.081$, $p < 0.002$). For every increase in top management support by one, perceived ease of use increases by 0.191 standard points. It seems that the top management supports the adoption for any new technology as it could enhance the productivity and work accomplishment. Hence, this result is consistent with that in previous studies (Rouibah *et al.*, 2009; Ragu-Nathan *et al.*, 2004; Wu *et al.*, 2008) which found that top management support has a positive direct effect on perceived usefulness and perceived ease of use.

H₁₂: top management support for a particular system has a positive effect on perceived usefulness of government managers and employees toward using the information technology: As expected, the result supports the hypothesis. Top management supports has a significant positive effect on perceived usefulness ($Y = 0.181$, $t = 2.044$, $p < 0.002$). For every increase in top management support by one, perceived usefulness increases by 0.181 standard point. This result is consistent with that in previous studies (Rouibah *et al.*, 2009; Shih and Huang, 2009; Wu *et al.*, 2008).

Organizations are investing in the information technology and providing all the necessary requirements such as hardware, software, system and the infrastructure support in order to improve the efficiency and productivity of the organization. However, if individuals under or over estimate available resources, they might take poor usage decision of the information technology. Therefore, in order for organizations to address these issues, it is important to measure the usage level of the

acceptance of the information technology. The level of usage, however, could be explained by the level of perceptions and beliefs such as ease of use, usefulness and the intention to use towards the actual usage.

In summary, the findings in this study provide explanation for the usage of the new information technology among employees and managers in the Yemeni government sector by using the information technology acceptance theory and unified theories (TAM2 and UTAUT). Based on the analyses, the model showed good of fitness of the measurements. It was also found that the structural and causal model can explain the employee's and manager's usage and adoption of information technology.

Consistent with the findings of previous studies (Al-Gahtani, 2004; Ahn *et al.*, 2007; Mohd *et al.*, 2005; Saeed and Abdinnour-Helm, 2008) perceived usefulness and perceived ease of use are the important determinants of behavioral intention to use and they mediate the relation between the external independent variables and the dependent variable of intention to use. In this study, perceived usefulness and perceived ease of use were found to have a positive significant effect on the intention to use the information technology and perceived ease of use has direct and indirect effects on the intention to use the information technology. However, the path coefficient showed that perceived ease of use has a stronger effect on the intention to use than perceived usefulness ($Y = 0.319, t = 4.544$) and ($Y = 0.215, t = 2.840$). Respectively, this result is consistent with (Klloppiing and McKiney, 2004). In another ward, employees accept to use the information technology after they perceived it to be useful and easy to use (Davis *et al.*, 1989).

Perceived ease of use was shown to have the strongest direct effects on perceived usefulness in this model compared to the study conducted by Shih and Huang (2009)'s. In addition, it seems that employees and managers in the public sector who have some sort of background in information technology or have respectful background about the technology found that using the technology in their daily work makes the work processes more smooth and easier to fulfill their tasks and perceived that the information system is easy to use which contributes to the new information technology being perceived to be useful.

The present study also showed that system characteristics (information quality) has a strong, significant and positive effect on both perceived usefulness and ease of use towards the acceptance of the information technology. This finding is consistent with previous studies that demonstrate similar result (Ahn *et al.*, 2007; Mohd *et al.*, 2005; Saeed and

Abdinnour-Helm, 2008). This offers more support for the employees and managers to use and adopt the information technology despite the non-integrity among the sub-systems. In other ward, the employees and managers perceived that it is easy to get good, quality and useful information for their daily work. Therefore, when they are satisfied with the result obtained from using the technology, this will encourage them to use the information technology.

As expected, top management support was found in this study as a critical factor affecting the acceptance and the adoption of the information technology. This finding is parallel with other findings reported earlier in the literature (Rouibah *et al.*, 2009; Wang and Chen, 2006; Ragu-Nathan *et al.*, 2004; Wu *et al.*, 2008; Shih and Huang, 2009). In another words, when top management provides the necessary support to facilitate the adoption and use of the new technology, other organizational members will embrace the technology in their work despite the difficulties and challenges they face at work. However, they considered the current government efforts in supporting the usage of the technology as not being useful because the government was perceived not to provide the necessary facilities (e.g., internet, hardware's and software's) to support the usage of the technology.

Theoretical contribution: The contribution of this research, in the theoretical prospective, lies in identifying some factors such as organization culture and government support that could be important in their influence on the acceptance for new information technology, particularly in the public sector of the republic of Yemen.

This study was conducted to find empirical support for the model of Technology Acceptance (TAM2) and the Unified Theory of Acceptance and Use of Technology (UTAUT) within the public sector of the republic of Yemen to examine technology acceptance and utilization issues among public employees to improve the success of IS implementation in this arena and to explore organization culture and the government role in supporting the adoption of information technology within the public utilities employees either as a strategy or as logistic support.

This research contributes to the theoretical grounds of information technology acceptance by testing the capability of the technology acceptance model for generalizing and explaining the usage of the new technology. This research contribute to the theoretical grounds of information technology acceptance by studying the success factors that provide empirical assessment of the critical factor in the Technology

Acceptance Model. These factors categorized in four categories: individual characteristics such as self-efficacy, social characteristics such as subjective norms and organization culture, technology characteristics such as information quality and institutional characteristics such as top management support and government support.

This research contributes to the theoretical grounds of information technology acceptance by combining Technology Acceptance Model (TAM2) with the Unified Theory of Acceptance and Use of Technology (UTAUT) to provide better explanation for the effect of organization culture on technology acceptance and to overcome the shortcoming in TAM2 which does not consider the effect of social influence such as culture (Venkatesh *et al.*, 2003).

From the managerial perspective, this research not only contributes to the theoretical grounds. It also contributes to the empirical knowledge to increase the success rate for accepting or adopting the information technology in the government sector in the Republic of Yemen. This research validates the importance of top management support and information quality in influencing the behaviour intention to use towards the actual usage for the information technology. This research proved that these factors hold true in the Republic of Yemen. This proves, therefore, it supports the notion that technology acceptance model could be generalized in middle east settings and hence the reliance to the efforts that testing western findings in the local organizations with local samples.

This study has mentioned perceived gap in the technology acceptance literature in the middle east in particular, in the Republic of Yemen and responding to calls that support that technology acceptance lacks empirical research and there are needs for understanding its factors and their influences in the acceptance for the technology. This study tested the validity and reliability of the technology acceptance scales in the public sector of Yemen which adopted from the original theory or the studies which undertook the original theory in their studies.

This research is one of the very few technology acceptance studies in the middle east region. In Yemen, this is the first research effort to investigate the factors that effect the acceptance of information technology in the public sectors in the Republic of Yemen. The empirical research has extended understanding of the four main categories factors of information technology acceptance, individual characteristics, social characteristics, technology characteristics, institutional characteristics components

and their impact on the acceptance for the information technology which have not been addressed together in previous studies in Yemen.

Methodological contribution: From the methodological perspective, this study has contributed to Methodological grounds in that, most of the literatures on technology acceptance have focused on the behavior intention to use the technology since the behavior intention is the merely or only determined related to actual use for the system Davis *et al.* (1989); Kiraz and Ozdemir (2006).

In the Technology Acceptance Model (TAM) which consists of four main factors as major determinants of technology acceptance. These factors are perceived ease of use, perceived usefulness, attitudes towards usage and behavioral intention to use and the external variable subjective norms and self-efficacy in Technology Acceptance (TAM2). Davis developed a reliable and valid scale to measure these factors. However, these scales were developed in different countries in the private sector. To show robustness and validity of the measurements, they suggested that the instrument should be tested with different groups and different settings. In response to their suggestion, this study assessed the applicability of these scales and tested it in the public sector in the Republic of Yemen.

The scope of technology acceptance study has to be extended to various contexts that was suggested by (Venkatesh *et al.*, 2003). Therefore, in this study, the public sector was selected as the context of the technology acceptance study. The positive result in this current study strengthens the methodology by adding a new setting and research context.

According to Agarwal, there are four factors categories that influenced the technology acceptance. These factors categories are individual characteristics, social characteristics, technology characteristics, institutional characteristics. Most of the previous studies focused in one or two factors categories. In this study, however, the study included the four factors categories following the Unified Theory of Acceptance and Use of Technology (UTAUT).

Based on the recommendation from the previous studies (Al-Gahtani, 2004; Gorke, 2006; Yalcinkaya, 2007; Almutairi, 2007; Loo *et al.*, 2009; Kim *et al.*, 2008a, b; Smith 2008; Agarwal, 2000; Agarwal and Karahanna, 2000) this study tested the validity of the set construct (self-efficacy, subjective norms organization culture, information quality, top management support and government support) which influence the technology

acceptance. At long last after factor analysis was run, all the indicators loading in their construct as explained in chapter four.

CONCLUSION

The study has provided empirical evidence for the effect of some determinants on acceptance of the technology in the government sector. In particular, it has managed to reveal that organizational culture, government support, subjective norms, top management support, information quality and computer self-efficacy play an important role in influencing technology acceptance. As such, the findings validate TAM theory and demonstrate the applicability of this theory to the Middle Eastern context, particularly in the Republic of Yemen. This study has important implications to practitioners and managers on the need to carefully consider the factors that could promote the use of the new technology in a country like Yemen. More so, the findings are important for the Yemeni government if it seriously desires for the country to move forward in its effort in encouraging and promoting the population to be technologically literate and savvy.

This research represents an effort to understand the factors affecting the usage of the information technology from the perspective of Yemen public sector. The findings successfully answered the research objectives. Whether the extent of Technology Acceptance Model (TAM2) and the Unified Theory of Acceptance and Use of Technology (UTAUT) explain the intention to use the information technology among the government employees in the Republic of Yemen. The effect of individual differences such as self-efficacy on the acceptance of new technology among employees in the public sector. The effect of system features such as information quality on the acceptance of technology. The effect of social factors such as subjective norm and organization culture on the acceptance of new technology among employees in the public sector. The effect of institutional factors such as top management support and government support on the acceptance of new technology among employees in the public sector.

The approach used is to assess the relationship between these variables and the employee's and manager's intention behavior to use the information technology so that it provides comprehensive understanding for the public sector practitioners for future researcher amongst academicians. Furthermore, the survey questionnaire enhanced the findings by providing detail account of how these factors affecting on the usage for the technology. The findings successfully answered the research objectives as follow. The capability of

Technology Acceptance Model (TAM2) and the Unified Theory of Acceptance and Use of Technology (UTAUT) to explain the intention to use the information technology among the government employees in the Republic of Yemen. The study has provided empirical evidence for the positive effect of perceived usefulness and perceived ease of use on the intention behaviour to use towards the actual usage for the technology. Empirical evidence has shown that the employees and managers increase their usage for the technology when they perceived the technology is useful and ease to use, that enhance their intention to use or adopt the technology.

The relationship between system features such as information quality on the acceptance of technology. The study has provided empirical evidence for the positive effect of information quality on the intention behaviour to use towards the actual usage for the technology throughout the positive effect on perceived usefulness and ease of use. Empirical evidence has shown that information quality could enhance the employee's and manager's intention to use or adopt the technology when they perceived this information is usefulness, ease of use and it helps them to achieve the organization goals.

The relationship between institutional factors such as top management support and government support on the acceptance of new technology among employees in the public sector. The study has provided empirical evidence for the positive effect of top management support on the intention behaviour to use towards the actual usage for the technology throughout the positive effect on perceived usefulness and ease of use. Empirical evidence has shown that the organization top management could enhance the employees and managers usage or adoption for the technology when the management provides the necessary equipments and facilities for them to achieve the organization goals. In addition, the study has provided empirical evidence for the positive effect of government support on the intention behaviour to use towards the actual usage for the technology.

RECOMMENDATIONS

Practical recommendations of study: There are some recommendations for the practitioners and the officials in the Yemeni government who are in charge of decision making and formulating the information technology strategy. Since, the information technology is developing rapidly, it is important for them to understand the drivers (variables) that influence the acceptance of any new technology. In particular, those in charge should make sure that the technology adopted be it the hardware or

software is perceived to be useful and easy to use to encourage users to accept and finally use the technology. If the technology is perceived to be useless and difficult to use, any investment made by those in authority will not yield any return as expected and such investment is a waste of resources, time and effort. This means that before implementing and installing the new technology, some feasibility studies need to be carried out first Smith 2008.

Recommendations for future studies: With regards to future studies, the following recommendations are proposed: the scope of the study targets the individuals in the government sector. Therefore, future researchers can consider conducting studies in the private sector individuals or carry out comparative studies between the public sector and private sector in the republic of Yemen or any country.

This study used quantitative method for collecting the data and could not conduct qualitative data due to the conflict between the political parties and the civil war, which prevented this study from conducting the necessary interviews with the relevant individuals. Thus, future studies could consider employing qualitative methodology to gather qualitative information on technology acceptance.

This study has shown some important factors that could influence an individual's intention towards the usage of the new information technology. However, it is possible that other factors such as training that was not considered in this study, may also be responsible in determining technology acceptance. By doing so, our knowledge on the factors that influence technology acceptance could be widened.

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