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FACTORS AFFECTING ACCEPTANCE AND THE USE OF TECHNOLOGY IN YEMENI TELECOM COMPANIES

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ABSTRACT

The factors leading to technology acceptance and use vary from country to country. For example, developing countries face many challenges that lead to the failure to apply technology, including the low level of efficiency and expertise for technology users, in addition to some technical factors, including the quality of the technology used. Although previous studies in this field examined acceptance factors and successful technology use, there is still a need for many studies in this field. This study aims to examine briefly the common individual acceptance and usage models. In addition, it identifies the factors that apply technology and affects acceptance in the Yemeni context. Data from employees in three telecommunications companies in Yemen were collected quantitatively. 300 completed questionnaires were received. Data have been analyzed using statistical programs, AMOS and SPSS. The study is expected to develop a model consistent with the Yemeni context. This survey reveals that a significant link with technology acceptance and use exists between device automaticity, user experience, system efficiency, and information quality. This study is limited to only influential factors mentioned on four common theories named Technology Acceptance Model, Computer Usage Model, Personal Computing Acceptance Model and Delone and Mclean Model. The second limitation of this study concerns the fact that the study is conducted in the capital city of Yemen, Sana'a. This study mainly contributes to developing a new model and conduct a test on it. According to the study findings, the adoption of this model will have an important part in the successful application of the new technology in Yemeni companies.

Disciplinary: Management Sciences, Information Technology.

1. INTRODUCTION

Technology is an essential tool that affects the entire organization. The use of technology has become essential to improve the performance of any organization (Al-Mamary et al., 2015a).

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Organizations can identify key factors leading to technology adoption and acceptance. Identify the factors correctly, will play a beneficial part in overall effective technology adoption. In the field of using and adopting technology, various theories are adapted. One of the dominant theories is in the area of individual acceptance of technology, Theory of Reasoned Action (TRA), Innovation Diffusion Theory (IDT), DeLone and McLean IS success model, Technology Acceptance Model (TAM), Unified theory of user acceptance of technology (UTAUT), Theory of planned behavior (TPB), Technology-Organization-Environment framework (TOE), Diffusion of innovation theory (DOI), personal computing acceptance model and computer usage model. In order to study technology acceptance, IDT was one of the first hypotheses used. Furthermore, in the field of the success of the information system (IS), the most common theories are, DeLone & McLean (1992); Delone & Mclean (2003); Petter et al. (2013) have stated about the factors in the information systems' success. According to the literature review in the context of Arab countries, it was found that the IS performance has many variables, except for machine efficacy and user experience, which were most discussed in previous theories. In previous common hypotheses, these variables were ignored. This study highlights four common models in the field of technology adoption namely: TAM and IS success model, personal computing model and computer usage model.

The model of technology acceptance focuses on the factors of technology for successfully adopting systems of information, ignoring the rest of the factors. Moreover, Delone and Mclean model is based primarily on or related to technology factors and human factors (Al-Mamary et al., 2019). Additionally, computer usage is another model and the model's theoretical grounding majorly comes from the theory of reasoned action (TRA), social cognitive theory (SCT), the theory of planned behavior (TPB) and technology acceptance model (TAM). The focus of this model is the human factors and support from organizations (computer anxiety, self-efficacy, experience with computers). Furthermore, one more model is known as the personal computing experience. Its focus is on only the organizational factors (extra-organizational and intra-organizational factors). The four models are explained in the next part of the study. The models that present the relationship between these variables with acceptance and use of the technology are well-known. But, to identify the generalizability of the study model, more practical studies are needed in the contexts of geographical locations.

2. REVIEW OF LITERATURE

The Technology Acceptance Model (TAM) in 1989, proposed that users should determine the time and process of using the technology on several factors: perceived utility and perceived ease of use at the time of the introduction of new technology to the users. The success Model by Delone and Mclean IS defined six variables (quality of information, usage, the satisfaction of users, system quality, impact by organizations and individual effects) that could be used to successfully implement IS in 1992. Six variables for the use of technology were established in 1995, and these are (experience with computer, support from the organization, self-efficacy, computer anxiety, obtained necessity and obtained ease of use). The personal computing acceptance model defined two key acceptance variables for the program in 1997, which (support from extra-organization and intra-organization) were suggested to influence the ease of use and the perceived usefulness of the technology. The modified model of Delone and Mclean (2003) in 2003 included the quality of service as an independent factor. Furthermore, two variables were merged with it for net advantages (impact by

individuals and organizations).

Optional choice for Technology Acceptance Model and Delone and Mclean model are the common models in the technology adoption and the success of IS. Based on Surendran (2012), one of the most extensively known study models is the Technology Acceptance Model for predicting the acceptance and use of systems of information and technology by individual users. One of the most influential models which are extensively used to determine the acceptance of IS/IT, according to Agrawal (2013). According to Urbach et al. (2009), the D&M IS success model gained massive popularity from IS researchers, who have frequently treated the success of IS. According to Al-Mamary (2019), Delone and Mclean IS Model is an influential theory in the field of the success of IS. Optional reason for personal computing acceptance model and computer usage model is these models which are rarely discussed in previous literature.

2.1 TECHNOLOGY ACCEPTANCE MODEL

The Technology Acceptance Model, created by Davis (1989), was one of the most important research models to predict the intention of people to use IS and information technology. There are two determinants in the Technology Acceptance Model, including perceived ease of use and perceived usefulness (Chen et al., 2011).

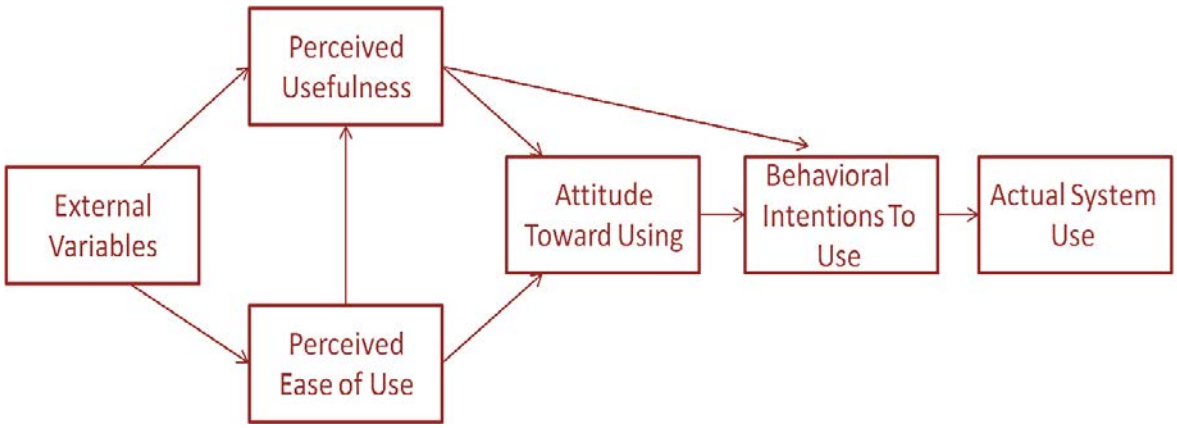

Figure 1: Technology Acceptance Model

Davis (1989) described perceived usefulness as "the degree to which an individual thinks that using a specific system would improve the performance of his or her job." People tend to use or not to use an application in so far as they believe it will help them to do their job better. The perceived usefulness defines the user's belief that technology improves workplace efficiency. In the meantime, perceived ease is defined as far as a person believes that a particular system would be easy to use. Users believe that a specified application is worthwhile, but they may feel while the technology is too hard to use and that the performance benefits of the app are superior to the effort. Perceived ease of use explains how much effort the user needs to use the program or to what degree a user feels it is easy to apply a particular technology (Davis, 1989). It was found by Legris et al. (2003) that perceived ease of use is calculated by a simple way of learning how to work for me. I can easily find what I want to do. Researchers have commonly used the Technology Acceptance Model (TAM) to obtain a better knowledge of the variables affecting technology acceptance (Al-Mamary et al., 2015a).

In summary, TAM defines two primary variables for effective technology adoption, And the accessibility and ease of use of these variables are interpreted. The layout is mainly concentrated on the technical side. Note that in certain cases the acceptance of technology requires top-ranking

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support in order to encourage end-users to accept or need self-efficacy or training. Consequently, the end-user is encouraged to accept technology in several areas. The knowledge gap is, therefore, the paradigm that does not exist in all the conditions that result in the use of technology effectively by the organization.

2.2 DELONE AND MCLEAN'S IS MODEL

DeLone & McLean (1992) conducted a review of the studies released between 1981 and 1987 and based on this assessment generated IS success taxonomy. Six factors of IS success were recognized in their 1992 article (Petter et al., 2008) figure 1 shows these factors.

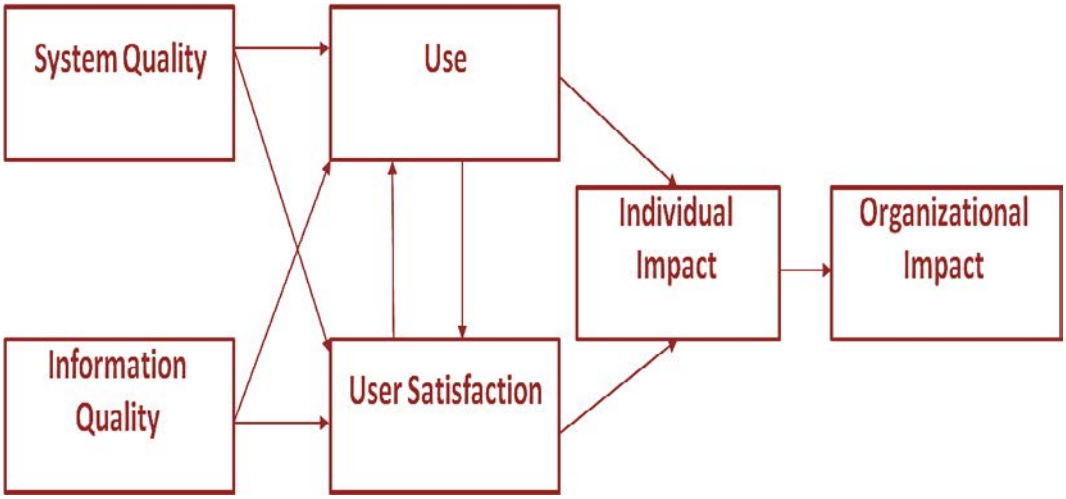

Figure 2: Delone & Mclean IS Success Model.

Quality of system is one of the most widely studied aspects of system quality IS performance. It refers mainly to how well hardware and software work together with the measures of the information processing system itself (DeLone & McLean, 1992). Although the quality of the information is the measurement of the output of the IS and is not the measurement of the quality of the operation of the system, the quality of the output of the IS, especially in the form of reports, is preferred by other IS researchers (DeLone & McLean, 1992). In addition, DeLone & McLean (1992) reported, in many IS conceptual models and research studies, device use was suggested as a positive measure. System use is the extent to which employees and customers use IS capabilities. For example quantity of use, frequency of use, nature of use, adequacy of use, the scope of use and intent (Petter et al., 2008). In the meantime, user satisfaction is considered one of the most important measures for the overall IS success investigation (Urbach et al., 2010). Petter & McLean (2009) Defined user satisfaction as IS approval and output likeability. According to DeLone & McLean (1992), the recipient's response to the use of the IS output will be user satisfaction. In addition, DeLone & McLean (1992) defined the effect of individual data on a recipient's behavior, suggesting that this is closely related to the performance of an individual. According to Cho (2007), The individual impact is whether the IS gives users a better understanding of the context of their decisions, assists them in improving their decision-making efficiency, empowers them to do their jobs, and enforces their perceptions of an IS's importance or usefulness. The impact of the IS on organizational efficiency. Many measures of the organizational impact include reductions in staff, overall gains in productivity, higher sales revenues, increased profits, an increase in work volume, quality of products and the contribution towards achieving objectives, etc. (DeLone & McLean, 1992). Furthermore, the accumulation of the end results of all the activities and work processes of the organization is known as organizational

performance (Robbins & Coulter, 2002).

2.3 COMPUTER USAGE MODEL

According to Igbaria & Iivari (1995), Seven computer experiments were evaluated to ask the respondents to indicate their experience in the use of applied systems, different types of computer software packages (e.g. spreadsheet, word processing), languages (third and fourth generation), financial modeling and the participation in non-technical analysis and technological computer design (feasibility studies and computer requirements analysis). The overview of these observations was the overall machine experience. In addition, the organizational support measures included general support including administrative support and resource allocation. In addition, Management is really keen to see that whether we are happy by using the microcomputers"; "Management has provided most of the necessary help to get us used to the microcomputer quickly"; "the management always supported to use the microcomputer in the job"; and "the management know that there are a lot of benefits which can be achieved with the use of microcomputers" (Igbaria & Iivari, 1995). Furthermore, self-efficacy is a conviction of a consumer about his or her technical capacity (Lui & Hui, 2011). The self-efficacy of the two-point scale was measured. The first item "I will understand how computers work"; and the second item "I am confident that I could learn computer applications." In addition, computer anxiety refers to a person's s propensity for computing, in general, to be awkward, apprehensive and/or phobic (Igbaria & Iivari, 1995). Computer anxiety was concerned about the effects of computer use such as fear of potential errors (Chou & Chen, 2009). Emotional discomfort, fear and phobia felt by the people when they consider or use computer technology are described as computer anxiety (Kim et al., 2011). Meanwhile Petter & McLean (2009) defined device is used as an IS consumption or its performance defined for real or independent use. According to Igbaria & Iivari (1995), microcomputer usage was measured using a two-item scale first item " perceived daily use of computers"; and the second item" perceived frequency of use of computers".

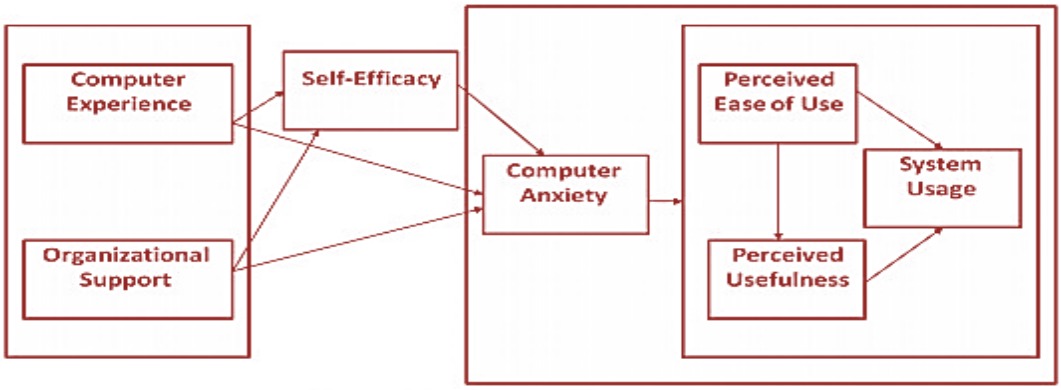

Figure 3: Computer Usage Model.

2.4 PERSONAL COMPUTING ACCEPTANCE MODEL

The possible inter-organizational factors that impact user computing success have identified three constructs. First, internal user computing assistance was defined as technical assistance for individuals (or groups) with internal computer expertise to the small enterprise. Second, internal training refers to the level of training received by other computer users or company computer specialists. Thirdly, management support refers to the perceived level of overall support in small companies offered by management. (Igbaria et al., 1997). Meanwhile, the possible

extra-organizational factors affecting personal computing acceptance have been described as two constructs. First, external computer support was defined as technical support for computer experts (or groups) outside of a small enterprise. The second extra-organizational factor was external computer support. This refers to the level of training received by relatives, suppliers, consultants or schools outside of the organization (Igbaria et al., 1997).

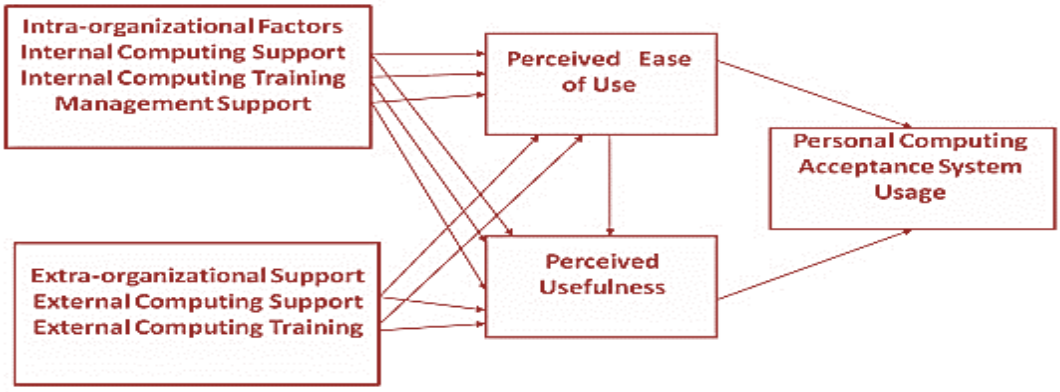

Figure 4: Personal Computing Acceptance Model.

2.5 UPDATED DELONE & MCLEAN IS SUCCESS MODEL

Based on a review of the literature, Delone & Mclean (2003) again suggested an updated model. They added quality of service as a significant dimension. It also added the intention to use it as an alternative measure as an attitude is worth assessing in some contexts. Eventually, the person and organization's effects were combined into one dimension known as net benefits.

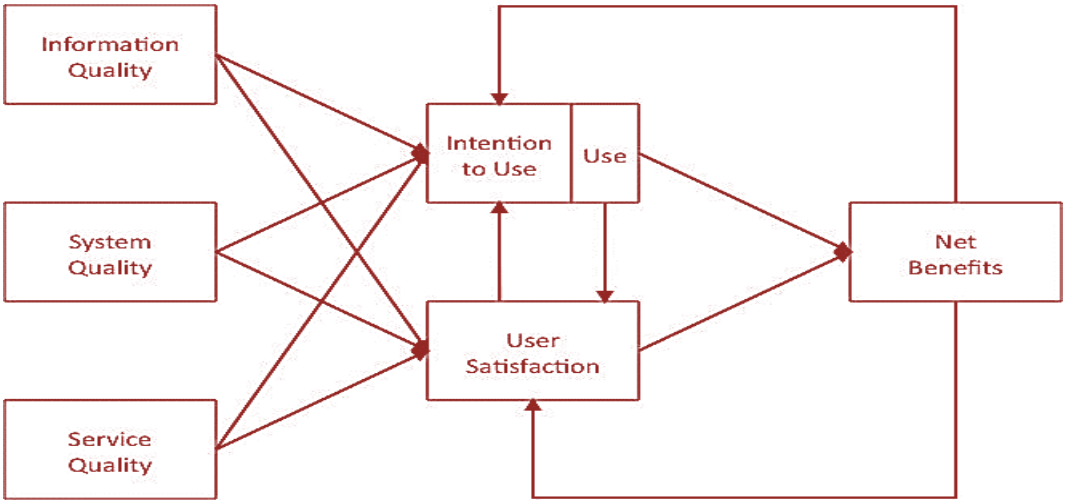

Figure 5: Updated D & M IS Success Model.

According to Petter & McLean (2009), service quality was described as IS user support for departments, often measured by the support organization's capacity to reaction, reliability, and empathy. Delone & Mclean (2003) explained the quality of service as overall support provided by the service provider, whether provided by the Internet Service Provider (ISP), a new organizational department, or outsourced to a service provider.

The net benefits, however, are to the degree that IS contributes to individuals, communities, organizations, business and nations ' progress. Examples of these include better decision-making, improved productivity, increasing sales, cost reductions, increased income, quality of the industry, customer welfare and job creation. (Petter et al., 2008) In summary, the performance model of Delone and Mclean IS defines six variables for positive IS adoption, and those variables (system quality,

knowledge quality, user satisfaction, personal impact, organization-related impact) are the independent variables of the model, which concentrate on only the technical side. In addition, the updated model of Delone and Mclean (2003) added service quality as a factor independently. In addition, two variables (individual impact and organizational effect) were combined to achieve net benefits. Although the redesign, the model is still technologically based, with the other variables largely ignored. The knowledge gap is, therefore, the paradigm not included in all the factors that lead to the successful implementation in companies of the IS.

3. CONCEPTUAL MODEL AND MEASUREMENTS

3.1 CONCEPTUAL MODEL

The model of the study consists of technological ability (soft aspect, and hard aspect). The soft (intangible) aspect, which is the computer's self-efficacy and user experience, the hard (tangible) aspect which is the quality of the system, the quality of service, and the quality of information. The model for the research is shown in Figure 6.

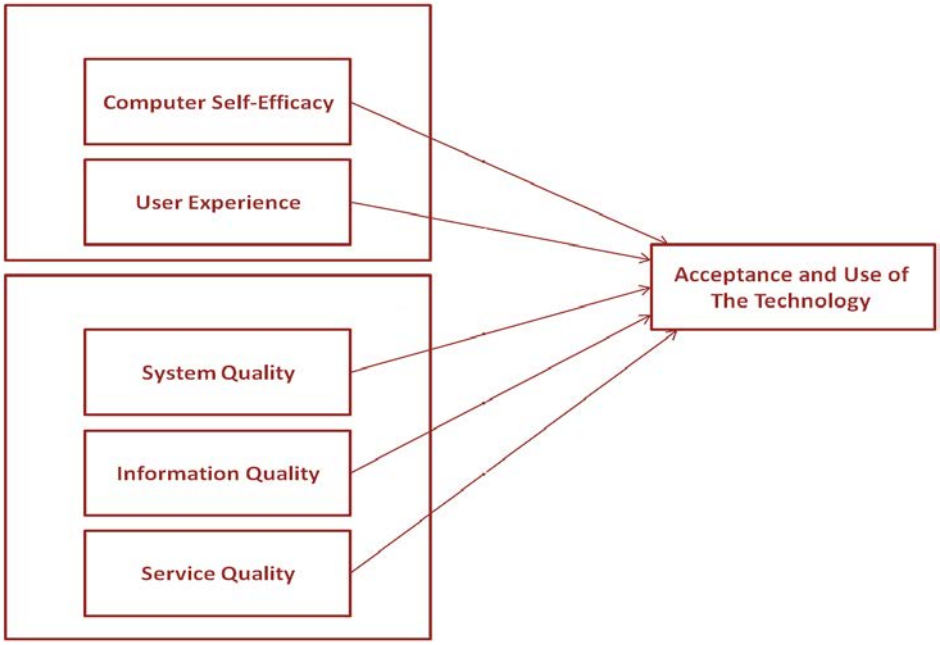

Figure 6: Study Model.

In Figure 6 the researcher assumed that the effect of computer self-efficacy, user experience, system quality, information quality, and service quality on technology acceptance and utilization.

3.2 DEFINITION OF VARIABLES AND MEASUREMENTS

3.2.1 COMPUTER SELF-EFFICACY (CSE)

Computer self-efficacy is, according to Al-Shawabkeh et al. (2012), the efficacy of the individual computing capabilities in performing duties. Zhao (2010) defined computer self-efficacy as an individual's belief that he or she has the skills and abilities to achieve an assignment in an effective way. Computer self-efficacy is related to a person's belief in the ability, understanding, and ability to use the technology to perform duties. Six-items adopted from Brown (2002) and Igbaria & Iivari (1995) were used in this study to measure the computer self-efficacy construction. These items

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understand the system process, they are confident to use the system, they are comfortable to use their own system, they apply the system features, apply the system if there is none around me to explain the process of using it, the expertise and the kills are required.

3.2.2 USER EXPERIENCE (UE)

Experience is the prior experience of a person with a specific technology (Chuttur, 2009). Experience is the duration or degree of an individual's prior use of computers or IS (Sabherwal et al., 2006). This study defines user experience as "the extent of the experience in using the technology".

Six items are from Igbaria & Iivari (1995) for the measurement of the construct for user experience. Certain subjects include the understanding with different types of IS, the experience of using Microsoft Office applications, feasibility studies, analysis of specifications, language programming expertise and the role of computer systems.

3.2.3 QUALITY OF SYSTEM (SYQ)

System consistency is the quality of the processing of IS, which includes software and data components and tests the technological sound of the systems (Popoola et al., 2014). Alla (2013) defines system quality as the term used to explain the content of the quality of the IS. For measurements of the consistency of the device construct, six objects were used from Petter et al. (2008). Such products are user-friendly, learnable, reliable system, response time, scalable and sophisticated.

3.2.4 INFORMATION QUALITY (IQ)

Data quality refers to the consistency of the IS that is delivered by records or internet screens. Informative consistency. The quality of information is described in four dimensions: completeness, accuracy, precision and currency (Wei, 2012). Gable et al. (2008) define information quality as a measure of the quality of (IS) outputs: that is, the quality of information generated by the scheme in reports and on-screen. This study defined the quality of information as "the desirable features that measure system output."

In this study, six items adopted from Petter et al. (2008) were used to measure information quality. Those items are relevant, accurate, timely and user-friendly, comprehensible.

3.2.5 QUALITY OF SERVICE (SERQ)

According to Baraka et al. (2013), the quality of service Reflects the quality of service offered by agents to clients. Quality of service is the quality of support IS department and IT support staff receive from system users. This study defined quality of service as "quality of assistance received by customers from the department of IS and technical support team."

In this analysis, six times adopted from Delone & McLean (2003) & Petter et al. (2008) are applied to assess the efficiency of the service model. Such elements include prompt service, efficient service, reliable, technical skills, employee empathy, and security.

3.2.6 USE OR ACCEPTANCE OF THE TECHNOLOGY (UAOT)

Al-Mamary & Shamsuddin (2015b) defined the use and acceptance of technology as the degree to which the individual believes he/she is content with using the technology. Six items adopted from Seddon & Kiew (1996) & Palvia (1996) Measuring acceptance and use of the technology constructs were applied. These items meet our requirements, Efficiency, Effectiveness, Successful, complies

with our expectations, we accepted the system in general.

4. METHODOLOGY

4.1 DATA COLLECTION METHOD: SURVEY

Surveys are amongst the most popular methods used by the research community of IS. A survey is a way of gathering information about a broad group of people's attitudes, habits, or beliefs, referred to as a population. The researcher had submitted a questionnaire survey for this analysis.

4.2 RELIABILITY

Reliability is compatible with what is to be evaluated insofar as a variable or group of variables. The generally accepted reduced limit for Cronbach's alpha is 0.70 (Hair et al., 2010). Table 1, indicates the reliability of each variable.

Table 1: Reliability Testing Result.

Item	Cronbach's Alpha	N of Items
CSE	0.848	6
UE	0.942	6
SysQ	0.854	6
IQ	0.885	6
SerQ	0.910	6
AoT	0.949	6

5. RESULTS

Structural equation modeling (SEM) is used to test theories emerging from the conceptual model.

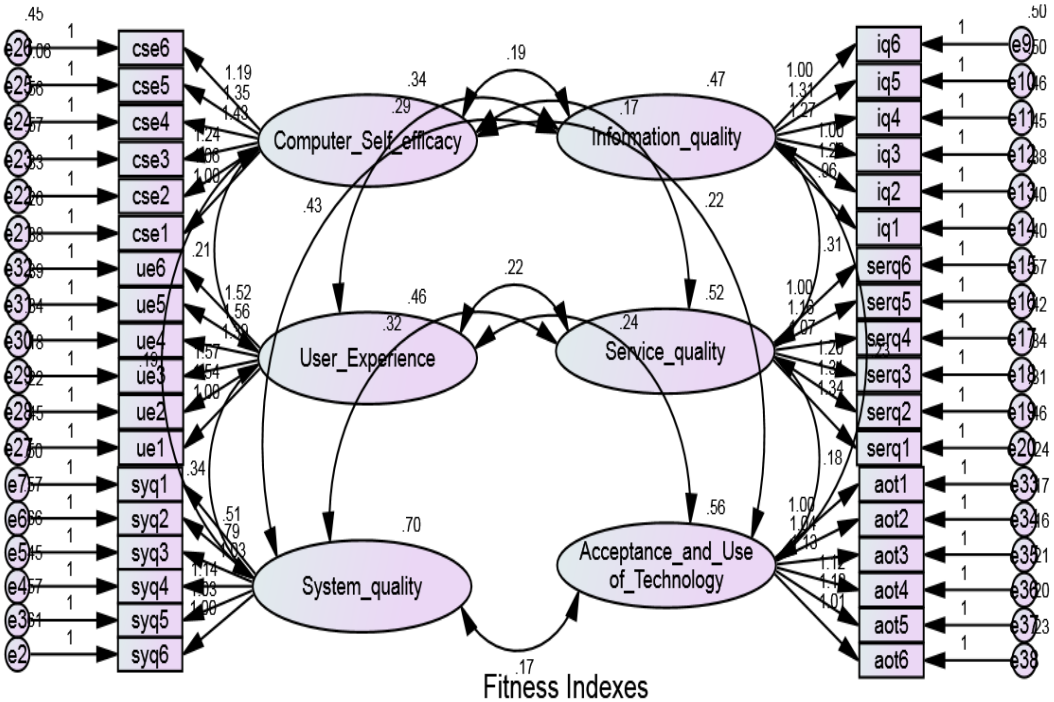

Figure 7: Initial CFA.

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To carry out the SEM analysis the two-stage approach was adopted. In the first stage (measurement model) the study was carried out by defining the causal relationships between the observed variables (items) and the theoretical constructs underlying them. For this feature, AMOS®21 performed confirmatory factor analyses. The structural model (second phase) stipulated the process or causal link between the underlying exogenous and endogenous buildings.

5.1 MEASUREMENT MODEL

Confirmatory factor analysis (CFA) has been used for testing the calculation models for each construct in this report. Confirmatory factor analysis (CFA) on the measurement model was performed to determine the uni-dimensionality, precision, and validity of the measurements. The CFA has adopted two specific methods for testing the calculation model. First, health consideration (GOF), and second, quality assessment and measurement pattern reliability. CFA was conducted on the six-factor measurement model, which included: computer self-efficacy (CSE), user experience (UE), system quality (SyQ), quality of information (IQ), quality of service (SerQ), and technology acceptance and use. Figure 7 illustrates the initial CFA model.

The goodness of fit indices (GFI) of the initial run of CFA was not within the recommended level. According to Hair et al. (2010) the size of the factor loading is one important consideration. For the first step, any measuring item having a factor loading less than 0.6 should be deleted from the measurement model. Selecting factor loading more than 0.6, the final CFA model is depicted in Figure 8.

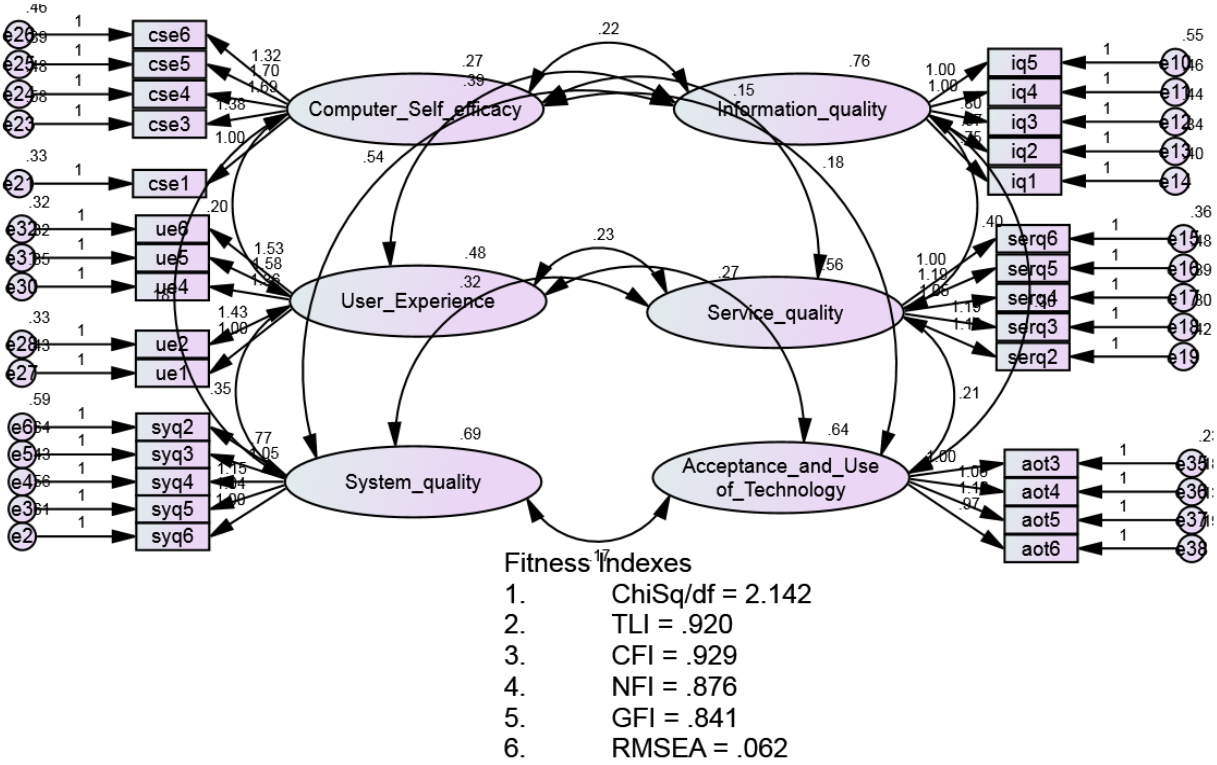

Figure 8: Re-Specify CFA Model

5.2 VALIDITY AND RELIABILITY OF A MEASUREMENT MODEL

The validity of the building was evaluated by determining convergent validity and biased validity in this study. In addition, internal reliability (Cronbach alpha >= 0.70) and building reliability (CR >= 0.70) are used to measure the reliability. Measurements of the measuring model's validity and reliability are shown in Table 2.

Table 2: Summary Report of CFA for Constructs

Construct	Item	Factor Loading	Cronbach's Alpha (≥ 0.7)	CR (≥ 0.7)	AVE (≥ 0.5)
Computer_Self_efficacy	cse1	.672	0.827	0.835	0.504
	cse3	.687			
	cse4	.784			
	cse5	.686			
	cse6	.714			
User_Experience	ue1	.726	0.923	0.925	0.712
	ue2	.866			
	ue4	.847			
	ue5	.888			
	ue6	.882			
System_Quality	syq2	.641	0.857	0.858	0.548
	syq3	.740			
	syq4	.825			
	syq5	.756			
	syq6	.729			
Information_Quality	Iq1	.719	0.873	0.875	0.584
	Iq2	.821			
	Iq3	.723			
	Iq4	.792			
	Iq5	.762			
Service_Quality	serq2	.806	0.894	0.900	0.644
	serq3	.853			
	serq4	.779			
	serq5	.791			
	serq6	.780			
Acceptance_ and_Use_of_The_Technology	aot3	.857	0.936	0.936	0.786
	aot4	.893			
	aot5	.924			
	aot6	.871			

The AVE square root is the diagonal values (in bold) while the other values are the relation of the respective structures. When a diagonal value in its row and column is larger than the values, it becomes unequal (Fornell & Larcker, 1981). Table 3 shows the validity of the discriminants.

Table 3: Discriminant Validity Index Summary

Construct	CSE	UE	SyQ	IQ	SerQ	UAOT
CSE	(0.710)					
UE	0.553	(0.844)				
SyQ	0.408	0.606	(0.741)			
IQ	0.486	0.643	0.740	(0.764)		
SerQ	0.397	0.451	0.517	0.621	(0.802)	
AOT	0.439	0.486	0.257	0.433	0.359	(0.887)

5.3 STRUCTURAL MODEL

As shown in Figure 9, according to GOF indexes the proposed model didn't fit well. TLI, CFI, and GFI are under 0.90 and 0.80.

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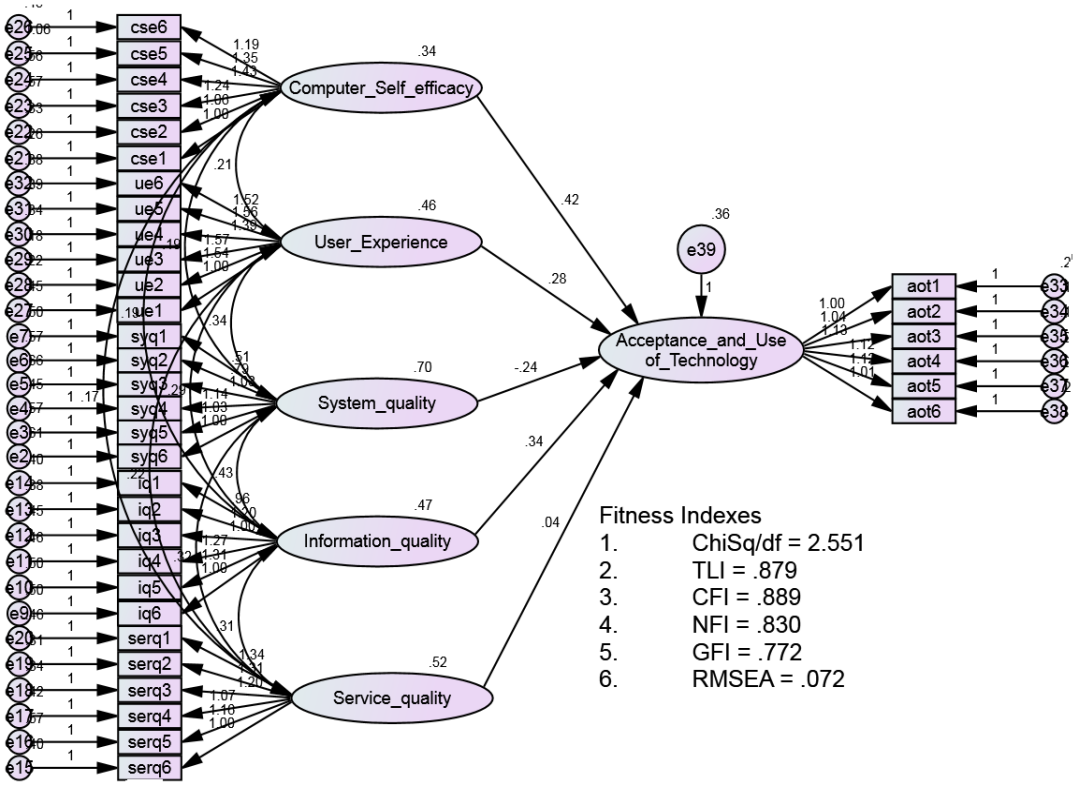

Figure 9: Initial Structural Model

The suggested model fits well on GOF indexes, as shown in Figure10. TLI, CFI, and RMSEA were < 0.90, NFI, GFI < 0.80, ChiSq/df < 3.

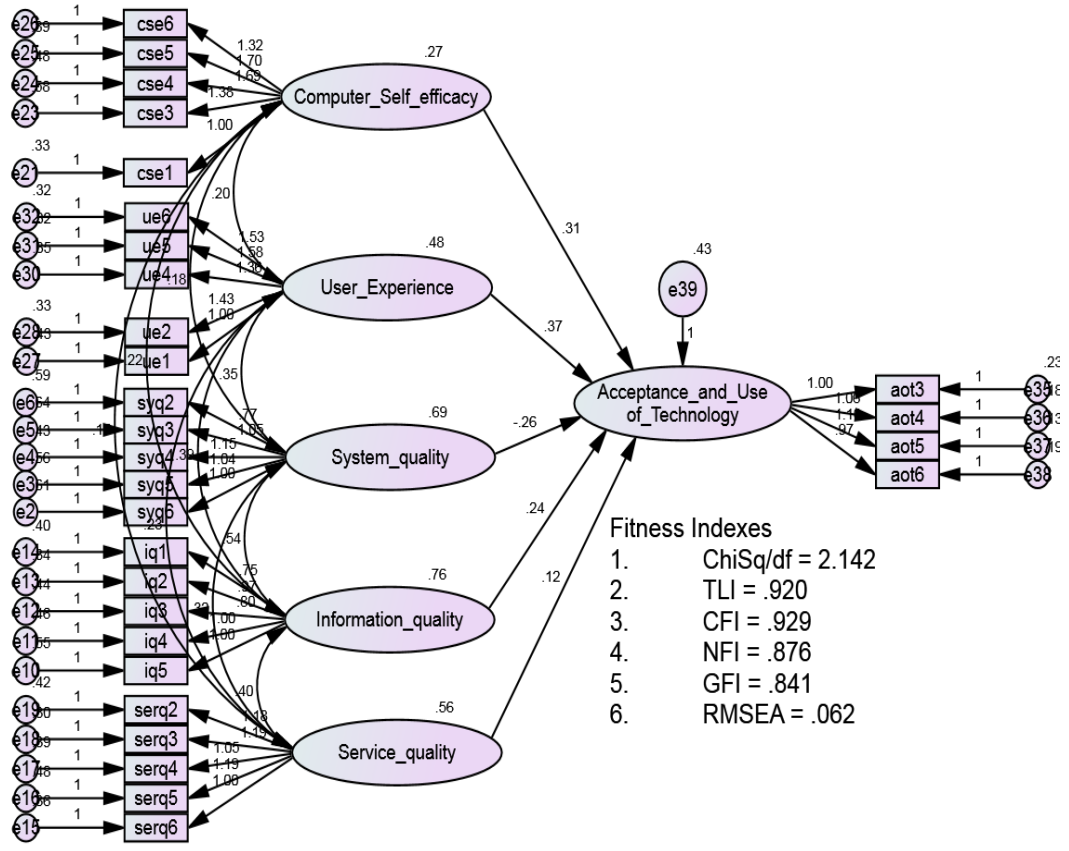

Figure 10: Revised Structural Model

6. A TEST OF RESEARCH HYPOTHESES

6.1 HYPOTHESIS 1

#H1 – There is a positive relationship between acceptance and use of technology and computer self-efficacy.

- The research findings in this study suggest that, in support of the H1 hypothesis, machine self-efficacy (CR= 2.730, p= 0.006 < 0.05) has a strong and positive relationship with the acceptance and use of the technology.

6.2 HYPOTHESIS 2

#H2 – There is a positive relationship between user experience and acceptance and use of the technology.

The research findings in this study suggest that, in support of the H2 hypothesis, user experience (CR= 3.824, p=0.000 < 0.05) is found to have a strong and positive relationship with the adoption and use of the technology.

6.3 HYPOTHESIS 3

#H3 – There is a positive relationship between system quality and acceptance and use of the technology.

Research findings in this study show that system quality (CR= 2.776, p= 0.005 < 0.05) in support of #H3 hypothesis is found to have a significant and positive relationship with technology acceptance and use.

6.4 HYPOTHESIS 4

#H4 – There is a positive relationship between information quality and acceptance and use of the technology.

Research findings in this study indicate that, in support of the H4 hypothesis, information quality (CR= 2.352, p= 0.019 < 0.05) has a significant and positive relationship with the acceptance and use of the technology.

6.5 HYPOTHESIS 5

#H5 – There is a positive relationship between service quality and acceptance and use of the technology.

Research findings in this study suggest that the quality of service (CR= 1.558, p= 0.119 > 0.05) is not important for the adoption and use of the technology. No support is provided for hypothesis H5. Table 4 provides an overview of the hypotheses for the study.

Table 4: Summary of Hypotheses Testing.

Path	Critical Ratios	p-value	Result
CSE-->AOT	2.730	.006**	Supported
UE-->AOT	3.824	***	Supported
SyQ-->AOT	2.776	.005**	Supported
IQ-->UAOT	2.352	.019*	Supported
SerQ-->UAOT	1.558	.119	Not Supported

Note: * p < 0.05; ** p < 0.01; *** P< 0.001; CSE = Computer Self-Efficacy; UE = User Experience; SyQ = System Quality;IQ = Information Quality ; SerQ = Service Quality ; UAOT=Use or Acceptance of The Technology.

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7. RESEARCH LIMITATION

This study presents several limitations. The data collected from a subset of telecommunications workers in Yemen's capital, Sana'a, at first sight. Testing the model using a particular dataset is important to assess the generalization of the Research Model before generalizing the results.

This review has also been the subject of four common theories in the field of technology acceptance and use. Many ideas are identifying the key factors in acceptability and use of technology that can be addressed in future research.

8. CONCLUSION

This Yemen studies continue to address issues related to technology adoption success. This study allows Yemeni researchers to recognize the factors that influence the successful utilization of technology by the company in order to use technology effectively. The aim of this study was to investigate the significant factors that affect the technology's acceptance and use. The proposed model was tested on AMOS. The modified model fitting indicators are suited to the model (Chisq / df=2.142, TLI=0.920, CFI=0.929, NFI=0.876, GFI=0.841, RMSEA=0.062). This study found that computer independence, user experience, system performance and quality of information were affected by the adoption and use of the technologies. The overall fitness-of-model metrics show statistically the research is applied to organizations in Yemen. The companies can use the model proposed for their company to successfully adopt the technology to improve their performance.

9. DATA AVAILABILITY

Relevant information is available by contacting the corresponding author.

10. ACKNOWLEDGMENT

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