

CRITICAL FACTORS INFLUENCING EFFECTIVE OF ICT RESOURCES AND CAPABILITIES

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ABSTRACT

Substantial research on the importance of strategic Information and Communication Technology (ICT) resources and capabilities for higher institution has mainly focused on developed countries. The results of these studies may not hold for developing nations and in particular, the Kingdom of Saudi Arabia (KSA). To address this gap, this research therefore, builds on theory of DeLone and McLean to examine the strategic links between the success of effective utilization of ICT Resources and ICT Capabilities of KSA higher institutions. Quantitative research methodology has been used. The study was conducted in a KSA context from a sample of 68 higher institutions. Nine main hypotheses were formulated and tested. Analysis of the data provided support for all the nine main hypotheses, except for relationship between “User Involvement and Effective utilization of ICT resources and capabilities

Keywords: *Hardware; Software; Data; Network; ICT human capabilities.*

1. INTRODUCTION

Information and communication tools aided efficient learning in most higher institutions around world. Effective utilization of these tools is crucial [1]. The stakeholder involves (students, instructors and administrative staff) in managing Information and Communication Technology (ICT) tools can get down to understanding policies and all means necessary in making best use of ICT resources [2]. In this way, ICT resources management ought to be made more open to instructors and students. This requires the availability of human resources capable of overseeing the implementation of the setup tools and rules [3]. As a result both ICT resources and capabilities are key issues when it comes to effective utilization of ICT tools. It might be in teaching where instructors are able and capable to utilize ICT for their own proficient advancement. The utilization of ICT for training is currently observed worldwide as both a need and an open door. ICT resources involves computer hardware; computer software; data, and network. These are further elaborated to includes a computer services; communications services and wired and wireless communications equipment. ICT capabilities refer to human capabilities. Within the context of this research on utilization of ICT in the educational process, it refers to ICT human capabilities.

Considering the use of ICT tools in education in Saudi Arabia, there are a lot of issues in terms of

utilization. The stakeholders in higher institution, with the quality and accreditation units, encouraged the use of value instructive approaches with ICT tools for higher education. These instructive quality framework prompts to enhance standard and great administration [2]. Many developed nations had gained an immense ground in the levels of the utilization of data and correspondence innovation in training. Unfortunately, utilization of ICT in Saudi Arabia higher institution, demonstrate that there is still a considerable measure to be improved. The most crucial issues outline, lies with the data utilization. This is because it is a vital and powerful element of spreading information.

Previous research studies have identified that utilization of ICT tools in education dwells on: Use of it; ICT Policy in Education; Attitude of students and Instructors with ICT in Education; The Impact of ICT on E-Learning; ICT resources and capabilities in Education [4-7], even though many applications of ICT has been seen in different area [7]. There is little research attention given to the interaction of ICT resources and capabilities on a theoretical success approach. Therefore, this study builds on information systems success theory and proposed an empirical evaluation of the degree of utilization of ICT resources and capabilities in Saudi Arabia’s higher institution. This is important because there is a need of research that will aid in promoting work environment in the workplace. This work is required to highlight and define the

effective utilization of ICT resources and capabilities of Saudi higher institutions. It has been observed that past literatures do not give much emphasis on effective utilization, rather on increasing awareness among higher institutions use of ICT in the academic process. This will increase the awareness of stakeholders in education to understand the importance of the ICT in the educational process. Hence, improve professional development.

This paper is organized as follows: Immediately after the current section which presents the overview of the study, the next is Section 2, it discusses the theoretical framework of the study. Section 3 present the related work. Section 4 presents and discuss the conceptualization, while section 5 discusses the research methodology. Section 6 present the analysis and results. Section 7 is the discussion and Section 8 concludes this paper.

2. THEORETICAL FRAMEWORK

Numerous theories have been proposed to clarify the relationship among determinants that would influence technology in the organization especially in the education field. This section establishes the theoretical background in which the forthcoming discussion and analysis is based. DeLone and McLean's Information Systems Success model has been adopted as the theory for this research [8]. This comes from the fact the theory gains huge support for information system success. Since its introduction in 1992, the DeLone and McLean IS success model has created a broad response in the literature [9]. It is based on six dimensions: system quality, information quality, service quality, use, user satisfaction, individual impact, and organizational impact. According to DeLone and McLean model, both system quality and information quality influence use and user's satisfaction, which in turn shape the impacts of the system on individual users and the organization. The reason for the existence of different measures for IS success is understandable when one considers "information" as the output of a system that can be measured at different levels – the personnel level, the technical level, the semantic level, and the effectiveness level – and different stakeholders are involved at each level. Motivated by DeLone and McLean's call for further development and validation of their model, many researchers have attempted to extend or re-specify the original model [8]. A number of researchers claim that the Model is incomplete.

Ten years after the publication of their first model, and based on the evaluation of the many

contributions to it, DeLone and McLean [10] proposed an updated IS success model. The primary differences between the original and the updated model are: (1) the addition of service quality (2) the addition of intention to use and (3) the collapsing of individual impact and organizational impact into a more parsimonious net benefits construct. The updated model consists of six interrelated dimensions of IS success. The dimension "Intention to use/use and user satisfaction" was omitted from the model because it is not seen as a fitting dimension of success unless system use is voluntary. Zaied [11] proposes an upgraded DeLone and McLean integrated model aimed at supporting decision makers in organizations. Consequently, ten dimensions were proposed for measuring information system success: Behavior intention; Information quality; Management support; Perceived ease of use; Perceived usefulness; Service quality; System quality; Training; User satisfaction; and User involvement. This paper's research variable are directly adopted and modified based on this IS success theory. The reason is that IS success means that the entire output required has been obtained by effectively utilizing the resources and capabilities of IS.

3. RELATED WORK

The use of ICT tool is an enabler to academic staff teaching. There are many empirical work on higher education's ICT environment. The most prominent once found are within the following: Use of ICT in education, ICT Policy in Education, Attitude of students and Instructors with ICT in Education, The Impact of ICT on E-Learning and ICT resources and capabilities in Education.

3.1 Previous Empirical work on Use of ICT in Education

There are many literatures on the usage of ICT in general. Some of the prominent once found by this study are discussed in this section. The infusion of IT tools in education give decision makers in educational districts in Saudi Arabia an insight into the extent to which teachers think [12]. Despite the increase in the levels of ICT use between the academic staff in Saudi, [13], yet the lack of ICT infrastructure, causes delay in utilizing many services and systems that might be accessible in the Saudi Arabian universities, particularly in new and merged universities [14]. The universities have IT facilities; however, they need to be better used with a specific end goal to give impartial and quality

instruction. Numerous Saudi universities spent millions of riyals a year on establishing and developing IT infrastructure. It is noted that universities have a satisfactory technological structure. However, they do not significantly improve the use of IT services. This is due to some of the reasons, most notably not being used effectively [15]. Ageel and Woollard [16] studied the extend of the usage of ICT in the university of Jazan in Saudi Arabia by using a virtual learning environment. Albugarni and Ahmed [6] investigated the achievement factors for the effective incorporation of ICT in Saudi schools by looking at important ICT techniques, models and systems utilized as a part of instruction. Assiri et al. [17] presents the finding of studies performed in three Saudi universities on academic staff use of ICT. Al-Maini [18] noted that there has been endeavours by the Ministry of higher institution Saudi Arabia to enhance teaching methodologies approaches concentrating on the best way to adequately utilize computers to support learning. Robertson and Al-Zahrani [19] showed that there is high performance of teaching and learning with the use of ICT tools between the lecturers on the Faculty of Education, King Abdulaziz University Saudi Arabia. Almalki and Williams [20] developed a set of strategies to improve the usage of ICT in the Kingdom of Saudi Arab. Where ICT has Classified to ICT utilize in classroom and supportive ICT utilize. Okolocha and Nwafani [21] proposed to design a new technique used in the classroom. Thereby relating the new curriculum is based on the use of information and communication technology in teaching. Which helps learning based on new challenges.

Consistent with the above-mentioned studies and in order to further on research regarding to ICT in education in Kingdom of Saudi Arabia. This research evaluates the state of Saudi Arabia's higher institutions' ICT resource and capabilities and their effective utilization.

3.2 ICT Policy in Education

Many studies on ICT policy in Education have been reviewed. Most of them discussed focused to Saudi Arabia. ICT policy in education and the relationship among its used has should be investigated. The finding of study should point to three main factors ruining educators' ICT use to include; utilization of time limitations, absence of preparation, and monetary issues. Ming et al. [5] proposed a policy for university instructors to undergo continuous professional development in ICT to empower them to effectively coordinate ICT into their method of educating. Alturise et al. [22]

showed the need for a policy to alleviate the discrepancies in infrastructure through the perspective of faculty members. Its recommended that strengthening the structure of Saudi Arabia universities ICTs has to be with policies. According to Mazi and Abouammoh [23], the approach of the Saudi Ministry of Higher Education is to organise support for more established colleges in the quest for quality instruction. New colleges are urged to look for assistance from the more developed colleges.

Alwani and Soomro [24] surveyed the barriers to in educational settings. They found that one of the most important obstacles facing education systems, which is the specific ICT budget in schools, and the lack of infrastructure and school resources. Lee and McLoughlin [25] proposed the user generate content (UGC) to provide another thought in teaching Curriculum to change the production strategy, and gives chances to understudies to utilize the Internet to get, share and collaboratively develop course content in the learning procedure. Educational quality system leads to an improved standard and good management of facilities [26]. In an analytical study of the effects of the utilization of information communication technology in teaching. The utilization of academic members has been classified into three categories at Brown University. Since the college had no expectations of the utility of technology. Users with long experience in using technology are likely to enhance classroom processing for students' interaction with the curriculum. This study found that most of the study in ICT policies dwells of general ICT platforms. Hence, the impact is utilized by the current study.

3.3 Attitude of People with ICT in Education

Many empirical studies on the attitude of students and Instructors with ICT for education have been reviewed. Some of the prominent once found are discussed in this section. Hussein [27] reveals the attitude of academic's staffs towards the learning management system (JUSUR) in Saudi universities. The study affirmed that, there is an adequate mindfulness and positive response of academics in these institutions towards the program. In spite of that, there was an undue reduction in their level of use. Alharbi and Drew [28] proposed a theoretical structure comprising of the core constructs in Technology Acceptance Model (TAM). The findings recommended the inclusion of a TAM model for measuring the behavioural intent of utilize a learning management system.

Saudi Arabia, in the same way as other different nations, is rapidly adopting the utilization

of ICT in schools as a method for enhancing its instruction system. Tondeur et al. [29] showed that teacher's use and reliance on technology within the classroom depends on the quantity and quality of the training he has received according to the preparing program. Although, developing countries, are still in the initial stages of the introduction of ICT in educations [30]. Borg and Alshumaimeri [31] revealed that college instructors of the Saudi Arabia's higher institution ICT engagement is significant to the success of Saudi Arabia higher institution. Croteau et al [32] described that instructors become more familiar with the use of ICT once they become average in computer proficiency. That is ICT makes a significant contribution to the learning process. Alsuraihi et al. [33] described that the academics have a strong feeling about the importance of ICT for sharing knowledge among them. Although there are many approaches toward research on students and instructor's attitude with ICT. Those research reviewed by the current study have shown the important of including both students and instructors in the implementation of ICT in education

3.4 The Impact of ICT on E-Learning

E-Learning has been the major activities that utilized ICT for education. Many researches has shown it is important towards the twenty-first century learning style. Unfortunately, most of this research do not evaluated the impact on ICT resources and capabilities towards E-Learning. Crucial work on the impact of E-Learning in education have been reviewed, among them are; Al-Balawi and Badawi [34] conducted a study focusing on the academics of Tabuk University in Saudi Arabia. The reaffirmed the awareness of academics about the existence and effectiveness of e-learning, 63% of academics were not performing well on the use of e-learning tools. The development of the ICT infrastructure within the university enable students to interact better [35].

Saudi education in the near future will be a blend of the traditional and e-learning systems [36]. Saudi Arabia's young students needs to acquire new skills and capabilities to meet the current diversification objectives and to be competitive with the best students from anywhere in the world. Within this context, the assessment of learning outcomes is particularly important to Saudi Arabia's higher educational institutes. Thus, it has recognised the need to move from a natural resource-based economy to a knowledge-based economy, which puts new priority on the role of universities [1].

3.5 ICT resources and capabilities in Education

Literatures on ICT resources and capabilities were reviewed. Although there are not many of them that directly, combine both ICT resources and capabilities. Teece [37] proposed dynamic capabilities assets as the source of competitive advantage. Tallon and Kraemer [38] lamented the lack of robust research on IT capabilities. The information is shared across web portals to several millions of concurrent access with ease and without reference to distance [21]. Kumar and Maskra [39] showed the contents storage where vast amount of information is stored for online and offline access rely on these resources counts as some of the use of ICT resources within academic environments.

Onasanya [40] argued that there is a lack or no utilization of information communication technology resources in education. Similarly, Umar and Hassan's [41] findings on lack of utilisation of ICT in education reveals that ICT training had significant influence on the use of ICT. That is, lack of training of ICT leads to lack of its effective utilization

3.6 Gaps from the literatures

It is worthwhile to mention that the previously aforesaid works focused most on "use of ICT in education", "ICT policy in Education", "Attitude of Students and Instructors with ICT in Education", and "the impact of ICT on E-Learning". Nevertheless, how to employ and conceptualized all the components of ICT for practical applications has not been greatly studied in those literatures that related to ICT resources and Capabilities. Hence, following the previous successful studies of the investigation of the factors of implementation of ICT in higher institution, this work proposes a new model for effective utilization of ICT resource and capabilities.

4. CONCEPTUALIZATION

This section presents the conceptualization of the study. DeLone and McLean Information Systems Success theory was used in conceptualizing the effective utilization of ICT resources and capabilities. Effective Utilization is one of the important keyword of this study. Its conceptualized from this research point of view as a "success". That is when IS is effectively utilized, it then meets the values required, hence a success is achieved. Thus, for ICT Resources and capabilities of higher institution to be successful they have to be effectively utilized.

4.1 Dependent Variable

Effective utilization of ICT resources and ICT capabilities are conceptualized to be the dependent variable. ICT as a global reference for educations is an umbrella that encompasses many aspects of computing, communications and technologies. Many people interchangeably understand ICT as IT, Information Technology, which is characterized by the Information Technology Association of America (ITAA), as the review, plan, improvement, execution, support or management based of information systems, especially software applications and computer equipment [21]. It is in this manner manage the utilization of electronic PCs and PC programming to change over, store, ensure, handle and retrieve information, securely.

In terms of infrastructural layout, findings indicate that most higher institution within Saudi Arabia do have the ICT resources and scholars at least have knowledge of their existence [33]. This is also confirmed by most higher institution's bid to incorporate ICT policies that implements the availability, usage and maintenance of such resources [32]. These resources related to contents management provides guarded access to information [21]. Also, intra-and-inter contents transfer through the use of Campus networks where both the trained and trainers have smooth transfer of information by using facilities like e-mail, file transfer etc. to exchange information.

Availability of remote information share where information is shared across web portals since host nodes avail information to several millions of concurrent access with ease and without reference to distance [21]. Contents storage where vast amount of information is stored for online and offline access, and even administrative facets of these institutions where top level management rely on these resources counts as some of the use of ICT resources within academic environments, universities [39]. Recently a feasible technique for utilization of ICT resources in teaching, intended to facilitate instructions in classrooms has been proposed by Okolocha and Nwafani [21]. There is always a claim for doing things in the right way by administrative body of higher education in utilizing ICT resources and capabilities. The study of Onasanya [40] raise a doubt, in that he argues that there is a little or no utilization of ICT resources in teaching in many higher institutions.

Lack of utilization of ICT in education has been reveals that it's most due to lack of ICT training which has a significant influence on the use of ICT [41]. Consistent to these studies, this will attempt to

further investigate the influence of effective utilization of previously examined factors.

4.2.1 Independent Variables

An independent variable is a variable that is presumed to cause change in another variable [42]. The entire independent variables for this study are adopted from Delone and McLean model's independent variables: Information Quality, System Quality and Service Quality. Information quality is one of the independent variables in the Delone and McLean IS success model. It alludes to the nature of yields that produces the information system, which can be as inquires or online messages [8].

Accuracy is concurrence with a property about a genuine entity; a value stored another database, or the aftereffect of a math calculation. Completeness is to be defined concerning some specific application, and it implies whether most of the information significant to that application are available. While consistency alludes to a nonappearance of conflict among two datasets, currency alludes to cutting-edge data. Researchers have utilized an assortment of traits for nature of information. Nelson et al. [43] conceptualized exactness, culmination, cash, and configuration for data quality; as the sub variables of Information quality. Doll et al. [44] uses five sub variables under information quality to include: exactness, arrange, convenience, and auspiciousness. Consistent to the above mentions studies, this research adopts information quality and build on it for conceptualizing a new model.

System quality is another independent variable in the Delone and McLean IS success. It was operationally defined as the nature of the data framework handling itself, which incorporates software and equipment, and it is a measure of the extent to which the system is technically sound. This study adopts system quality of DeLone and McLean [8] and further conceptualized it to "ICT resources" for the fact that, the "system" in DeLone and McLean [8] is referring to ICT system, which involves Software, Hardware, Data and Network. Thus, a new conceptual model was formulated from this.

Service quality comes from an improved Delone and McLean IS success model in 2003. The construct service quality has been defined as the level of inconsistency among clients' regularizing desires for favor and their visions of service performance. This study adopts service quality of DeLone and McLean [10] and conceptualized it to "ICT capabilities" the justification of this lies with the fact that, the "service" in DeLone and McLean

[10] is referring to ICT service, which includes human capabilities. Hence, the new conceptual model was formulated using it.

ICT Resources in Higher Institutions is another independent variable. Information technology is an imperative and impact tool in the success of the institutions of education, and it is increasing the absorptive capability of learners and the spread of knowledge [30]. Resources that falls within this wide scope of ICT resources houses hardware components that forms the tangible agents that provides physical layers for users, software systems that presents logical layers to the hardware in use, communication mediums that transfers resources across clustered associations, Networks and development tools that avails an option for re-introducing new options [45]. Human expertise that provides intellect layer to supplement the right usage of these resources can be qualified under this classification and considered as an important ICT resource component. ICT resource is conceptualized as a System.

Quality from DeLong and McLean model, which three sub constructs “System Costs”, “System Functionality” and “Systems Interoperability” are adopted from Bernroider [46]. This research measure of system quality is focusing on how performance characteristics of the ICT resource could be exerted when it’s effectively utilized. Some researchers had looked at asset use and speculation usage, unwavering quality, reaction time, conglomeration of subtle elements, human elements, and framework trust and exactness as systems quality measures [47]. To further evaluates this work conceptualization, system quality elements are measured from DeLone and McLean using the following variables: System Costs, System Functionality and Systems Interoperability, similar to study performed in Bernroider [46], and further consider systems as ICT resources.

ICT Capabilities in Higher Institutions is another conceptualized independent variable. This research uses the term “ICT capabilities” to refer to human capabilities on utilization of ICT in the educational process. Thus, the study tries to focus on the factors of effective utilization of ICT resources and capabilities in higher education [48]. The nature and extent of information communication technology capability is not settled, but rather is receptive to continuous technological developments. This is clear in the emergence of cutting edge web technology in the course of recent years and the subsequent changes in the ways that students construct knowledge and cooperate with others [49]. Students develop capability in using

information communication technology for tasks associated with information access and management, information creation and presentation, problem-solving, decision-making, communication, creative expression and empirical reasoning.

This incorporates leading examination, making interactive media data items, investigating data, planning solutions for issues, controlling procedures and equipment’s, and supporting calculation while working autonomously and in a joint effort with others [36]. Students develop knowledge, skill around ICT and its utilization, and the capacity to exchange these crosswise over conditions and applications. They figure out how to utilize ICT with certainty, care and thought, understanding its conceivable outcomes, constraints and effect on people, gatherings and groups [45].

ICT Capabilities is conceptualized as Service quality from DeLong and McLean model. Availability of IT/IS Service and Improved Level of service are the subcontract used. Consistent with the previous work of Bernroider [46] in adopting service quality to form sub constructs namely; Availability of IT/IS Service and Improved Level of service. this research aims to evaluates them with respect to ICT capabilities effects on management support, training and User involvement.

A mediating variable tend to causes mediation in the relationship between dependent and the independent. The mediating variables for this study are Management support, Training and User involvement, they are adopted from Zaid, [11] integrated DeLone and McLean model.

Management Support is conceptualized as a mediating variable. Management support is adopted from Zaid, [11] integrated DeLone and McLean model as a mediating factor of system and service quality of DeLone and McLean model. It combines to management endorsement and constant support amid the IS venture usage as well as all through the operational period of the system. This research conceptualized it to mediated both ICT resource and capabilities and effective utilization relationship. Previous studies use it as a measure of: administration's support; giving every single essential asset; examining issues related with the system; valuing the ideal utilization of the system; and having adequate information of the system [45] Consistent with these previous works this research aims to evaluates ICT resources and capabilities.

Training is also adopted from Zaid [11] integrated DeLone and McLean model as a mediating factor of system and service quality of DeLone and McLean model. This variable is

determining the level of preparing an association's representatives experience as for respect information systems. Thus it should have a positive relationship with implementation success. This research conceptualized it to mediated both ICT resource and capabilities with effective utilization relationship. Previous research uses it as: preparing programs on the application; the freedom of preparing projects; users' turn; accessibility of preparing material; and support [49]. In order to further from these previous works, this study is adopting training to evaluate the effective utilization of ICT resources and capabilities. As a result, it is conceptualized to mediate the relationship between ICT resources and capabilities with Effective Utilization.

User involvement is also adopted from Zaid [11] integrated DeLone and McLean model as a mediating factor of system and service quality of DeLone and McLean model. This variable is determining user involvement as an issue of significance and individual pertinence that users connect to a given platform [11]. This research conceptualized it to mediate both ICT resource and capabilities with effective utilization relationship. Previous research studies select user involvement measures as: user's association in info configuration; user's contribution in yield outline; perceptions of administration assessments; saw esteem; and customer attitude [48]. Consistent with these previous works, this study is adopting user involvement to evaluate effective utilization of ICT resources and capabilities.

Considering the vast number of claims made with regards to ICT resources and capabilities. Owing to the conceptualizing effective utilization with management support, training and user involvement, this research formulated the following hypothesis:

- H1: ICT resources is significantly related to Management Support.
- H1a: ICT resource Accessibility is significantly related with Management Support.
- H1b: ICT resource Stability is significantly related with Management Support.
- H1c: ICT resource Functionality is significantly related with Management Support.
- H1d: ICT resource Interoperability is significantly related with Management Support.
- H2: ICT resources is significantly related with Training.

- H2a: There is a positive relationship between ICT resource Accessibility and Training.
- H2b: There is a positive relationship between ICT resource Stability and Training.
- H2c: There is a positive relationship between ICT resource Functionality and Training.
- H2d: There is a positive relationship between ICT resource Interoperability and Training.
- H3: ICT resources is significantly related with User Involvement.
- H3a: There is a positive relationship between ICT resource Accessibility and User Involvement.
- H3b: There is a positive relationship between ICT resource Stability and User Involvement.
- H3c: There is a positive relationship between ICT resource Functionality and User Involvement.
- H3d: There is a positive relationship between ICT resource Interoperability and User Involvement.
- H4: ICT Capabilities has a significant effect on Management Support.
- H4a: Availability of IT/IS service has a significant effect on Management Support.
- H4b: Improved Level of Service has a significant effect on Management Support.
- H5: ICT Capabilities has a significant effect on Training.
- H5a: Availability of IT/IS service has a significant effect on Training.
- H5b: Improved Level of Service has a significant effect on Training.
- H6: ICT Capabilities has a significant effect on User Involvements.
- H6a: Availability of IT/IS service has a significant effect on User Involvements.
- H6b: Improved Level of Service has a significant effect on User Involvements.
- H7: Management Support mediate the relationship of Effective utilization and ICT resources and capabilities.
- H8: Training mediate the relationship between Effective utilization and ICT resources and capabilities.
- H9: User Involvement is positively associated with Effective utilization of ICT resources and capabilities.

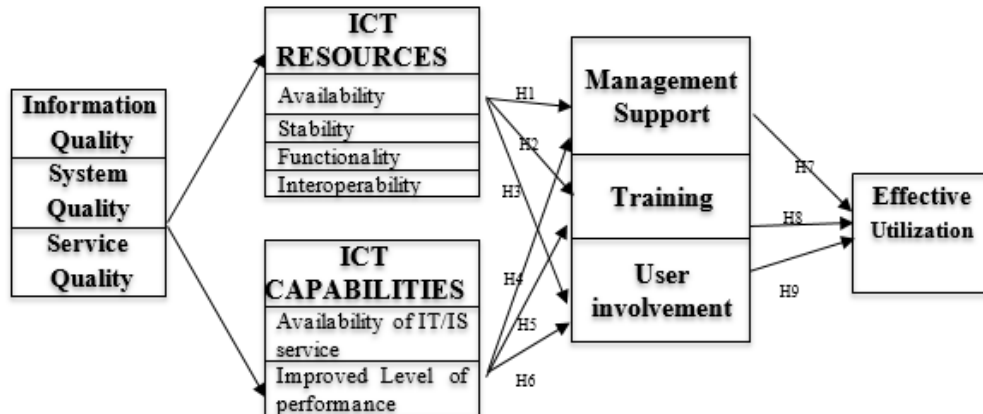


Figure 1. Proposed structure model

5. RESEARCH METHODOLOGY

Quantitative research methodology has been adopted for this research. The choice of this method depends on the objectives of the research, where people are the unit of measurement.

5.1 Population of the Study and Sampling Technique

The population of interest in this study is defined as Saudi Higher Institution. The sample for the study is drawn from a theoretically available population of 68 institutions within 65404 academic staff that listed in the official website of the Ministry of Education of Saudi Arabia as of downloaded in January 2017. The role of the Ministry of Education to provides a brief description of the establishment of each university, its faculties, agencies and support committees, as well as its scientific research centres and chairs. As well as scientific societies, scientific journals, university hospitals, and the means of communication at each university.

This study adopts a simple random sampling, in order for every respondent to have an equal opportunity to participate in the survey. This method avoids biasness [50].

5.2 Instrumentation for Data Collection

Questionnaire are used as the instruments for data collection. The design of the questionnaire comes through three phases involving planning, pilot testing and building the final version. The questionnaire is a five-point Likert scale type. It is divided into two section, demographic and research variable. Section A includes the demographic elements, and Section B is the part for research variable. Invitation are send to the respondents for participating in the survey, through online

questionnaire and face-to-face administering. The researcher distributed (500) questionnaire on face-to-face approach within the population of the study, and it has been published online using google form. The data collection of this study was carry out from November 7, 2016 to February 15, 2017 among the higher institutions community in Saudi Arabia.

6. ANALYSIS AND PRESENTATION RESULT

This research has been able to conceptualize a model suitable for investigation ICT in Saudi Higher Institution. The unit of analysis is individual tasks representing the use of ICT. That is why this current study seek to examine the factors influencing effective utilization of ICT Resources and Capabilities. As defined in section 1, both ICT resources and capabilities include computer services and human intervention, but this study dwells within the context of utilization of ICT resource and capabilities in the educational process only. It does not concern with the evaluation of Information System, as a result data has been collected and the analysis of the data is presented in this section.

The response rate by the respondents captured through online questionnaire and face-to-face administering is presented here. Out of the distributed (500) questionnaire on face-to-face approach within the population of the study, two hundred (200) face-to-face responses are received. Sixty (60) have been excluded because of empty data; and (25) twenty-five are outlier; therefore, only eighty-eight (88) face-to-face responses was clear. In addition to (127) online responses so the response rate was 215 responses could be analyzed.

6.1 Data screening

Data screening is a process of ensuring the data are clean and ready for conducting analysis. In this research, data screening procedures conducted involves the analysis of missing data, outliers and assessment of normality. Incorrect data entry can lead to outliers, there are some widely acceptable rule of thumb which suggest how outliers can be treated. Hair et al. [50] suggest that standard score for small size (fewer than 80) is ± 2.5 while standard score for large size (more than 80) is ± 2.5 standard deviation away from the mean is regarded as an outlier.

In the present study, in order to detect univariate outliers, items were grouped together to represent single variable. Using SPSS functions of descriptive statistics, the data values of each observation were transformed to standardized score also known as z-scores [50-51]. The results reveal that the data set contained 25 cases of outliers because z-scores for these cases were more than ± 3 . Accordingly, these cases were excluded from the data set leaving a final (366) to be analyzed. Table 1 shows cases of outliers for variables.

Table 1. Treatment of Outliers

Variable	Code	Case of outlier	z-score $> \pm 2.5$
Accessibility	AC	137,138,165,169,195	More than ± 2.5
Stability	ST	209	More than ± 2.5
Functionality	FU	212	More than ± 2.5
Interoperability	IN	14	More than ± 2.5
Availability	AV	173	More than ± 2.5
Performance	PE	No case	Less than ± 2.5
Management Support	MA	No case	More than ± 2.5
User involvement	US	76	More than ± 2.5
Training	TR	92,205,206	Less than ± 2.5
Effective Utilization	EF	214	Less than ± 2.5

Normality is considered an important requirement in multivariate analysis. Several previous studies illustrate that the data are normally distributed if the Z-value CR skewness is less than ± 3 and the Z-value kurtosis is less than ± 3 . In the present study, the researcher followed the guidelines suggested by Hair et al. [50] to consider the cut-off critical value ± 2.58 . From Table 2, it is obvious that the value of skewness and kurtosis for each construct are within the given range (± 2.58). The descriptive analysis indicates good normal distribution with mean

skewness and kurtosis values of 1.49 and 1.937 respectively. Table 2 indicates skewness and kurtosis for all constructs.

Table 2. Normality Test result

Constructs	Skewness	Kurtosis
AC	-1.522	2.458
ST	-.308	-.150
FU	-.600	1.280
IN	-.521	.722
AV	-.483	1.216
PE	-.788	.946
MA	-.543	.528
US	-.444	.379
TR	.390	5.884
EF	-1.069	2.351

6.2 Confirmatory Factor Analysis (CFA)

This section introduces the results of the Confirmatory Factor Analysis (CFA) and PLS for the proposed Model. The analysis was utilized to recognize the goodness-of-fit of the proposed model additionally to validate the significant latent variables and ensuing estimation explanation for the model. Model fitness alludes to how well the proposed model shows or represents the connections among factors in the dataset [52]. By representing all the real connections natural in the dataset in regard to every one of the factors in the model, then a good fit will be accomplished; generally, there is a critical contrast between the relationships proposed, and the relationships watched, and along these lines the outcome will be a poor fit [52]. Goodness-of-fit is contrariwise related to sample size and variables in the model. Therefore, acceptable thresholds are Chi-square/df (CMIN/DF) < 3 is good, < 5 sometimes permissible; p-value for the model > 0.05 good; CFI > 0.95 great, > 0.90 traditional, > 0.80 sometimes permissible; and RMSEA < 0.05 good; 0.05-0.10 moderate, > 0.10 bad [52]. However, the chi-square goodness-of-fit measures and its p-values were the least useful, since both measures are very sensitive to the sample-size rather than measuring the true fit. The results of each CFA examination for the variables of this current study is good. Thus, the present model (see Figure 2) is satisfactory and acceptable in view of the multifaceted nature and the quantity of respondents (215) utilized in the study.

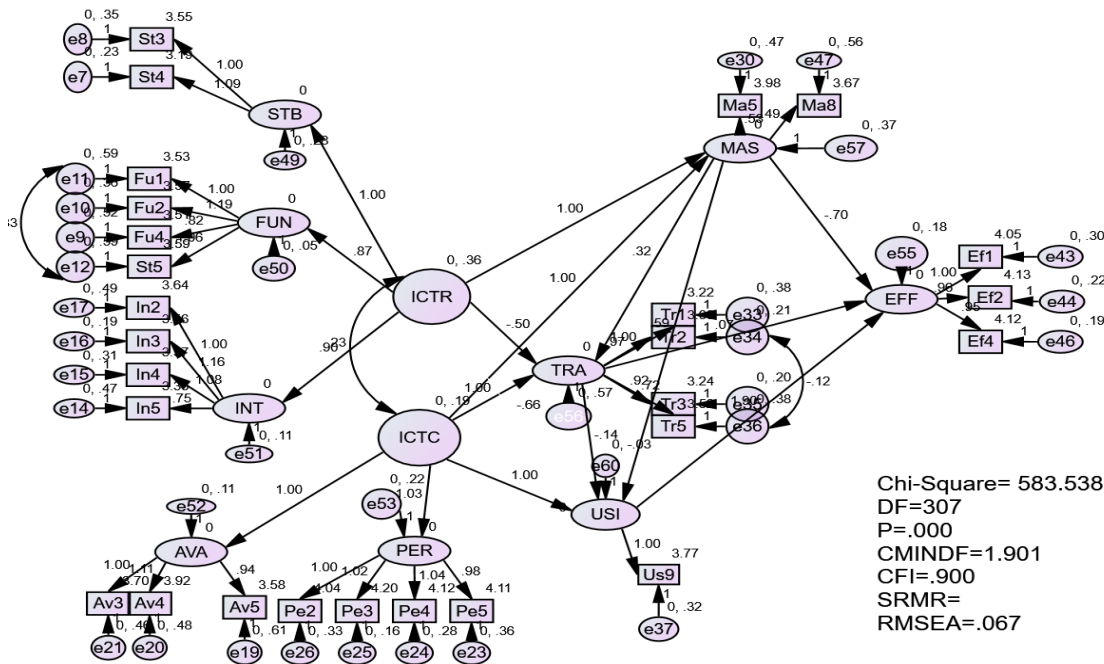


Figure 2. CFA for Effective Utilization Conceptual Model

7. DISCUSSION

This study evaluates the effective utilization of ICT resources and capabilities by higher institutions of learning in Saudi Arabia. It shows the use of ICT resources by the academic staff of those institutions who participated in this research. The research contributes to the reviewed verification of the “effective ICT utilization”. The ICT resources and capabilities output show that the management, support and training are positively associated with ICT resources (effective utilization). In addition, the user involvement is positively associated with the ICT capabilities factors (effective utilization). This has assists in understanding how the ICT resources and capabilities are effectively utilized by the academic staff at higher institutions in Saudi Arabia. The IS model with ICT resources and ICT capabilities represents the realistic use ICT.

The results of the ICT resource factors show a satisfactory discriminant validity of all the factors (stability, accessibility, interoperability, and functionality) and are statistical significant of management support and training. Accessibility, stability, functionality and improbability are inter-

construct variables representing the impact of the effective utilisation of ICT resources in higher institutions in Saudi Arabia. The following results are also obtained: Management support, training and user involvement are the main intermediary or mediating constructs for the proposed model and

produce high loadings ranging in measuring the impact of the effective utilisation of ICT resources and ICT capabilities in higher institutions in Saudi Arabia. Management support and training are discriminant and directly influence the ICT resources. All factors directly influence the effective utilization. These constructs are represented in the proposed conceptual model.

The two factors of ICT capabilities of the proposed model, namely availability of IS/IT services and improved level of performance, are inter-construct variables. These constructs represent the impact of the effective utilisation of ICT capabilities in higher institutions in Saudi Arabia. The following results are obtained: Management support, training and user involvement are discriminant and directly influence the ICT capabilities. The antecedent process in the effective utilisation of ICT capabilities are represented in the proposed conceptual model.

Based on the results discussed above, there is a need to understand the effective utilisation of ICT resources and capabilities by the academic staff at Saudi Arabian higher institutions. Most of these institutions contribute to the development of society as part of their social objective policies in their specific subject areas. The benefits and disadvantages of ICT resources and capabilities should be clearly defined and explained to create a sense of expectation on part of the academic staff. This will ease the implementation processes. Also observed is the lack of ICT policy and strategy,

lack of proper infrastructure and access to ICT resources, in addition to the lack of management roles [6]. Therefore, the new conceptual model establishes a significant relationship between management support, training and ICT resources. The agencies responsible for the quality and accreditation of academic units should help facilitate the application of quality educational policies in Saudi Arabia. The educational quality systems lead to an improved standard and good management of facilities [26].

8. CONCLUSION

Managing ICT tools, is beyond management process, it involves educational process. In this study, the main aspect of user involvement consists of the involvement of academic staff in the design and determination of effective use. Unfortunately, user involvement has been found not to be associated with effective utilization of ICT resources and Capabilities. This research undertakes quantitative survey study to uncover that. Saudi Arabia's higher institutions is the populations of the study; samples of respondents are drawn from them. Hypotheses are formulated using grounded theory of Delone and McLean. The hypotheses are statistically tested. The result of the hypotheses testing validates the adopted construct in understanding how the ICT resources and capabilities in the educational process can be effectively utilized.

The research findings show that effective utilization and ICT resources and ICT capabilities is an educational goal. Some limitations of the study are highlighted: The researchers did not have the time or resources to conduct follow-up sessions. Most of the participants were male which was due to the specific socio-economic environment in Saudi Arabia. The majority of the participants were foreigners. Although the Kingdom of Saudi Arabia possesses many academic institutions, the distribution was not as even as initially planned as some institutes had a high percentage of participation while others had a low percentage of participation.

It is hoped that the IT Committee will develop a strategic plan for IT resources based on the known policies. Moreover, the management needs to support the IT senior departments in order to provide appropriate levels of training for its members depending on their abilities, skills and requirements to effectively use the latest technology, especially in the area of Network where an understanding of the flow of data is crucial [53].

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