



Factors for Measurement of ITES Quality for Higher Education Institutions in Saudi Arabia

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Factors for Measurement of ITES Quality for Higher Education Institutions in Saudi Arabia

Romana Aziz^a & Basit Shahzad^a

Abstract- Information technology has blessed the current scientific era with the promising initiatives that are un-match able with the past. The range of impact is diversified in nature and massive in scale. Information Technology Enabled Services (ITES) have emerged over time in many disciplines. ITES are becoming increasingly prevalent in the global economy. Due to the growing importance of ITES Service Science has emerged as a fundamental area in Information Systems (IS) research and it combines technical and managerial knowledge under the umbrella of the more popular interdisciplinary approach of Service Science Management and Engineering (SSME). Along with the emergence of the ITES the question to measure the quality has also arisen. The measurement of ITES quality in different areas requires different factors to be considered. This paper addresses the identification of the factors for measuring the quality of ITES in higher education institutes in Saudi Arabia. The paper unleashes number of factors that can be used to measure the quality of ITES in higher education institutions.

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I. INTRODUCTION

Information technologies are now considered a core resource for all universities and universities are currently making massive investments in information technology. In addition to the learning management systems universities tend to invest in administrative systems for students, financial and human resource services [1]. The common reason stated by Bates and Sangra (2011) for these huge investments in information technology is to improve the cost effectiveness of universities by increasing flexible access for students. In order to demonstrate the achievement of this goal it is important to measure the quality of ITES from the users' point of view [2].

Much of the research on service quality in higher education can be linked with the marketing discipline [3, 4]. These scholars have mainly focused on the physical facilities or the outcomes of teaching and learning process and they have ignored the role of ITES like admissions, registrations, learning management and library systems in higher education.

We have reviewed the knowledge of service quality and service quality measurement in many different contexts and transferred it to the domain of

ITES service quality measurement in higher education. The paper in short identifies the factors required to measure the quality of ITES in Saudi universities. Section 2, describes the background of the problem and section 3 describes the literature review for the identification of the factors to measure quality of ITES. Section 4, is on identification of service quality measurement factors for higher education institutions and conclusions.

II. BACKGROUND

Services are defined as the non-material equivalent of a good or product and are intangible. Services sector is expanding in most developed economies of the world and according to a recent report eight out of ten workers are employed in the services sector in the United States [5]. Some services are still delivered interpersonally but these days most of the services are based on information and they are delivered via some technology. Organizations measure their service quality in order to use this measurement as a basis for improvement. Investigation of alternative models of service quality is an active research area [6]. Over the past years three broad and overlapping streams of research [7] have emerged in this area from the disciplines of marketing, supply chain management and information technology.

Information Technology enabled services (ITES) are becoming increasingly prevalent in the global economy. Due to the growing importance of ITES Service Science has emerged as a fundamental area in Information Systems (IS) research and it combines technical and managerial knowledge under the umbrella of the more popular interdisciplinary approach of Service Science Management and Engineering (SSME). The objective of SSME "is to help organizations improve their competitiveness in a rapidly changing business environment by exploring the true requirements of their customers, and setting up an effective service process with the support of IT" [8]. It is important to distinguish between IT Services and IT-Enabled Services. In the literature there are a number of definitions of IT enabled services [9, 10] but a comprehensive definition is given by Meyer and Fähnrich [11] as: "IT-enabled services are solutions, whose added value for the customer is generated significantly through the use of information and communication technologies using networked software. They manifest themselves in the form of

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services which can only be delivered efficiently and in their entirety by using information and communications technology, or alternatively as services in support of information and communications technology products, as well as complex hybrid solutions consisting of services combined with information and communications technology."

Advances in internet related technologies have led to informatization of service sector. Historically the term Information Technology Enabled Services (ITES) was used in the context of business process outsourcing. Today ITES refers to services which are provided via information and communication technologies (ICT) and Information systems (IS) [12]. Reengineering of traditional forms of paper and labor intensive forms of organizational activities and enabling them with ICT leads to IT enabled service delivery and offers substantial opportunities for service innovation. ITES are prevalent in many industries. The industries that rely most heavily on ITES include government, healthcare, finance, retail and last but not the least higher education[13-19].

ITES consist of a wide range of services delivered over a network in the above mentioned domains whereas IT services are the various IT applications and engineering services typically provided by the IT department of an organization [20]. Sudan et. al. [20] have given a typology of IT Services and IT-Enabled Services. They identify three categories of ITES. Firstly ITES encompass horizontal business processes like customer support, human resource management, finance, administration and supply chain management, secondly ITES cover most vertical processes of many sectors like banking, insurance travel, etc. and lastly the high end business processes like business and financial research and data analytics are also offered as ITES under business process outsourcing. IT services include application services and engineering services covering application development and maintenance, system integration, IT infrastructure services, simulation, design engineering and software product development. The software development standards need to be at par with the risk management techniques to avoid any development challenges [21-38].

The important research question of how to measure the service quality of ITES was first identified in 2005 [39] and after a lapse of almost a decade we still do not see substantial progress in this area [7]. Moreover scholars [5] agree that ITES provide the user with personal value added experience instead of a mere transaction. Therefore, it is suggested that factors affecting service quality will differ from one country to another due to cultural differences.

Measuring service quality of ITES in higher education as a field of study seems to have been neglected and as such there is very little that is understood about this contemporary phenomenon of

growing importance. Therefore, there is a need to develop a comprehensive understanding and description of the phenomenon, investigate its theoretical foundations and develop an instrument to measure it.

III. LITERATURE REVIEW

In this section we give an overview of service quality measurement in the related domains of marketing and retailing, e-services, e-government, IT/IS services, web services, enterprise systems and higher education services and service quality of ITES in higher education.

a) *Marketing and Retailing Service Quality*

In marketing research SERVQUAL [40-42] is the most widely used model for service quality assessment and is very frequently used for gap analysis. SERVQUAL uses five factors containing twenty two indicators and these five factors are: tangibles, reliability, responsiveness, assurance and empathy to measure the gap between customer expectations and perceptions of service quality. A number of marketing service quality models have descended from SERVQUAL, e.g. [43][44][45][46]. Although the original SERVQUAL was developed for assessment of quality in physical markets it has been used to measure the quality of IS systems as well [47, 48]. Roses et al [49] have applied SERVPERF which is an instrument based on SERVQUAL to measure IT service quality in banking sector.

The authors of SERVQUAL developed E-S-QUAL and E-RecS-QUAL for measuring service quality delivered by on-line shopping web sites[50]. The E-S-QUAL scale has four dimensions efficiency, fulfillment, system availability and privacy. The E-S-QUAL is for non-routine encounters and it has eleven items in three dimensions namely responsiveness, contact and compensation. With the passage of time as the delivery of electronic services became widespread the same group of authors developed E-SQ which is a conceptual model for consumer evaluation of electronic services [51]. E-SQ has eleven dimensions: access, ease of navigation, efficiency, flexibility, reliability, personalization, security/privacy, responsiveness, assurance/trust, site aesthetics, and price knowledge.

b) *E-service Quality*

E-service is different from traditional service in three main aspects [52]: no face to face sales staff, services process takes place in a virtual environment and self service of customers. E-service quality can be defined as the evaluations by the customer or user of the quality of service obtained from internet based virtual environment. Li and Suomi [52] did a review of the dimensions of e-service quality. They covered twenty five articles covering e-service concepts applied in the

areas of online retailing, online shopping and online financials. They proposed that the most relevant dimensions or measures of e-service are website design, reliability, responsiveness, security, fulfillment, personalization, information and empathy. Each of these eight dimensions consists of four items.

Swaid and Wigand [53] have studied service quality in on-line retailing. They developed a scale containing twenty eight items divided into six dimensions, namely information quality, reliability, responsiveness, assurance, website usability and personalization to evaluate service quality. This study performed exploratory factor analysis and structural equation modeling to investigate the influence of service quality attributes on three aspects of customer loyalty. The three loyalty constructs were preference loyalty, price tolerance and complaining behavior.

H. F. Lin[54], in his research on identifying the factors in measuring the quality of service for the banking sector, has identified some 16 factors in this regard. The factors include 'Response Time', 'Security', 'Reliability', 'Responsiveness', 'Competence', 'Trust', 'Multimedia capability', 'Accessibility', 'Accuracy', 'Currency', 'Relevance', 'Understandability', 'Navigability', 'Empathy', and 'Format'. In response to an exploratory study in their paper the author linked these factors to four categories including 'Functionality', 'Content', and 'Interface design' and 'Customer service. L. Yitong[55] mentioned that the measurement for the quality of service for the streaming service can be measured by focusing on 'Definition', 'Fluency' and 'Responsiveness'. The number of factors used to measure the quality of service are too few to be useful and also the streaming service are different in nature as compared to the electronic transactions.

George [56] has worked to identify the impact of the service dimensions on internet banking with respect to the customer satisfaction. The service quality dimensions identified were Website attributes, Reliability, Responsiveness, Fulfillment, Efficiency, and Privacy and Security. It was identified that all the factors except the efficiency factor do not have a significant influence on the customer satisfaction. The findings of the study are very crucial in improving the quality of service for internet banking to gain more customer satisfaction.

c) *E-government Service Quality*

The work of Alanezi [57] is focused on reformulating the SERVQUAL[42] for measuring e-government service quality. They have studied dimensions for measuring service quality in the domain of e-service, online retailing, online shopping, online banking, libraries, online travel, online financial services and web portals. They have successfully transferred the knowledge of service quality measurement from these different domains to e-government service quality. After compiling a list of fifty three dimensions from a survey of

thirty two papers, they selected seven dimensions for measuring e government service quality. The seven dimensions are defined by a number of items. The dimensions and their number of associated items are website design: seven items, reliability, responsiveness, information and personalization: three items each, security/privacy: four items and easy to use dimension has two items. Another recent work [58] identified information layout and content, ease of use, performance, citizen support, behavior and public value as the primary dimensions for e-government service evaluation.

A comprehensive survey was done by Tan et al[59] to study the dimensions of e-service quality. They systematically analyzed thirty seven empirical and conceptual studies in the related areas of website quality and e-service quality. They have proposed a scale for e-government service delivery quality assessment based on eighteen statements covering six dimensions: accessibility, navigability, interoperability, adaptability, security and interactivity.

d) *IT/IS Service Quality*

Lepmets [60], [61] has proposed a comprehensive framework for the measurement of IT service quality. This frame work is based on SERVQUAL [42] and Practical Software Measurement [62] concepts. The framework consists of customer satisfaction, service behavior, IT service value, IT service management process performance, IT service quality and IS quality. Customer satisfaction is based on customer feedback and customer support while service behavior depends on IT service climate and sustainability of a service system. The suggested measurement categories for value of IT service are mutual value creation, value production and IT governance. The performance of the process for IT service management can be measured via compliance efficiency and effectiveness. The framework considers the information systems (IS) as the main channel through which the IT services are delivered. The IS service quality attributes are functional correctness, portability, availability, reliability, maintainability, component capacity, scalability and adjustability whereas they have based IT service quality on availability, continuity, capacity, performance, utilization, information security and monetary value of the IT service.

SERVQUAL has been applied by many authors to measure the performance of IT/IS services. Kettinger and Lee[63] and Pitt et al [64] have studied and stated that the dimensions of SERVQUAL are applicable to measure IT service quality. There are many reservations and concerns about this claim notably by van Dyke et al and Asubonteng et al.[65, 66]The main concern is that SERVQUAL dimensions are likely to be industry specific and simple adaptation of SERVQUAL to different sectors is not sufficient.

L. F. Pitt [67] have adopted the SERVQUAL factors for the evaluation of the quality of service of the information technology enabled services. The factors include: tangible, reliability, responsiveness, assurance, and empathy. These five factors behave like five classes and consists of the following attributes. Tangible (up-to-date computational resources, physical facilities visually appealing, smart employees and appearance of physical facilities), reliability (keeping promised deadlines, interest in solving problems, dependable, time keeping and error-free records), responsiveness (notice in advance, prompt service to users, willingness to help users and never too busy to respond), assurance (confidence in users, safe transactions, courteous with users and knowledge to do the job) and empathy (individual attention, convenient operating hours, giving user personal attention, having the user's best interest at heart and understanding the specific needs of the users).

Campbell [68] has also identified several attributes for measuring the effectiveness of the IT services, that include efficiency, profit, quality, accidents, growth, absenteeism, turn over, job satisfaction, motivation, morale, control, conflict cohesion, flexibility adaptation, planning and goal setting, goal consensus, internalization of organizational goals, role and norm congruence, managerial interpersonal skills, information management and communication, readiness, utilization of environment, evaluation by external entities, stability, value of human resources, participation and shared influence, training and development emphasis and achievement emphasis.

e) *Web Service Quality*

Researchers have extensively used and adapted the theory of Technology Acceptance Model (TAM) [69], the Unified Theory of Acceptance and Use of Technology (UTAUT) [70] and the DeLone and McLean model of information systems success [71] to propose models for web service quality evaluation. According to TAM users' intention to use information systems is influenced by users' beliefs about the information system. TAM states that two factors: perceived usefulness and perceived ease of use impact the intention to use a system, eventually leading to the use of the system. In line with TAM, UTAUT is also a framework for predicting the acceptance and use of IT/IS. UTAUT extends TAM and UTAUT2 has seven dimensions: facilitating condition, performance expectancy, effort expectancy, social influence, hedonic motivation, price value, and habit. DeLone and McLean include six inter-related dimensions to explain IS success in their updated model. The dimensions are system quality, information quality, service quality, use, user satisfaction and net benefits.

Udoet al [72] has drawn upon TAM, UTAUT and DeLone and McLean model to develop and test an instrument that captures the constructs of the dimensions web service quality. Their model consists of twenty seven indicators belonging to six constructs. The constructs are Individual PC skill, service convenience, perceived risk, web site content, web service quality, satisfaction and behavioral intentions. Yang et al [73] developed an instrument to measure users' perceived service quality of information presenting web portals. They identified and verified five quality dimensions: usability, usefulness of content, adequacy of information, accessibility and information.

f) *Enterprise Systems Quality*

Sadera [74] in her findings has come up with the identification of following factors in four classes including system quality, information quality, individual impact and organizational impact. The attributes include: ease of use, availability, learning organizational costs, ease of learning, usability, awareness/recall staff requirements, user requirements, understandability, decision effectiveness, cost reduction, system features, relevance, individual productivity, overall productivity, system accuracy, format, improved outcomes/outputs, flexibility, conciseness, increased capacity, sophistication e-government and integration business process change.

g) *Service Quality in Higher Education*

Much of the research on service quality in higher education can be linked with the marketing discipline [3, 4]. These scholars have mainly focused on the physical facilities or the outcomes of teaching and learning process and they have ignored the role of ITES like admissions, registrations, learning management and library systems in higher education. There is some evidence in literature about the application of service quality measures in higher education industry. Scholars have adapted SERVQUAL to do comparative analysis of nonacademic service quality assessment among students and faculty members [75]. A small scale study based on SERVQUAL was done to investigated the discrepancy between students' expectations and their perceptions towards the quality of services [76]. SERVQUAL has been modified into HEDPERF [77] and applied within a higher education setting. The concept of total quality management has also been applied in higher education industry as HETQMEX [78]. These models of service quality focus on behavioral aspects and physical facilities and have not attempted to include IT enabled services.

Noor et al [79] has investigated to identify the critical factors for measuring the quality of service in the education sector in Malaysia. The authors have used the International Islamic University of Malaysia as a test case and chose to conduct this study in the school of management. The authors have identified that

administrative service, tangibles academic programs, academic staff, delivery of teaching, assurance and empathy of academic staff. The factors are different from other factors already identified in other papers. The reason for the difference is that this specific study is specific to the education industry and the parameters for measurement are different. However this study is specific to the quality of education and the electronic / technology enabled services have not been addressed in this study.

IV. FACTORS FOR MEASURING SERVICE QUALITY OF ITES IN HIGHER EDUCATION

The main purpose of literature review was to identify a set of salient factors which scholars have used to measure service quality in different domains. There is

a large number of studies that have attempted to identify the dimensions of service quality in the areas of marketing, retailing, e-services, e-government, web services and IT/IS services. Authors have arranged these dimensions into factors and items where each factor is described by a number of related items. After a comprehensive literature review one hundred and two unique factors were identified from twenty two studies. These factors are listed in Table 1. Besides the twenty two research papers included in our study there are numerous other articles in the extant literature on service quality measurement. The reason that we limited our study to the twenty two published papers was that we were interested in identifying as many unique factors as possible. The other studies were mostly repeating the already listed factors and there were hardly any new factors to be added to the list.

Table 1: Initial identified quality factors

No	Factor	Reference
1	Academic programs	[79]
2	Academic staff	[79]
3	Accessibility	[57][51][73][59][80]
4	Accuracy	[80]
5	Adaptability	[59]
6	Adequacy of information	[73]
7	Administrative service	[79]
8	Assurance	[42][81][49][47][48][64][79][57][53]
9	Assurance / trust	[51]
10	Availability	[57][80]
11	Behavior	[58]
12	Behavior intentions	[72]
13	Citizen support	[58]
14	Collaboration	[57]
15	Communication	[57]
16	Compensation	[50]
17	Competence	[57]
18	Completeness	[80]
19	Contact	[57][50]
20	Content	[54][57]
21	Convenience	[57]
22	Convenience of service	[72]
23	Courtesy	[57]
24	Credibility	[57]
25	Customer satisfaction	[72][61][60]
26	Customer service	[57][54]
27	Customization	[80][57][59]
28	Customization/personalization	[51]
29	Data integrity	[80]
30	Definition	[55]
31	Delivery	[57]
32	Delivery of teaching	[79]
33	Ease of navigation	[80][51]
34	Ease of use	[57][58][80]
35	Efficiency	[57][50][51][56]
36	Empathy	[64][57][42][49][47]
37	Empathy of academic staff	[79]
38	Entertainment	[57]

39	Features	[57]
40	Flexibility	[80][51]
41	Flow	[57]
42	Fluency	[55]
43	Fulfillment	[50][56][57]
44	Functionality	[57][54]
45	Graphic style	[57]
46	Incentive	[57]
47	Individual impact	[82]
48	Information	[57]
49	Information - layout and content	[58]
50	Information quality	[82][53]
51	Innovativeness	[57]
52	Interaction	[73]
53	Interactivity	[57][59]
54	Interface design	[54]
55	Interoperability	[59]
56	Intuitiveness	[57][80]
57	Linkage	[57]
58	Loyalty intentions	[50]
59	Monitoring	[59]
60	Navigability	[59]
61	Organizational impact	[82]
62	Perceived risk	[72]
63	Perceived service content quality	[59]
64	Perceived value	[50]
65	Performance	[58][57]
66	Personalization	[57][53]
67	Presentation	[80]
68	Privacy	[56][50][57]
69	Processing speed	[57]
70	Product portfolio	[57]
71	Reliability	[57][42][49][51][64][56][53]
72	Reputation	[80][57]
73	Response time	[57]
74	Responsiveness	[57][80][42][50][49][48][64][56][53][55][51]
75	Security	[56][57][59]
76	Security / privacy	[57]
77	Service differentiation	[57]
78	Service reliability	[80]
79	serviceability	[57]
80	Simplicity	[80]
81	Site aesthetics	[51]
82	Site design	[80]
83	Speed	[80]
84	Structure	[57]
85	Substitutability	[57]
86	System availability	[57][50]
87	system integrity	[57]
88	System quality	[82]
89	Tangible	[47][42][64][49][79][80]
90	Technical reliability	[80]
91	Transaction capability	[57]
92	Trust	[57]
93	Understanding	[57]
94	Usability	[73][57]
95	Usefulness	[80]
96	Usefulness of content	[73]
97	Web service quality	[72]
98	Web site content	[72]

99	Web site design	[57]
100	Website attributes	[56]
101	Website designs/ appearance / aesthetics	[57]
102	Website Usability	[53]

These factors were assessed for their applicability to the domain of ITES in higher education by a panel of experts using the Analytic Hierarchy

Process [83]. As a result seventeen factors were chosen for measuring service quality of ITES in higher education and are given in Table 2.

Table 2 : Description of identified factors for measuring ITES quality.

No	Factor	Description
1	Accessibility	Accessibility is the degree to which the users are able to access the routine information as well as information related with maintenance downtime and archives and backup.
2	Customization	Customization factor is concerned with the provision of such features which allow the users to configure the ITES according to their own preferences.
3	Delivery of teaching	Delivery of teaching is the level of various academic programs offered by the university and the quality of academic staff and the learning management systems.
4	Efficiency	The factor efficiency measures the degree to which the users save time by using the ITES.
5	Functionality	Functionality refers to the degree to which the various functions are completely implemented with the ability to reflect the progress of activities and tracking of dates and events.
6	Information quality	Information quality includes accuracy, level of detail and understandability of the information delivered by ITES.
7	Interoperability	Interoperability is the level to which users are able to access and complete different ITES from the same portal or website.
8	Privacy	Privacy is the degree to which the personal information of users is protected via effective mechanisms including monitoring of inconsistent access attempts.
9	Response time	Response time factor is related with the level to which ITES response time is consistent at different times and acceptable.
10	Security	Security factor reflects the adequacy of security features implemented in the ITES.
11	Service reliability	Service reliability is the percentage of time the ITES is available for use without failure.
12	Service usability	Service usability factor refers to the degree to which the users find it easy to use the various ITES. It is understood that availability of easy to understand instructions and procedures improves service usability.
13	Site design	Site design factor measures the quality of site design in terms of user satisfaction and ease of use.
14	System integrity	System integrity is the degree to which the ITES system is able to present consistent information by eliminating redundancy and barring malicious attacks.
15	Trust	Trust factor is the level of goodness of reputation of the ITES related with the trustworthiness and consistency of information provided by them
16	Usefulness	Usefulness is the degree to which the users find it easier to do their work via the ITES in a convenient and less time consuming way.
17	User support	User support factor refers to the degree to which the ITES department personnel are willing to serve the users in case their help and support is required.

V. CONCLUSION AND FUTURE WORK

It can be concluded that several factors for measuring the quality of ITES in higher education institutes have been identified. The identification process used the Analytic Hierarchy Process that was applied on the 102 initially identified factors from 22 recent publications. The identified factors cover several dimensions, including user support, responsiveness, trust, security, functionality and customization. In the findings of this paper seventeen quality measurement factors have been identified that can contribute in measuring the quality of ITES in any higher education institute. This study is focused to the education institutes and identified quality factors belonging to this specific domain. However, the study can be extended to derive

the possible quality factors in any other scientific application / setup where the quality of services is to be quantified and scaled. Such areas include but are not limited to health information systems, library information systems and financial management systems.

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