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Assessing user satisfaction with the MAKKEN system in Shaqra University: A structural equation modelling analysis

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Abstract

Background/Objectives: In Saudi Arabia, most organizations are rushing to adopt new technologies of digital transformation to achieve Saudi Vision 2030. Shaqra University has, therefore, adopted a new system, the Makken system, which allows users to conduct transactions such as printing salary details and helping managers to manage their employees and other faculty members. This study aimed to assess the factors that impact on users' satisfaction with the Makken system in Shaqra University. **Method:** A questionnaire was distributed among administrative employees and faculty members in Shaqra University to assess users' satisfaction with the Makken system based on the following factors: Information quality (IQ), System quality (SQ) and Service quality (SV). In this study, the snowballing selection technique is used among 122 staff members (academic and administrative) who are working in the Shaqra University from both the male and female sections. The structural Equation Model (SEM) was employed to analyse the data via maximum Likelihood operation. This was done by calculating each pathway for significance and also by estimating the strength of each path in terms of the obtained Beta value (β).

Findings: Structural equation model (SEM) analysis was used in this study and the results revealed that Information quality, System quality and Service quality had positive impacts on user satisfaction with the Makken system. It was also found that most users were satisfied, but not completely satisfied, with the Makken system in Shaqra University.

Keywords: Makken system; Shaqra University; SEM; User Satisfaction; Information System

1 Introduction

User satisfaction is a key theme in Information System research, with various studies emphasizing the importance of understanding and meeting user needs. The term "satisfaction" derives from "satisfy", which has its roots in Latin. The term signals the senses of "contentment and appeasement" and the "action of gratifying". It is described as a

“fulfilment of one’s wishes, expectations, or needs, or the pleasure derived from this”, signaling that satisfaction means a “filling or fulfillment up to a threshold of undesirable effects”⁽¹⁾. On the one hand, satisfaction can be viewed as “the consumer’s fulfillment response”, namely, a judgment that features a product/service or the product or service itself are providing a pleasurable level of fulfillment. On the other hand, based on the information sciences, differing interpretations of satisfaction have emerged in recent research, which considers a range of favorable and unfavorable responses. Hence, over time, researchers have moved away from the literal meanings of satisfaction to focusing on consumer experiences.

Research based on information sciences has focused on the satisfaction of the needs and desires of users who utilize the system. As such, information science-based researchers have defined and conceptualized satisfaction based on developments in systems and other sciences regarding concepts such as needs/motives, attitude and intention/satisfaction⁽²⁾. Attitude, in particular, is a key construct that underpins the concept of satisfaction. There are two general approaches to the measurement of user satisfaction: the Objective and the Subjective. With the system approaching the objective is the unit of analysis and the proportion of services that the system can offer upon demand is considered the measurement of satisfaction. These measures of satisfaction are purported to be indicators of the performance of a system and it is assumed that users of the system experience satisfaction of their demands commensurate with these levels of performance. With the Subjective approaches, the user is the unit of analysis and the user’s opinions of how well the system has performed in satisfying their demands is the measurement of satisfaction.

Shaqra University is one of the emerging universities in the Kingdom of Saudi Arabia. It is located in the middle of the Kingdom. It is one of the biggest universities in the Arabic gulf region in terms of its huge geographic area. The university has nine campuses within the central region of the Kingdom. The university consists of twenty-four faculties. The colleges are distributed over nine cities, with each college having many departments and each department having various faculty members⁽³⁾. The Information Technology and Electronic Learning Deanship is one of the deanships in Shaqra University. It is responsible for delivering electronic services in Shaqra University, including the MAKKEN system.

Electronic services^(4,5) (E-services) are the services which use the application of information and communication technologies. The three main components of e-services are e-service provider, e-service receiver and the e-service channels (the technology). For example, when it comes to system-based e-service, systems agencies are the service providers and users are the service receivers. The third requirement of e-service, the channel of service delivery, is the internet. It is the main channel of e-service delivery while other classic channels can be telephones, call centers, public kiosks, mobile phones, television etc.⁽⁶⁾. The software paradigm used in the E-services enables peer-to-peer computation in distributed environments based on the concept of “service” as an autonomous piece of code published in the network⁽⁷⁾. The integration of information and communication technology is done mainly for the delivery of services electronically. The factors that contribute to the e-services are the ability of various organizations to provide access to information and services for the users through the information systems, the promise of which is an enhanced service for the users. E-service is a highly generic term which refers to ‘the provision of services via the Internet’. Hence, E-service may also include e-Commerce, and also online non-commercial services which are usually delivered by the providers.

The authors in⁽⁸⁾ identify a number of benefits of E-services, including:

- Accessing a greater customer base
- Broadening user reach
- Lowering of entry barrier to new services and cost of acquiring new users
- Alternative communication channel to users
- Increasing services to users
- Enhancing perceived service image
- Gaining competitive advantages
- Enhancing transparency
- Potential for increasing the user knowledge

The MAKKEN system is web-based and is available via a local area network. Two types of user can employ the system:

- Administrative Employees
- Faculty members

The users can access the system only via a university local network. All the users of the system must have a username and a password which is provided by the Deanship of Information Technology & Electronic Learning.

After logging-in to the system, the users can conduct various transactions such as applying for vacations and printing salary details as well as reviewing previous transactions such as financial procedures and displaying personal and employee data. The

system also helps a manager to manage their employees and other faculty members. The managers can accept/reject vacation requests, following online requests. The system also allows them to view information about their employees and other faculty members.

1.1 This study aimed to

- Assess factors that impact on users' satisfaction with the Makken system in Shaqra University, based on the factors of information quality, system quality and service quality.
- Assess users' satisfaction with the Makken system in Shaqra University.

1.2 Research questions

The main research questions were:

- Q1: What factors impact users' satisfaction with the Makken system in Shaqra University?
- Q2: Are users satisfied with the Makken system in Shaqra university?

The sub-research questions are as follows:

- Does the information quality (IQ) impact users' satisfaction with the Makken system in Shaqra University?
- Does system quality (SQ) impact users' satisfaction with the Makken system in Shaqra University? Does service quality (SV) impact users' satisfaction with the Makken system in Shaqra University?

Research has been conducted by earlier researchers^(9–14) in the field of user satisfaction. The authors in⁽¹⁵⁾ refers to the needs for services as individual information needs of the user. Information need is an individual or groups desire to locate and obtain information to satisfy a conscious or unconscious need. The purpose of an information system is to fulfill potential user's needs for documents and information. Such needs, for example, may be related to educational information, the information for professional purposes or cultural purposes, or for personal needs.

In⁽¹⁶⁾ a survey was conducted with the intention of developing an evaluation tool. In his survey, researchers determined five different instruments^(17,18) that evaluate teaching activities, namely, Instructor and Course Evaluation System, Student Description of Teaching Questionnaire and Students' Evaluations of Educational Quality Instrument. He also developed a questionnaire in order to obtain some sample data. That questionnaire⁽¹⁶⁾ included a 24-item list that was comprised of all the satisfaction's factors plus a pair of global satisfaction questions (global satisfaction and success of the e-learning system). The dimensions satisfaction that researchers used referred to user information satisfaction, end-user computing satisfaction, customer satisfaction and student satisfaction. Finally, he proposed an ultimate evaluation measure and a better way of assessing individual satisfaction the comparison between individual satisfaction levels and norms.

While the previous example implemented some statistical tools to evaluate e-learning systems, a group-decision approach was followed by Gwo-Jen Hwang et al.⁽¹⁹⁾. The authors developed Educational Web Site Evaluator (EWSE) which is a system that handles methodologies such as multiple criterion decision-making⁽¹¹⁾, fuzzy logic, Grey system theory⁽⁷⁾ and Analytic hierarchy process (AHP)⁽²⁰⁾. The model of EWSE consists of four phases. In the first phase, the system collects the criteria that domain experts suggest and then selects the most favored ones using the Grey system method. In the second phase, the EWSE adjusts the weight of each evaluator, based on the evaluators' ratings. It is in phase three, that the system implements fuzzy theory and membership functions in order to rate the educational websites. While fuzzy theory is used to assess alternative ratings of every criterion, the criterion weights are arbitrarily decided. Finally, the ratings of all the evaluation items are integrated and the final decision is presented to the users.

Some researchers have attempted to identify particular student characteristics or other factors that can be used to predict whether a student might drop out of, or otherwise fail to achieve satisfactory results in an e-learning course⁽¹⁸⁾. Characteristics and other circumstances identified in previous studies, including clarity of design, interaction with instructors, and active discussion in the context of the course⁽²¹⁾, will enhance students' satisfaction toward e-learning. Understanding learners' attitudes toward e-learning is a critical issue for improving e-learning usage and effects. Therefore, this research investigated learners' attitudes toward e-learning to understand how to improve e-learning satisfaction, behavioral intention and to enhance learning effectiveness. In this study, we used Blackboard as our e-learning system.

1.2 D&M IS success model

The DeLone and McLean (D&M) IS success model is a theory which seeks to provide a comprehensive understanding of IS success by identifying, describing, and explaining the relationships among six of the most critical dimensions of success against

which information systems are commonly evaluated⁽²²⁾. This model, which was initially proposed in 1992⁽²³⁾, consisted of six interdependent constructs such as Information Quality, System Quality, System Use, Individual Impact, and Organizational Impact. Extensive research^(24–26) was conducted on the IS model and, as a result, various suggestions and modification or extensions of the original model were proposed. Later, the authors in⁽²³⁾ published an enhanced version of their previous model of IS success, with an additional component of quality, namely, service quality as suggested in⁽²⁴⁾. This combined the individual and organizational impacts as one impact, namely, net benefit⁽²⁶⁾.

Information Quality characterizes the outputs offered by the IS, namely, accuracy, timeliness, and completeness. Information quality captures the e-commerce content issue in an elaborate manner. In this factor, web content should be personalized, complete, relevant, easy to understand, and secure if prospective buyers or suppliers are to initiate transactions via the Internet and return to a site on a regular basis⁽²⁰⁾. Information Quality has the following sub-divisions: precise information; up-to-date information; sufficient information; reliable information; and useful information. System Quality refers to the performance of the IS in terms of reliability, convenience, ease of use, functionality and other system metrics. Regarding System Quality, the Internet environment measures the desired characteristics of an e-commerce system. Usability, availability, reliability, adaptability, and response time (e.g., download time) are examples of qualities that are valued by users of an e-commerce system. System Quality has the following sub-divisions: user-friendliness, ease of use and usability. With regard to Service Quality, support of users by the IS department is often measured by the responsiveness, reliability, and empathy of the support organization. With Service Quality, the overall support delivered by the service provider applies regardless of whether the support is delivered by the IS department or a new organizational unit or is outsourced to an Internet service provider. This dimension is now more important in an e-commerce environment than ever before, because the users are now customers rather than employees and, therefore, poor user support will translate into lost customers and lost sales. Service Quality consists of the following factors: readiness for service; safe transactions; availability; individual attention; and users' specific needs.

Cognitive information processing theory is an extension of the constructivist model, based on a model of memory. It proposes processes and structures through which an individual receives and stores information and focuses on cognitive processes during learning. These involve processing instructional input to develop, test, and refine mental models until they are sufficiently elaborated upon and reliable to be effective in novel problem-solving situations⁽¹⁹⁾. A major assumption of the cognitive learning model is that a learner's attention is limited and, therefore, selective. With more interactive and richer media available, a learner who prefers a self-directed and interactive learning style has more flexibility to meet individual needs. On this basis, we assume that an instructional method that provides a greater variety of interactions and richer media should be more effective. In an e-learning environment, students and instructors are physically separated. Based on activity theory, increased student engagement can improve learning outcomes, such as promoting problem solving and critical thinking skills⁽⁹⁾. Studies have suggested that learner engagement is higher with interactive communication and multimedia instruction, thus, higher interactivity can lead to higher learner engagement and better learning outcomes.

1.3 Conceptual research model and hypothesis

In this study, the D&M IS success model was used with some modifications to relationships between its factors to achieve the study's objectives, namely, to assess factors (information quality, system quality and service quality) that impact on users' satisfaction with the Makken System in Shaqra University.

1.4.1 Hypotheses

- H1: Information quality (IQ) has positive impact on user satisfaction with the Makken system.
- H2: System quality (SQ) has positive impact on user satisfaction with the Makken system.
- H3: Service quality (SV) has positive impact on user satisfaction with the Makken system.

2 Methodology

This study used a questionnaire to collect the data about the advantages for researchers such as saving money, time and because it is an appropriate tool for access to female and male participants alike⁽²⁷⁾. The questionnaire in this study has been used and validated in previous studies such as⁽¹⁴⁾ with some modifications to suit this study's goals. As most of the target population were native Arabic speakers, this questionnaire was validated by three experts in translation to avoid wording issues.

The questionnaire consisted of three parts. Part one, an invitation to participate in this research, contained general information about the research and its aims, and some information about ethical concerns to obtain informed consent from participants. Part two related to demographic characteristics and part three listed items related to factors that may impact on users' satisfac-

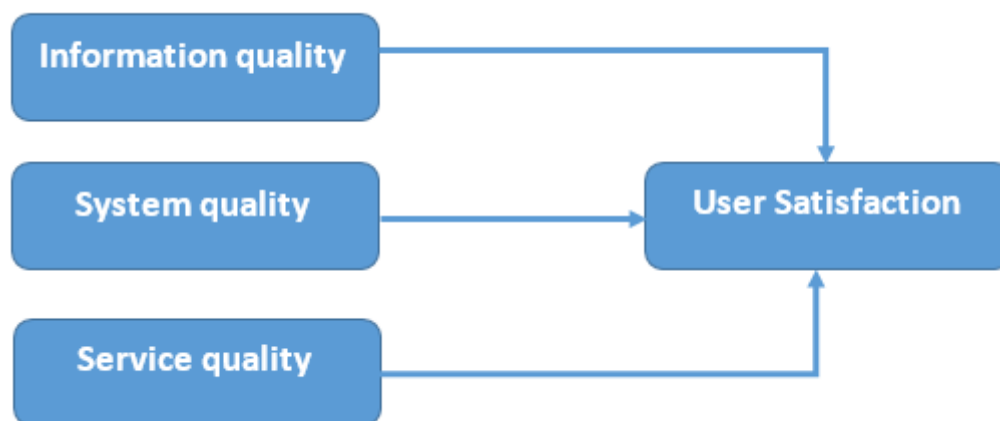


Fig 1. Conceptual framework for this study

tion. All factors were measured using a five-level Likert-type scale. Participants were asked to choose from 5 = Strongly Agree, 4 = Agree, 3 = Neutral, 2 = Disagree, 1 = Strongly Disagree.

The population in this study was all Shaqra university staff (academic members and administrative staff) in two sections, male and female. We used a snowballing selection technique, which is defined as being “based on social network logic whereby people are linked by a set of social relationships and contacts”⁽²⁸⁾. The researcher sent the link to the questionnaire in WhatsApp groups for his colleagues and asked them to distribute the questionnaire to their colleagues in their departments. In order to increase response rate, a follow-up was sent. A total of (122) responses were received.

3 Results and Analysis

3.1 Demographic analysis of the sample

As shown in the [Table 1](#) below, (88) participants were male while (34) were female. Ninety-seven participants were faculty members and (25) were Administrative employees. Most participants (77) worked in other campuses, while the remaining participants (45) worked in the main campus. Only (2) of the (122) participants had no experience of E-services.

Table 1. Characteristics of participants

Information		Number of participants	Percentage of sample
Gender	Male	88	72.1
	Female	34	27.9
	Total	122	100.0
Employee type	Faculty member	97	79.5
	Administrative employee	25	20.5
	Total	122	100.0
Working Place	Main campus	45	36.9
	Other campuses	77	63.1
	Total	122	100.0
Experience of E-services	Yes	120	98.4
	No	2	1.6
	Total	122	100.0

Table 2. Questionnaire reliability

Cronbach Alpha	Number of items	Section
0.883	5	Information quality (IQ)
0.911	3	System quality (SQ)
0.886	5	service quality (SV)
0.953	3	User Satisfaction (US)
0.966	16	Total

3.2 Reliability (Cronbach's alpha)

According to ⁽²⁷⁾, when constructs have a Cronbach Alpha value above (0.70), they are considered to be reliable. In this study Cronbach Alpha was tested and results showed that all constructs were above (0.70) and had high levels of reliability range (0.883 to 0.953). Therefore, it can be concluded that this questionnaire was reliable.

3.3 Assessment of the hypotheses

The structural equation model (SEM) examined three hypotheses presented in Table 3 via Maximum Likelihood.

Table 3. Summary of hypotheses

Hypothesis	Hypothesis statement
H1	Information quality (IQ) has a positive impact on user satisfaction with the Makken system.
H2	System quality (SQ) has a positive impact on user satisfaction with the Makken system.
H3	Service quality (SV) has a positive impact on user satisfaction with the Makken system.

The results after conducting the Maximum Likelihood estimation are presented in Figure 2 and Table 4. It revealed a significant path between user satisfaction with the Makken system and Information quality (IQ), System quality (SQ) and Service quality (SV). Therefore, H1, H2 and H3 are supported and confirmed in this study. Also, the results in Table 4 revealed that Service quality (SV) has the greatest impact on user satisfaction with Makken system followed by Information quality (IQ) and System quality (SQ). Based on the results, it can be concluded that, all factors have been used in this study are significant for users in this context. Therefore, Shaqra University should be aware about these factors if they launch new systems.

Table 4. Assessment of accepted hypotheses

Path	Hypothesis	Hypothesis statement	Path weight Beta β	Overall results
IQ \rightarrow US	H1	Information quality (IQ) has a positive impact on user satisfaction with the Makken system.	0.277	Significant P<0.001
SQ \rightarrow US	H2	System quality (SQ) has a positive impact on user satisfaction with the Makken system.	0.246	Significant P<0.001
SV \rightarrow US	H3	Service quality (SV) has a positive impact on user satisfaction with the Makken system.	0.476	Significant P<0.001

3.4 Assessment of users' satisfaction with the Makken system in Shaqra University

The results of the preliminary analysis revealed that most of the participants tended to give high ratings to items (positive responses) related to user satisfaction (US), usually in the agree (4) to strongly agree (5) interval. For this reason, both the items and the associated scale scores were somewhat negatively skewed as seen in Table 5.

Based on these results, we can conclude that users were satisfied, but not completely satisfied, with the Makken system in Shaqra University.

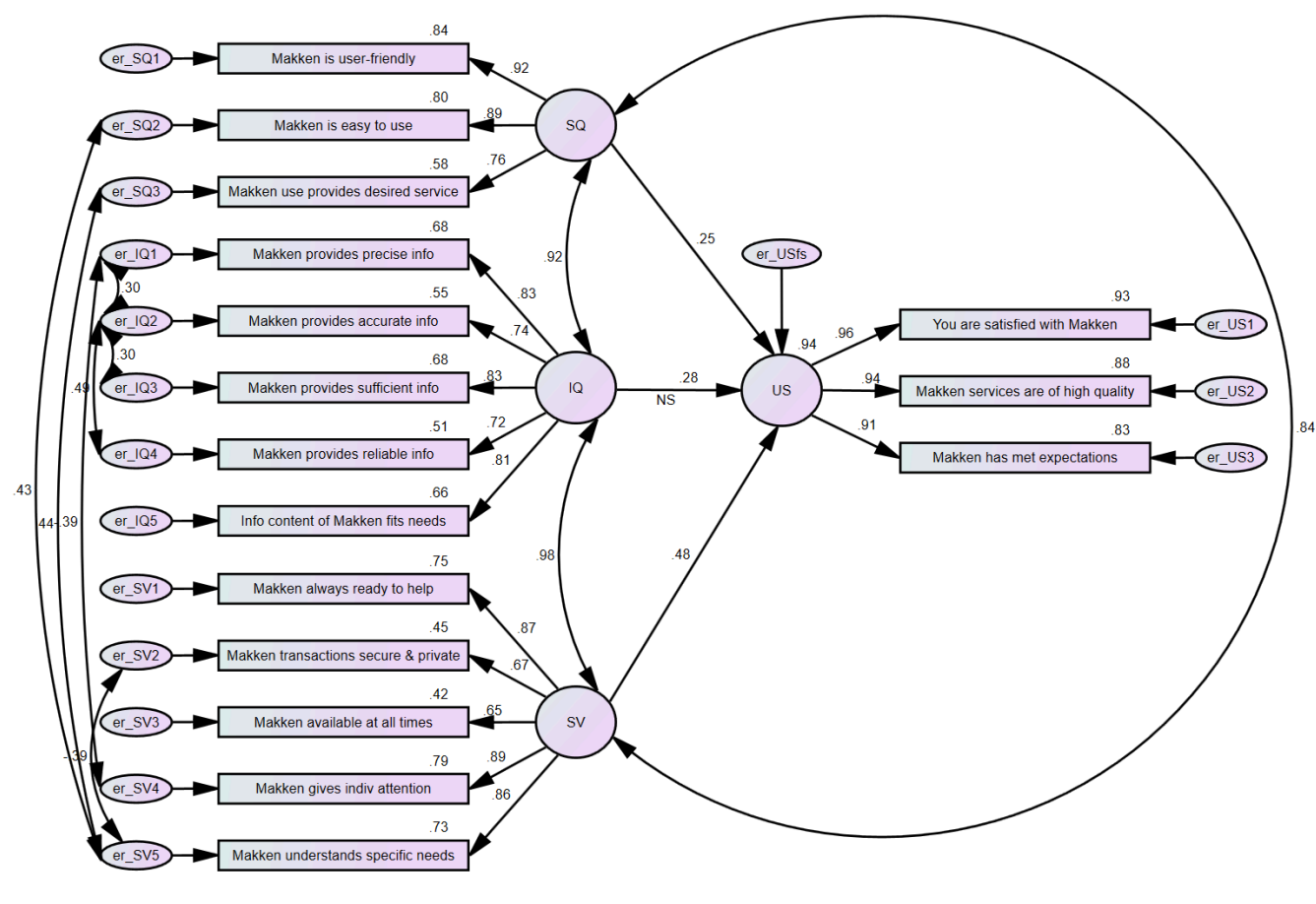


Fig 2. Structural equation model (SEM) used to test associations between hypothesized latent variables

Table 5. Results of preliminary analysis

Statistics	
Mean user satisfaction (US)	
Valid	122
N Missing	0
Skewness	-.319
Std. Error of Skewness	.218
Kurtosis	-1.001
Std. Error of Kurtosis	.433

4 Conclusion and Future Studies

In order to adopt new technologies to achieve digital transformation, Shaqra University adopted the Makken System to facilitate management activities and provide all management transactions electronically for their staff. This study aimed to assess factors that impact on users' satisfaction with the Makken system and assess their satisfaction with the Makken system in Shaqra University. The findings of this study were that Information quality (IQ), System quality (SQ) and Service quality (SV) had positive impacts on user satisfaction with the Makken system. It was also found that most users were satisfied with the Makken system in Shaqra University. Based on these results, Shaqra University should continue to provide other e-services and improve existing systems.

In future, studies could use more factors to measure users' satisfaction such as electronic service quality using E-S-QUAL and E-RecS-QUAL scales. Also, it could increase sample size to make a good generalization. Conceptual framework for this study was designed to assess the users' satisfaction. Future studies could focus on more topics such as technical challenges and problems of new systems by using other methods such as semi structured interviews to explore users' perspectives. Also, the future study could use other statistical tests such as correlation test and multiple regression.

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