## Research Article

# Development of Measurement Scale for Hypothesized Conceptual Model of E-service Quality and User Satisfaction Relationship

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**Abstract:** As the Education industry becoming more competitive these days, the institutions of higher education is competing to attract students by providing better e-Services Quality (e-SQ) which can improve their relationship and enhance their satisfaction. However, measuring e-SQ and satisfaction is a complex process because they relate to users feelings which cannot be predicted and measured easily. This study aims to develop a measurement scale for hypothesized conceptual model of e-service quality and user satisfaction relationship in Malaysian universities. The hypothesized conceptual model utilises Expectancy Disconfirmation Theory model (EDT), which is based on expected outcome and perceived performance of e-services quality. Nine dimensions of e-SQ are proposed for this model based on reviewing and analysing the related literature, especially the common e-SQ measures. The dimensions include efficiency, availability, privacy/security, fulfilment, reliability, web design, interactivity, information and ease of use. A structured questionnaire is conducted in five Malaysian universities to achieve the first stage of the hypothesized model related to evaluating the dimensions and defining the significant ones suitable for evaluating the expected outcome and perceived performance of e-Service Quality (e-SQ). These dimensions represent a core of a proper scale for the quality of e-services in higher education in Malaysia and will help to measure the students' satisfactions in the target domain.

**Keywords:** Expectancy disconfirmation theory, e-service quality, e-service quality dimension, users' satisfaction

## INTRODUCTION

Malaysian universities are constantly seeking to use modern technologies in various fields to enhance their services for the dissemination of knowledge. In demonstrating their commitments in academic excellence, research excellence and professional services, they are subjected to continuous pressure to surpass their competitors in presenting better e-services quality to improve client's relationship and to meet their satisfaction (Shekarchizadeh*et al*., 2011; Al-Nuaimi*et al*., 2013). The success of providing e-services depends significantly on the quality perceived by users one of which is the universities portals that offer various services for students. Although some of these services are similar in content, they vary in dimensions such as the look and feel, viewing method and quality of service. The quality of services in the educational institutions' portal has received a great attention by researchers (Angell *et al*., 2008), because studies have shown that it can increase current users'

retention, attract new users, hence enhance the online competitive advantages of companies (Ladhari, 2009). Attaining high e-service quality and user satisfaction is difficult because they depend on user perception which can't be measured easily. To date, it is still inconclusive as to what service quality is and how it should be measured (Suuroja, 2003).

As such there is a need for a scale to measure e-SQ in higher education sector in order to enhance its e-SQ. This study develops a measurement scale for hypothesized conceptual model of e-service quality and user satisfaction relationship in Malaysian universities. The hypothesized conceptual model integrates the quality dimensions, Expectancy Disconfirmation Theory model (EDT).

## LITERATURE REVIEW

The process of precisely measuring the quality of electronic service (e-SQ) is quite challenging, because ofthe complex natureofe-services.Theliteratureindicates

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the lack of global set of dimensions for measuring e-SQ, though there have been studies conducted in specific area such as banking, financial, shopping, travel (Al-Nuaimi*et al*., 2014). Hence, the studies employed the traditional SERVQUAL scale of service quality for measuring e-service quality but it was not quite appropriate for e-SQ measurement. This is due to three main differences between e-services and conventional services:

- Absence of sales staff.
- Inadequate traditional tangible element.
- Customers' self -service.

Al-Nuaimi*et al*. (2013) asserted that e-services deviate from conventional ones; consequently, there is a need to formulate novel measures for electronic service quality.

This poses a lot of challenges to organizations while attempting to enhance their e-services (Zeithaml, 2002).

Hence, it is imperative to develop a tool for measuring e-SQ (Li *et al*., 2009; Li and Suomi, 2008). Common practice that users employ few prevalent dimensions, such as, reliability, responsiveness, access and assurance for evaluating both traditional service quality and e-SQ (Yang and Fang, 2004).

Zeithaml*et al*. (2001) have identified the following eleven dimensions of e-SQ: flexibility, reliability, access, ease of navigation, efficiency, responsiveness, personalization, assurance/trust, site aesthetics, price knowledge and security/privacy.

Furthermore, Zeithaml(2002) andZeithaml*et al*.(2002);has attempted to evaluate e-SQ by means of Web Sites and developed e-SQ scale with seven dimensions (Yang and Fang, 2004).

The effective scale deals with the nature of e-SQ in terms of online shopping perspective by means of a website developed by Parasuraman*et al*. (2005). It is known as E-S-QUAL scale, which contains the following e-service quality measurement dimensions: Efficiency, Availability, Fulfilment and Privacy (Boshoff, 2007).

Additionally, Yoo and Donthu(2001), have developed SITEQUAL scale, which comprises four dimensions for measuring online service quality of website, such as, ease of use, aesthetic design, processing speed and interactive responsiveness.

On the other hand, eTailQ scale was proposed by Wolfinbarger and Gilly(2003), which encompassed the following dimensions: reliability, website design, security and customer service.

Researchers proposed e-SQ scale WEBQUAL, which includes the dimensions: information, visual appeal, response time, interaction, trust, design, intuitiveness, innovativeness, flow-emotional appeal, integrated communication, business processes and substitutability (Zeithaml*et al*., 2002; Vanpariya and Patel, 2010).

Bressolles and Nantel (2008), have developed NetQual, with five dimensions: information, ease of use, reliability/fulfilment, security/privacy and site design. Table 1 illustrates the typical measures and the associated factors.

Researchers used various dimensions for e-SQ based on the field of their study. Moreover, some researchers identified different dimensions for the same field. Furthermore, the dimensions of the common measures are subject to change based on researchers study. Yang *et al*. (2003), indicated that e-SQ dimensions tend to be dependent on various industries and different service types even within same industry. Most of the studies in the higher education area were

Table 1: Common E-Sq measures and their dimensions

| No | Instrument | Dimensions | |
|----|-----------|------------|--|
| 1 | E-S-QUAL(Boshoff, 2007) | 1. Efficiency | 3. Fulfilment |
| | | 2. Availability | 4. Privacy |
| 2 | Webqual | 1.Fit to task | 9.Flow-Emotional appeal |
| | (Zeithaml*et al*., 2002) | 2.Interaction | 10.Integrated communication |
| | | 3.Trust | 11.Business processes |
| | | 4.Response time | 12.Substitutability |
| | | 5.Design | |
| | | 6.Intuitiveness | |
| | | 7.Visual appeal | |
| | | 8.Innovativeness | |
| 3 | Webqual 4(Bressolles and Nantel, 2008) | 1. Usability | 3. Interaction |
| | | 2. Information | |
| 4 | E-Tailq(Li *et al*., 2009; Wolfinbarger and Gilly, 2003) | 1.Website design | 3.Fulfillment/Reliability |
| | | 2.Customer service | 4.Security/Privacy |
| 5 | SITEQUAL(Li *et al*., 2009;Yoo and Donthu, 2001) | 1. Ease of use | 3.Processing speed |
| | | 2. Aesthetic design | 4. Responsiveness |
| 6 | Netqual(Bressolles and Nantel, 2008) | 1. Information | 4.Security /Privacy |
| | | 2. Ease of use | 5. Site design |
| | | 3.Reliability/Fulfilment | |

done to measure service quality in higher education (Sultan and Wong, 2011, 2010) and a few studies were conducted on e-SQ (Didegah and Erfanmanesh, 2010; Ahmadi*et al.*, 2008).

## MATERIALS AND METHODS

**Operationalized proposed dimensions and hypotheses for e-service quality:** Based on Table 1, nine dimensions are proposed for evaluating e-service quality have been chosen in this research to develop the hypothesized conceptual model namely efficiency, availability, privacy/security, fulfilment, reliability, web design, interactivity, information and Ease of use. These dimensions are selected from the common scales of e-service quality as they can affect the students' perceives and expectations towards the services. Moreover, the selected dimensions are covered all the aspects of e-Service Quality (e-SQ) in higher education in terms of their variation and their contents, which can lead to determine the users' satisfaction clearly and effectively. The questionnaire includes the main dimensions of e-SQ each dimension contain a number of statements which give a clear vision about the selected dimensions The data is analysed by using the statistical software package SPSS 20 to define the final dimensions of e-service quality in Malaysian universities.

**Efficiency:**It refers to the speed of downloading, search for required information and complete service easily and quickly with minimum input information (Yang and Fang, 2004). According to Ojasalo(2010), efficiency refers to the speed of downloading, search and navigation. It is very important since convenience and saving time are the main reasons for online services (Ranganathan and Ganapathy, 2002). Difficult access to the website and slow downloads may lead to leave the site. A well-organized and navigable site satisfies the users through navigating the site without any confusion (Jun *et al.*, 2009). Also it refers to the efficiency of the services provided by the university website. The statements of efficiency dimension are derived from (Vanpariya and Patel, 2010; Didegah and Erfanmanesh, 2010; Ibrahim *et al.*, 2012; Zeithaml*et al.*, 1993), as shown in Table 2. The hypotheses proposed for this dimension as follows:

**H1A:** There is a positive relationship between efficiency and expected outcome.
**H1B:** There is a positive relationship between efficiency and perceived performance.

**System availability:**System availability means the correct technicalfunctioning of the site (Ojasalo, 2010).The technical functions include the continuous

Table 2: Efficiency variable items

| No. | Efficiency |
|---|---|
| 1 | It is easy and fast to load pages |
| 2 | It is easy to find the required information |
| 3 | It is easy and quick to complete a service |
| 4 | The site offer the necessity services required by the user |
| 5 | The site requires a minimal amount of information to be input by the users |

Table 3: System availability variable items

| No. | System availability |
|---|---|
| 1 | The website is available 24/7 |
| 2 | The site launches and runs at acceptable response time |
| 3 | URL links work correctly |
| 4 | Site failures are rare |
| 5 | Support several file formats (.ppt, .doc, .pdf) |

availability of the site, easy to launch and run the site at acceptable response time, validity of URL links, rare failure of the site and its capability to support different files formats. The availability enables continuous access to online service and enhances users' loyalty and satisfaction. If users cannot use the online system on their need to get online service, they will leave the site. The system availability is a significant element to ensure the technical function of the website. Universities websites should grantee the continuous working of their web sites all the day to ensure their service quality (Li *et al.*,2009; Wachter, 2002; Kim *et al.*, 2006). Also it refers to the correct technical functioning of the site. The statements of system availability dimension are derived from (Yoo and Donthu, 2001; Didegah and Erfanmanesh, 2010; Jayasundara, 2009; Herington and Weaven, 2009), as shown in Table 3. The hypotheses proposed for this dimension as follows:

**H2A:** There is a positive relationship between system availability and expected outcome.
**H2B:** There is a positive relationship between system availability and perceived performance.

**Privacy/security:**This dimension refers to safe transactions and secured user's personal information. It refers to freedom from danger, risk, or doubt during the service process. Privacy and security are significant issues for both e-services and users (Ojasalo, 2010). They can be achieved by developing privacy policies that ensure security of users' information. Enhancing privacy and security can enhance user trust, which leads to attract and retain of many good users and prevent them abandoning e-services and returning to exercise traditional services. Users perceive a great risk in conducting online e-services fearing exposure of their personal information and improper use of it. Universities websites should ensure the safety of personal information retrieved or submitted through the site (Li *et al.*, 2009; Jebur*et al.*, 2012). Also itrefers tothe level of security and protection to user's

Table 4: Privacy/security variable items

| No. | Privacy/Security |
|-----|------------------|
| 1 | The website does not share my personal information with other sites |
| 2 | Personal information and online payment need high security |
| 3 | Posting a clear privacy policy is important |
| 4 | The site is safe and free from attacks or potential threats |

Table 5: Fulfilment variable items

| No. | Fulfilment |
|-----|-----------|
| 1 | The website delivers services as expected |
| 2 | The website delivers the required services within the expected time frame |
| 3 | The website provides services at real time |
| 4 | The time for service processing is acceptable |
| 5 | All services indicated on the site are available |

Table 6: Reliability variable items

| No. | Reliability |
|-----|-------------|
| 1 | Correct information is provided on each service |
| 2 | Alternative options are given for each service when the service is disrupted |
| 3 | The same problems occurs frequently |
| 4 | Problems in e-services are solved quickly |
| 5 | All services are performed accurately |

personal information provided by the university website. The statements of privacy/security dimension are derived from (Yoo and Donthu, 2001; Didegah and Erfanmanesh, 2010; Chandrashekaran*et al.*, 2007), as shown in Table 4. The hypotheses proposed for this dimension as follows:

**H3A:** There is a positive relationship between privacy/security and expected outcome.
**H3B:** There is a positive relationship between privacy/security and perceived performance.

**Fulfilment:**It is the degree of keeping the site of his promises in providing the expected services and delivering the mat acceptable time. It also refers to the availability of the services and reasonable processing time for service. Fulfilment is one of the significant dimensions to judge online services quality and can lead to achieve customer satisfaction or dissatisfaction (Yang and Fang, 2004). It is very important for university website to keep its promise in providing and delivering good services within the time to improve user trust and satisfaction (Yang and Fang, 2004). Also it refers to the punctuality on providing and delivering the services. The statements of fulfilment dimension are derived from(Vanpariyaand Patel, 2010;Sunanto*et al.*, 2007), as shown in Table 5. The hypotheses proposed for this dimension as follows:

**H4A:** There is a positive relationship between fulfilment and expected outcome.
**H4B:** There is a positive relationship between fulfilment and perceived performance.

**Reliability:**It is the performance consistency and services providers' dependability (Parasuraman*et al.*, 1985; Parasuraman*et al.*, 1988). In addition; reliability manifests service provider capability to provide proper information on the services (Raman *et al.*, 2008). It also refers to the ability to perform the promised service accurately and consistently, including frequency of updating theWeb site and prompt reply to customer

enquiries site (Ojasalo, 2010). In addition, the reliability refers to the existence of the alternative option in case of service problem. Reliability is an essential dimension of e-SQ. In online services, it is important to ensure trust that service provider keeps his promises. Reliability can make users realize the services providers' consistency and credibility as well (Li *et al.*,2009). Many researchers indicated reliability as one dimension in e-SQ (Lee and Lin, 2005; Van Riel *et al.*, 2003; Bressolles and Nantel, 2008; Wolfinbarger and Gilly, 2003). Also it refers to the degree of "perform as promised" of a service provided by the website. The statements of reliability dimension are derived from (Ibok and John, 2013; Woodruff*et al.*, 1983; Yoo and Donthu, 2001; Udo*et al.*, 2010; Didegah and Erfanmanesh, 2010; Raman *et al.*, 2008; Al-hawari, 2008; Picazo-Vela, 2010), as shown in Table 6. The hypotheses proposed for this dimension as follows:

**H5A:** There is a positive relationship between reliability and expected outcome.
**H5B:** There is a positive relationship between reliability and perceived performance.

**Web design:**It is the main access for users to online services so; it should provide appropriate information and multiple functions for users. Website refers to good and easy structure, attractive appearance and aesthetics. Appearance refers to the proper use of colours, graphics, images and animations, together with the appropriate size of the Web pages (Ojasalo, 2010). It also refers to use various languages and respect the other cultures. The website design deficiency can lead to a user negative impression of website quality and may increase his dissatisfaction and lead to leave the site (Zeithaml, 2002; Yang *et al.*, 2001; Fassnacht and Koese, 2006; Li and Suomi, 2009). Also it refers to the site design and appearance and how the site is tailored to users' preferences. The statements of web design dimension are derived from (Yoo and Donthu, 2001; Parasuraman*et al.*, 2005; Didegah and Erfanmanesh, 2010; Seth *et al.*, 2005; Sultan and Wong, 2011), as shown in Table 7. The hypotheses proposed for this dimension as follows:

**H6A:** There is a positive relationship between web design and expected outcome.

Table 7: Web design variable items

| No. | Web design |
|-----|------------|
| 1 | The website is visually appealing |
| 2 | The website design is simple and clear |
| 3 | The website is well structured |
| 4 | The website provides its contents in different languages |
| 5 | The website respects the other cultures |

Table 8: Interactivity variable items

| No. | Interactivity |
|-----|---------------|
| 1 | The website motivates users to use online services |
| 2 | The website informs users when new services are available |
| 3 | The website reminds users prior to deadlines of services. |
| 4 | The website provides channels for communication with the users |
| 5 | The interaction with different users is important to judge the quality of e-services |

Table 9: Information variable items

| No. | Information |
|-----|-------------|
| 1 | Information about all services are available |
| 2 | The provided information are easy to understand |
| 3 | The information are always detailed and relevant |
| 4 | The website provides information on how to use e-services |

Table 10: Ease of use variable items

| No. | Ease of use |
|-----|-------------|
| 1 | It is easy to log into the website |
| 2 | The website provides clear site map |
| 3 | It is easy to navigate through the website to find the required information |
| 4 | It is easy to find the required services |
| 5 | It is easy to perform the required services |

**H6B:** There is a positive relationship between web design and perceived performance.

**Interactivity:** This dimension points out the interaction degree between service provider and the users and helps the users to grasp and track the procedures on their required services (Nyshadham and Obi, 2009). The interaction includes motivation the user to use the online services, inform the user about the new and expired services and provides channels for communication with the users. In spite of lack of direct human interaction in e-service process, assistance could be offered to citizens by telephone or e-mail to handle any problem or answer any enquires (Kim *et al*., 2006). Providing users' attention shows empathy to them, which increases perception of e-SQ (Li *et al*., 2009). Also it refers to the website interaction with the users and how it encourages them to use the available services and keeps them on touch. The statements of interactivity dimension are derived from (Yoo and Donthu, 2001; Herington and Weaven, 2009; Sultan and Wong, 2010), as shown in Table 8. The hypotheses proposed for this dimension as follows:

**H7A:** There is a positive relationship between interactivity and expected outcome.
**H7B:** There is a positive relationship between interactivity and perceived performance.

**Information:**It relates to the suitability of the information for the user's purposes (Ojasalo, 2010). Information quality refers to the accurate and relevant information provided by service provider through his website (Parasuraman*et al*., 1991). It also refers to easy and detailed information about service and how to use it. Information is a very important factor for users in making their decisions in online environment (Li and Suomi, 2009). Tan *et al*. (2003) considered information as one of the factors of e-SQ. Furthermore, according to Sung *et al*.(2009), information is a significant factor that affects users' satisfaction. Universities should provide accurate and updated information on their services to enhance user satisfaction. Too much information and too little information are both (Ojasalo, 2010). Also it refers to the level of accurate and updated information provided by the university website. The statements of Information dimension are derived from (Ojasalo, 2010; Didegah and Erfanmanesh, 2010; Ranganathan and Ganapathy, 2002; Jun *et al*., 2009), as shown in Table 9. The hypotheses proposed for this dimension as follows:

**H8A:** There is a positive relationship between information and expected outcome.
**H8B:** There is a positive relationship between information and perceived performance.

**Ease of use:**It refers to the easiest of the Web site for customers to conduct external search in cyberspace as well as internal navigation and search within the Web site (Ojasalo, 2010). It relates to the degree of ease of use the web site, high ability for searching for service and related information (Alanezi*et al*., 2010), the easy navigation through the pages (Al-Tarawneh, 2012), easy to logon and perform the service. According to Santos(2003), easy to use is related to easy website navigation, concise and understandable contents. This dimension affects customers' satisfactions significantly (Yoo and Donthu, 2001). Also it refers to the ease of use of the website. The statements of ease of use dimension are derived from (Ladhari, 2009; Wachter, 2002; Didegah and Erfanmanesh, 2010; Yang *et al*., 2003; Kim *et al*., 2006), as shown in Table 10. The hypotheses proposed for this dimension as follows:

**H9A:** There is a positive relationship between ease of use and expected outcome.
**H9B:** There is a positive relationship between ease of use and perceived performance.

The Rest of Research Model Hypotheses

**H10:** There is a negative relationship between expected outcome and disconfirmation.
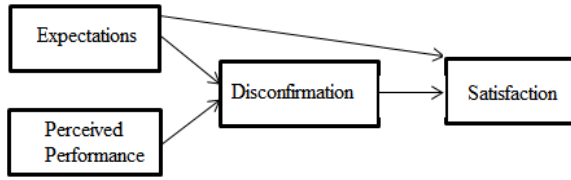
Fig 1:  Proposed model with positive relationship between expectations and satisfaction(Picazo-Vela, 2010)
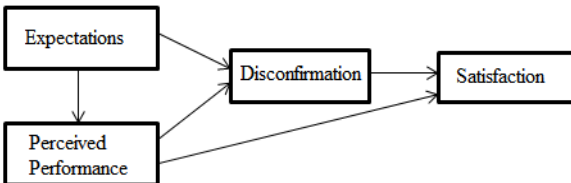


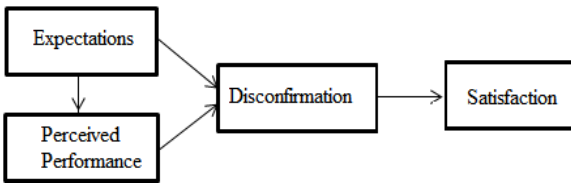Fig. 2: Expectancy disconfirmation theory model (Bakri and Elkhani, 2012)



Fig. 3: Proposed model to analyse the impact of online reviews on customer satisfaction, (Picazo-Vela, 2010)
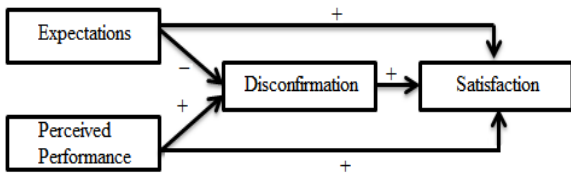


Fig. 4: Hypothesized research EDT model (Lankton and McKnight, 2012)

**H11:** There is a positive relationship between perceived performance and disconfirmation.

**H12:** There is a positive relationship between disconfirmation and user satisfaction.

**H13:** There is a positive relationship between expected outcome and user satisfaction.

**H14:** There is a positive relationship between perceived performance and user satisfaction.

The questionnaire is structured in six sections. The first section contains eight close ended questions. The second one contains nine dimensions for e-SQ; each dimension has certain numbers of likert-scale questions, while the third, fourth, fifth and sixth section contains nine questions for perceived e-SQ, expected e-SQ, disconfirmation and user satisfaction respectively.

**Expectancy disconfirmation theory:** Expectancy Disconfirmation Theory (EDT) is based on Cognitive

Dissonance Theory (CDT) that was introduced by Festinger (1957). The EDT can measure the customer's satisfaction from the difference between customer's expectation and experience in perceived products or services (Bakri and Elkhani, 2012). According to EDT, consumers compare their expectations to perceivedperformance.If perceived performance exceeds expectations, positive disconfirmation results and satisfaction occurs. If expectations exceed perceived performance then negative disconfirmation results and dissatisfaction occurs (Picazo-Vela, 2010).

Researcher defined different models based on EDT. Oliver (1980) cited in Picazo-Vela, 2010) proposed a model with positive relationship between expectations and satisfaction, with high expectations leading to high satisfaction as shown in Fig. 1.

Bakri and Elkhani (2012) proposed the model illustrated in Fig. 2 the model includes the same components of the complete model but with different relations.

Picazo-Vela (2010) presented his model as shown in Fig. 3 to analyse the impact of online reviews on customer satisfaction.

It is obviously that researchers utilized EDT in different models based on their field of study to investigate the relations between their EDT models components. Based on that and on Premkuma and Bhattacherje, this research utilizes a comprehensive model of EDT that studies the relations between both perceived performance and expectations with with satisfaction as shown in Fig. 4 (Lankton and McKnight, 2012).

**The hypothesized conceptual model:** Researchers and organizations managers always thrive for learning details about components of service quality that lead to customer satisfaction, increased profitability etc. (Al-Nuaimi*et al*., 2013). In this context, a model gains specific importance as it not only helps in learning the factors associated with it but also will provide a direction for service quality improvements (Seth *et al*., 2005). Many models were developed based on the expectancy disconfirmation theory to define user customers' satisfaction (Jayasundara, 2009). The hypothesized conceptual model for the relation between e-SQ and users' satisfaction is shown in Fig. 5. The model aims firstly to define the main e-SQ dimensions in higher education institutes in Malaysia. Secondly, the model is used for investigating the effect of expected outcome and perceived performance of e-SQ final dimensions on users satisfaction based on expectancy disconfirmation theory.

**User satisfaction:**Satisfaction of users has been regarded as yet another significant factors for
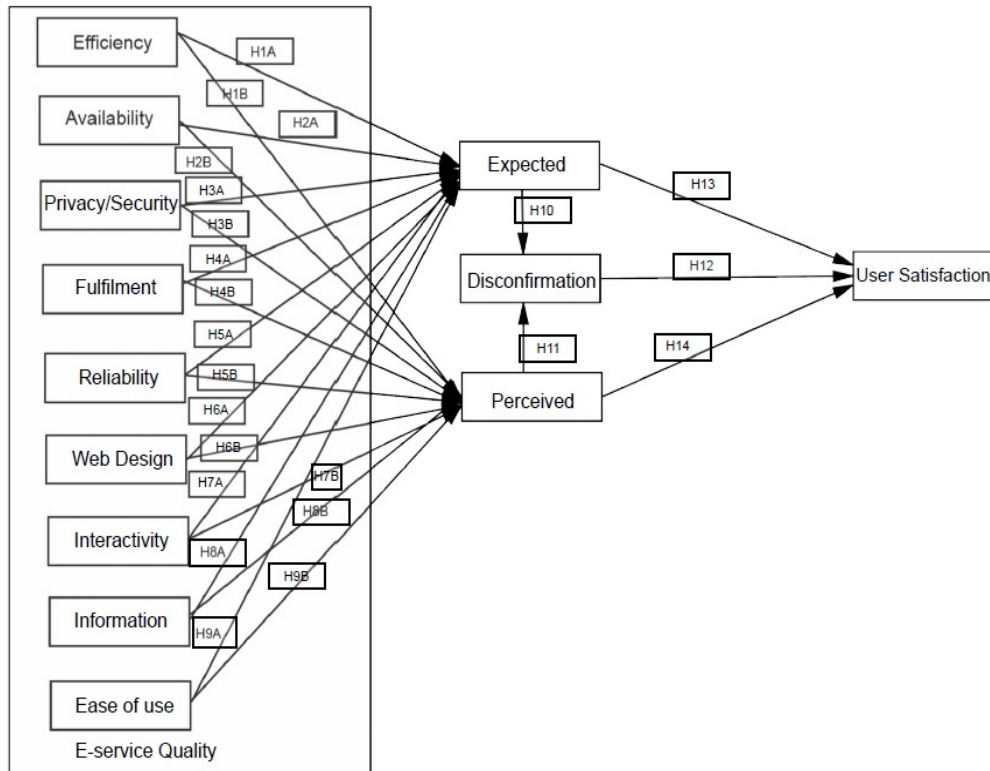
Fig. 5: Hypothesized conceptual model for the relationship between e-SQ and user satisfaction

measuring perceptions or expectations of customers about the services offered, for the purpose of managing these services or serving them better. Zeithaml*et al.* (1993) have identified that users' satisfaction is a crucial factor for evaluating the service quality and price. Additionally, Zeithamland Bitner, have characterized user satisfaction as a significant aspect for measuring a product or service that is impacted by the perceptions of service quality cited in Jayasundara(2009). Furthermore, Herington and Weaven(2009) have also indicated that service quality precedes customer satisfaction, which is associated with the experience of customers. Similarly, it is evident that, e-service quality is an antecedent of customer satisfaction (Chandrashekaran*et al.*, 2007). It is essential to understand the nature of the satisfaction for building the conception of customer satisfaction. Nevertheless, a number of studies have identified various influential factors of customers' satisfaction; hence there is a lack of universal list of factors, since customer's satisfaction varies across traditions and industry (Ibok and John, 2013) and it is also associated with their psychological response towards a product or service (Woodruff *et al.*, 1983). The following are the theories of satisfaction (Jayasundara, 2009):

**Equity theory:** satisfaction is explained in terms of perceptions of resources distributions extent between involved parties. This means that satisfaction occurs when one of the parties feels that the output of any process be balanced with the input in terms of cost, time and effort.

**Attribution theory:** satisfaction is explained in terms of the expectation of users about products or services, when they fail to meet the users demand. The parties will conclude various reasons for failure that may lead to contradiction that result in dissatisfaction.

**Performance theory:** satisfaction is explained in terms of perceived performance of the product or service.

**Expectancy Disconfirmation Theory (EDT):** satisfaction is explained in terms of former users' expectations of service performance before purchasing.EDT is an intrinsic theory that aims to measure customer satisfaction from perceived quality of services. EDT based on two variables; expectation or desire and experience or perceived performance (Bakri and Elkhani, 2012).

**User satisfaction and e-SQ relationship:**Many studies confirm the relationship between service quality and (Balasubramanian*et al.*, 2003; Watson *et al.*, 1998; Pitt *et al.*, 1997; Prybutok*et al.*, 1997). Zhang and Prybutok(2005), indicated that service quality is acrucial factor in information system success and stated that service quality was included as one of the dimensions that affect user satisfaction and they concluded that service quality leads to satisfaction. Li

Table 11: University distiribution

| Education level | | Frequency | Percent | Cumulative percent |
|---|---|---|---|---|
| Valid | UTP | 28 | 25.5 | 25.5 |
| | UM | 16 | 14.5 | 40.0 |
| | UKM | 20 | 18.2 | 58.2 |
| | UTM | 23 | 20.9 | 79.1 |
| | UNITEN | 23 | 20.9 | 100.0 |
| | Total | 110 | 100.0 | |

Table 12: Respondants gender

| University name | | Frequency | Percent | Cumulative percent |
|---|---|---|---|---|
| Valid | Foundation | 4 | 3.60 | 3.600 |
| | Bachelor degree | 49 | 44.5 | 48.20 |
| | Masters degree | 42 | 38.2 | 86.40 |
| | PhD | 15 | 13.60 | 100.0 |
| | Total | 110 | 100.0 | |

Table 13: Respondants age

| Gender | | Frequency | Percent | Cumulative percent |
|---|---|---|---|---|
| Valid | Male | 64 | 58.2 | 58.2 |
| | Female | 46 | 41.8 | 100.0 |
| | Total | 110 | 100.0 | |

Table 14: Current education

| Age | | Frequency | Percent | Cumulative percent |
|---|---|---|---|---|
| Valid | Less than 20 years | 9 | 8.2 | 8.2 |
| | From 21-30 years | 73 | 66.4 | 74.5 |
| | From 31-40 years | 23 | 20.9 | 95.5 |
| | From 41-50 years | 5 | 4.5 | 100.0 |
| | Total | 110 | 100.0 | |

andSuomi (2008), stated that service quality has strong impacts on customer satisfaction and companies' performance. Few researchers stated in their examination of the relationship between service quality, customer satisfaction and store loyalty stated that firms, which give a higher priority to meeting their customer expectation achieve higher performance (Sivadass and Baker-Prewitt, 2000;Kotler, 2000; Levitt, 1983). Ibok and John (2013) also stressed that customer satisfaction is important for business success and performance. In general, many researches indicated that service quality should be considered an important indicator of customer satisfaction (Al-hawari, 2008). However, some service quality attributes may not be critical for customer satisfaction but can significantly lead to dissatisfaction when they are performed poorly (Yang and Fang, 2004).

**Data analysis:** The research includes two stages. The first stage aims to develop a measurement scale for e-SQ in higher education. The second stage aims to measure students' satisfaction. This study fulfils the objective of stage one by determining the significant dimensions of the scale. Five Malaysian universities namely UTP, UM, UKM, UTM and UNITEN are chosen as shown in Table 11.

The questionnaire is constructed based on literature considering the standard format and was validated and evaluated by a pre-test in UTP, which included (20) respondents and a judgment of (6) experts in the UTP. The research data was gathered by conducting a questionnaire with (110) respondents represented by male and female students from the five universities as

they have academic knowledge and experience on the provided e-services and the Table 12 shows that male have the majority of respondents as shown in above.

The ages of respondents were divided into four categories covering all the students' ages starting from less than twenty years and ending with fifty years. The majority of respondents are from the category (21-30) years as shown in Table 13.

The education levels of respondents were divided into four categories starting from finishing the high school to PhD student. The majority of respondents are from Bachelor degree as shown in Table 14.

**RESULTS AND DISCUSSION**

After collecting the data, SPSS is used to analyse it. The first step to prepare the data for analysis by SPSS is data coding. Data coding was performed for the sub dimensions. The proposed dimensions contain several statements. The statements of each dimension have given different codes from other statements dimensions. Table 15 shows each dimension and its statements. After coding the data, reliability test, KMO

Table 15: Coding of dimensions statements

| Dimensions | Statements coding |
|---|---|
| Ease of use | EOU1, EOU2, EOU3, EOU4, EOU5 |
| System availability | SA1, SA2, SA3, SA4, SA5 |
| Privacy /Security | PS1, PS2, PS3, PS4 |
| Interactivity | INT1, INT2, INT3, INT4, INT5 |
| Information | INF1, INF2, INF3, INF4 |
| Reliability | RE1, RE2, RE3, RE4, RE5 |
| Web design | WD1 ,WD2 ,WD3, WD4, WD5 |
| Fulfilment | FU1, FU2, FU3, FU4, FU5 |
| Efficiency | EFF1, EFF2, EFF3, EFF4, EFF5 |

Table 16: Reliability cronbach's test

| Dimension | No of items | Cronbach's alpha |
|---|---|---|
| System availability | 5 | 0.832 |
| Privacy/Security | 4 | 0.829 |
| Efficiency | 5 | 0.897 |
| Fulfilment | 5 | 0.925 |
| Reliability | 5 | 0.806 |
| Information | 4 | 0.851 |
| Ease of Use | 5 | 0.888 |
| Web design | 5 | 0.834 |
| Interactivity | 5 | 0.871 |

Table 17: KMO and bartlett's test for the all dimensions

| Kmo and bartlett's test | | Value |
|---|---|---|
| Kaiser-meyer-olkin measure of sampling Adequacy. | | 0.896 |
| Bartlett's Test of Sphericity | Approx. $\chi^2$ | 3858.955 |
| | df | 903.0000 |
| | Sig. | 0.000000 |

reduce and structure the data as it is one of the best techniques for data structure and data reduction (Jebur*et al*., 2012).

In order to check the significance and reliability of dimensions for analysis, Cronbach's alpha reliability test was conducted for all dimensions. The results show that all dimensions are significant as the Cronbach's alpha is more than (0.8) for all dimensions as shown in Table 16.

For more precise convenience judgment of data in performing factor analysis, the KMO measure of sampling adequacy and Bartlett's test of sphericity was conducted for the all dimensions. KMO with a value above 0.5 refers to the convenience of factor analysis for a dimension (George and Mallery, 2005) and the results confirm that as shown in Table 17.

The data reduction is carried out by identifying the variables that correlate to a large extent with other

and Bartlett's test were conducted. Eventually, exploratoryfactor analysis (EFA) was conducted to

Table 18: EFA pattern matrix

| Item | Component | | | | | | |
|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| FU5 | 0.976 | | | | | | |
| FU1 | 0.968 | | | | | | |
| FU4 | 0.927 | | | | | | |
| FU3 | 0.890 | | | | | | |
| EFF1 | 0.828 | | | | | | |
| FU2 | 0.730 | | | | | | |
| RE1 | 0.664 | | | | | | |
| EFF5 | 0.570 | | | | | | |
| EFF4 | 0.559 | | | | | | |
| RE5 | | | | | | | |
| EFF2 | | | | | | | |
| EFF3 | | | | | | | |
| INT1 | | 0.963 | | | | | |
| INT4 | | 0.904 | | | | | |
| WD1 | | 0.749 | | | | | |
| INT3 | | 0.746 | | | | | |
| WD4 | | 0.711 | | | | | |
| WD5 | | 0.688 | | | | | |
| INT2 | | 0.657 | | | | | |
| WD3 | | 0.643 | | | | | |
| EOU1 | | 0.543 | | | | | |
| WD2 | | 0.503 | | | | | |
| INT5 | | | | | | | |
| EOU2 | | | | | | | |
| INF2 | | | 0.887 | | | | |
| EOU3 | | | 0.755 | | | | |
| INF1 | | | 0.753 | | | | |
| INF3 | | | 0.512 | | | | |
| EOU4 | | | | | | | |
| SA1 | | | | 0.931 | | | |
| SA2 | | | | 0.851 | | | |
| SA4 | | | | 0.640 | | | 0.638 |
| SA3 | | | | 0.633 | | | |
| PS1 | | | | | | | |
| SA5 | | | | | | | |
| RE3 | | | | | 0.844 | | |
| RE4 | | | | | 0.656 | | |
| RE2 | | | | | 0.590 | | |
| PS2 | | | | | | 0.700 | |
| PS3 | | | | | | 0.617 | |
| PS4 | | | | | | 0.529 | |
| INF4 | | | | | | | |
| EOU5 | | | | | | | |

variables group, but not correlate with variables outside that group (Parasuraman*et al.*, 1988). In the EFA (Exploratory Factor Analysis), the most common method of extraction namely the principle component analysis was used in addition to the Rotation Method Promax.

The EFA was conducted on 43 statements of 9 dimensions of e-service quality in Malaysian universities. The exploratory factor analysis revealed 6 of the proposed dimensions with 33 statements as shown in Table 18.

The results showed that statements of some dimensions are moved to other dimensions due to strong correlations between the dimensions statements, while some statements are ignored. However, there are strong correlation between the statements of Fulfilment and Efficiency, which are combined under fulfilment dimension. This is because most original statements of fulfilment remain after the analysis followed by some efficiency statements, which can also refer to the fulfilment. Also, there is a strong correlation between Web Design and Interactivity dimensions, which are combined under Interactivity dimension. This is because most original statements of Interactivity remain after the analysis followed by interactivity statements and it has the highest scores, which can be associated underInteractivity dimension. The ease of use

dimension is removed because only two statements remain and they moved to the web design and information dimensions, while other dimensions remain since they keep nearly most of their original statements. The total variance show same dimensions number of EFA in Table 19.

**Extraction method:** Principal Component Analysis. When components are correlated, sums of squared loadings cannot be added to obtain a total variance.

**E-Service quality scale for Malaysian Universities:**The final significant dimensions of e-service quality in the target Malaysian universities, which represent the core of the e-SQ measurement scale, are shown below with their statements:

**Fulfilment:** Refers to the degree of the website in keeping his promises to provide the required and expected services at reasonable time:

- All services indicated on the site are available. (FU5)
- The website delivers services as expected. (FU1)
- The time for service processing is acceptable. (FU4)

Table 19: Total variance explained

| Component | Initial Eigen values | | | Extraction sums of squared loadings | |
|---|---|---|---|---|---|
| | Total | % of variance | Cumulative % | Total | % of variance |
| 1 | 19.690 | 45.791 | 45.791 | 19.69 | 45.791 |
| 2 | 2.968 | 6.903 | 52.694 | 2.968 | 6.9030 |
| 3 | 2.254 | 5.242 | 57.936 | 2.254 | 5.2420 |
| 4 | 1.387 | 3.225 | 61.161 | 1.387 | 3.2250 |
| 5 | 1.354 | 3.149 | 64.310 | 1.354 | 3.1490 |
| 6 | 1.213 | 2.820 | 67.130 | 1.213 | 2.8200 |
| 7 | 1.083 | 2.519 | 69.649 | 1.083 | 2.5190 |
| 8 | 0.968 | 2.252 | 71.901 | | |
| 9 | 0.944 | 2.194 | 74.095 | | |
| 10 | 0.821 | 1.909 | 76.004 | | |
| 11 | 0.789 | 1.835 | 77.839 | | |
| 12 | 0.699 | 1.625 | 79.465 | | |
| 13 | 0.643 | 1.496 | 80.961 | | |
| 14 | 0.629 | 1.464 | 82.425 | | |
| 15 | 0.583 | 1.357 | 83.781 | | |
| 16 | 0.524 | 1.218 | 85.000 | | |
| 17 | 0.506 | 1.176 | 86.176 | | |
| 18 | 0.479 | 1.114 | 87.290 | | |
| 19 | 0.468 | 1.089 | 88.380 | | |
| 20 | 0.437 | 1.017 | 89.397 | | |
| 21 | 0.397 | 0.922 | 90.319 | | |
| 22 | 0.367 | 0.852 | 91.172 | | |
| 23 | 0.343 | 0.798 | 91.970 | | |
| 24 | 0.323 | 0.752 | 92.722 | | |
| 25 | 0.308 | 0.717 | 93.439 | | |
| 26 | 0.288 | 0.670 | 94.109 | | |
| 27 | 0.256 | 0.595 | 94.704 | | |
| 28 | 0.249 | 0.580 | 95.284 | | |
| 29 | 0.231 | 0.538 | 95.821 | | |
| 30 | 0.221 | 0.513 | 96.334 | | |
| 31 | 0.211 | 0.491 | 96.826 | | |
| 32 | 0.198 | 0.461 | 97.286 | | |

- The website provides services at real time. (FU3)
- It is easy and fast to load pages. (EF1)
- The website delivers the required services within the expected time frame. (FU2)
- Correct information is provided on each service. (RE1)
- The site requires a minimal amount of information to be input by the users. (EF5)
- The site offers the necessity services required by the user. (EF4)

**H4A:** There is a positive relationship between fulfilment and expected outcome.
**H4B:** There is a positive relationship between fulfilment and perceived performance.

**Interactivity:** This refers to the website interaction with the users and how it encourages them to use the available services and keeps them on touch.

The website motivates users to use online services. (INT1):

- The website provides channels for communication with the users. (INT4)
- The website is visually appealing. (WD1)
- The website reminds users prior to deadlines of services. (INT3)
- The website provides its contents in different languages. (WD4)
- The website respects the other cultures. (WD5)
- The website informs users when new services are available. (INT2)
- The website is well structured. (WD3)
- It is easy to log into the website. (EOU1)
- The website design is simple and clear. (WD2)

**H7A:** There is a positive relationship between interactivity and expected outcome.
**H7B:** There is a positive relationship between interactivity and perceived performance.

**Information:** Refers to the quality, relevance and availability of provided information to the user through the website.

- The provided information is easy to understand. (INF2)
- It is easy to navigate through the website to find the required information. (EOU3)
- Information about all services is available. (INF1)
- The information is always detailed and relevant. (INF3)

**H8A:** There is a positive relationship between information and expected outcome.

**H8B:** There is a positive relationship between information and perceived performance.

**System availability:** Refers to the proper technical performance of the site, which includes its continuous availability, URL validation, website integrity, easy to lunch and run the website:

- The website is available 24/7. (SA1)
- The site launches and runs at acceptable response time. (SA2)
- Site failures are rare. (SA4)
- URL links work correctly. (SA3)

**H2A:** There is a positive relationship between system availability and expected outcome.
**H2B:** There is a positive relationship between system availability and perceived performance.

**Reliability:** Refers to the performance integrity and the service provider ability to supply accurate service and alternative option in case of service halt:

- The same problems occur frequently. (RE3)
- Problems in e-services are solved quickly. (RE4)
- Alternative options are given for each service when the service is disrupted. (RE2)

**H5A:** There is a positive relationship between reliability and expected outcome.
**H5B:** There is a positive relationship between reliability and perceived performance.

**Privacy/security:** Refers to the secured user personal information and website safety against threats by developing policies to regulate and ensure these issues:

- The website offers high security for personal information. (PS2)
- The website posts a clear privacy policy. (PS3)
- The site is safe and free from attacks or potential threats. (PS4)

**H3A:** There is a positive relationship between privacy/security and expected outcome.
**H3B:** There is a positive relationship between privacy/security and perceived performance.

The Rest of Research Model Hypotheses

**H10:** There is a negative relationship between expected outcome and disconfirmation.
**H11:** There is a positive relationship between perceived performance and disconfirmation.
**H12:** There is a positive relationship between disconfirmation and user satisfaction.
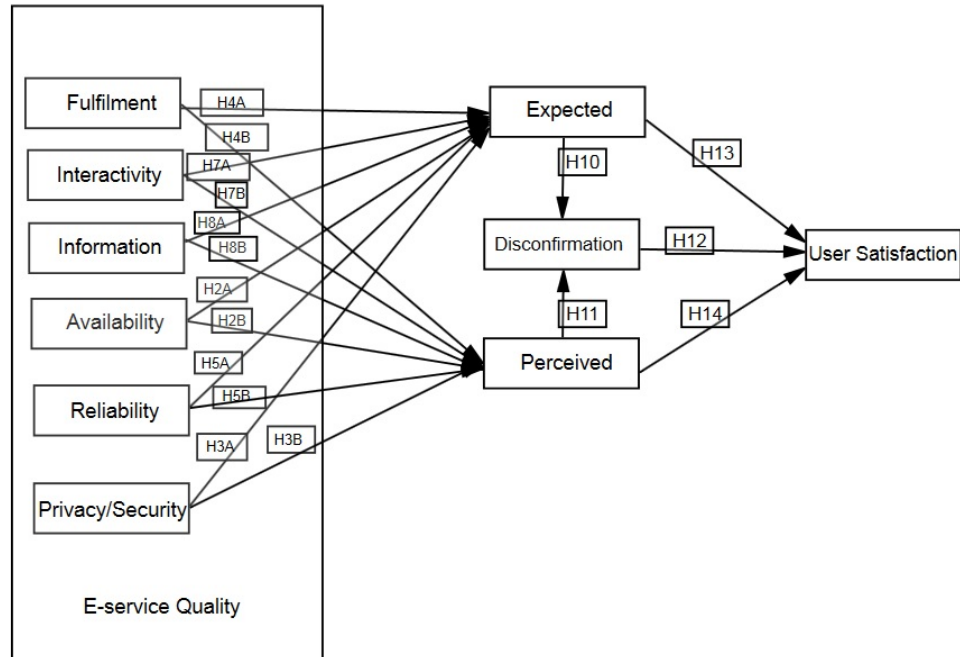
Fig. 6: Hypothesized conceptual model based on EFA

**H13:** There is a positive relationship between expected outcome and user satisfaction.

**H14:** There is a positive relationship between perceived performance and user satisfaction.

These e-SQ dimensions are the first scale that proposed for higher education domain. This scale can helps universities to measure their e-services provided to the students in order to improve the e-services and to achieve high user satisfaction. Figure 6 shows the hypothesized conceptual model based on EFA.

## CONCLUSION

Regarding higher education, the literature includes a little researches focusing on minimal number of e-services rather than an entire view of e-SQ. According to that, a hypothesized conceptual model of e-service quality and user satisfaction relationship in Malaysian universities is developed. The model proposed nine dimensions for measuring e-SQ and implemented EDT model to measure the students' satisfaction. The model includes two stages; the first stage is to define the significant dimensions of e-SQ and the second one is to measure the students' satisfaction. This study achieves the first stage objective. The first stage utilized a structured questionnaire in some Malaysian universities. The findings refine the proposed dimension of the model to 6 dimensions and update the statements of some dimensions based on the analysis of the gathered data using the SPSS 20. The final dimensions lead to build a proper scale to measure the quality of e-services in higher education, which can

assist to improve the performance and effectiveness of e-services to achieve the students' satisfaction. Consequently, the competitive advantage for the universities in their respective target markets can be enhanced. More experiments and tests will be conducted to achieve the second objective of the hypothesized model. Generally, much research, more experiments and validation are needed to enhance e-service quality models and measurements, which can provide a foundation for the researchers to study the user satisfaction in all domains.

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