QUALITY EVALUATION MODEL OF YEMENI UNIVERSITIES WEBSITES FROM STUDENTS PERSPECTIVES

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Abstrak

Laman web Institut Pendidikan Tinggi (IPT) adalah salah satu platform untuk mempromosi program akademik serta aktiviti berkaitan penyelidikan, penerbitan, perundingan dan lain-lain yang dapat menyumbang kepada pencapaian universiti ke arah meningkatkan posisi dalam senarai kedudukan universiti di dalam atau luar negara. Laman web ini juga penting untuk meraih kepercayaan pemegang kepentingan terhadap program pendidikan yang ditawarkan oleh pihak universiti berkenaan. Selain daripada berupaya untuk menyediakan maklumat yang diperlukan kepada bakal pelajar secara efisien, laman web tersebut harus juga memastikan maklumat mudah dicapai. Tugas untuk menghasilkan laman web ini bukanlah sesuatu yang mudah di mana terdapat beberapa laman web IPT yang tidak dapat dicapai disebabkan oleh reka bentuk yang kurang baik. Oleh itu, terdapat keperluan untuk mereka bentuk laman web IPT yang berkualiti tinggi berdasarkan kepada salah satu daripada piawaan kualiti iaitu ISO 9126-1. Kajian ini bertujuan untuk menilai kualiti laman web IPT bagi memenuhi keperluan bakal pelajar. Penilaian ini bertumpu kepada perpektif pelajar terhadap laman web IPT yang terlibat dalam pemerhatian. Kaji selidik telah dijalankan yang melibatkan lima laman web universiti terkemuka di Yaman. Kajian ini mengguna pakai piawaian kualiti perisian ISO 9126-1 sebagai teori asas kajian. Selain itu beberapa faktor lain yang berkaitan dengan kandungan dan keperluan laman web IPT juga diambilkira di dalam penilaian ini. Model penilaian laman web yang terdiri daripada enam faktor kualiti: kebolehgunaan, kandungan, penampilan laman web, kecekapan, fungsi dan kualiti servis telah dihasilkan. Berdasarkan model ini, soal selidik secara atas talian telah dibangunkan bagi tujuan pengumpulan data. Responden kajian ini terdiri daripada 125 graduan sarjana muda dan pascasiswazah. Soal selidik sah yang dikembalikan telah dianalisa menggunakan perisian SPSS, teknik PLS-SEM dan kaedah analisis WEBUSE. Walaupun, keputusan pengujian hipotesis menunjukkan kesemua hipotesis diterima, terdapat dua faktor kualiti yang tiada kesan signifikan ke atas kualiti laman web IPT iaitu kandungan dan kecekapan. Selain itu, dapatan kajian menunjukkan keseluruhan tahap kualiti laman web IPT adalah baik. Namun begitu, terdapat beberapa kelemahan aspek tertentu fungsi carian, reka bentuk, kandungan, dan prestasi. Kajian ini juga menyediakan beberapa cadangan bagi meningkatkan kualiti laman web universiti yang dikaji.

Kata kunci : Kualiti Laman Web, ISO 9126-1 Kualiti Standard Perisian, Penilaian Laman Web, Laman Web Institut Pendidikan Tinggi

Abstract

Higher Education Institute (HEI) website is one of the platforms to promote academic programs as well as research, publication, and consultation activities; and so forth, that may contribute to the university achievements towards advancing its position in the local and international university ranking list. The website is also important in gaining the trust of stakeholders of the educational programs offered by the respective universities. Besides being able to efficiently provide required information to potential students, the HEI website should also ensure that the information can be accessed easily. The creation of such website is certainly not an easy task whereby some of the existing websites are not accessible due to its poor design. Thus, there is a need to design a high quality HEI website based on one of the quality standards such as the ISO 9126-1. This study aims to evaluate the quality of HEI websites in meeting the requirements of potential students. The evaluation focuses on the students' perspectives of the observed HEI websites. A survey was conducted involving five established Yemeni universities websites. This study adopted the ISO 9126-1 software quality standard as the based theory. In addition, a few other related factors to content and requirements of HEI website were also taken into consideration. A HEI website evaluation model was constructed comprises of six quality factors: usability, content, web appearance, efficiency, functionality, and service quality. Based on the model, an online questionnaire was constructed for collecting data. The respondents of this study were 125 undergraduate and postgraduate students. The valid returned questionnaires were then analyzed using the SPSS software, PLS-SEM technique and WEBUSE analysis method. Even though, the hypothesis testing results showed that all hypotheses are acceptable, there were two quality factors that did not have significant effect on the HEI website quality: content and efficiency. In addition, the results revealed that the overall quality level of the HEI websites is good. However, some weaknesses in certain aspects were found, such as the searching function, design, content, and performance. This study also provides some suggestions for enhancing the website quality of the observed university websites.

Keywords: Website Quality, ISO 9126-1 Software Quality Standard, Website Evaluation, Higher Education Institute Website

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CHAPTER ONE

INTRODUCTION

1.1 Introduction

Nowadays, every individual utilizes the internet to join with others or offer data about them. That is the reason why websites are imperative perspectives that should be addressed and legitimately developed. They serve as means by which individuals have a better view of the data they need to send and receive. The reasons for which organizations create websites are: delivering content to the target users, marketing, services or products transactions, or promoting services and products (Djajadikerta & Trireksani, 2006). Thus, the gateway for information, products, and services in organizations is websites. As a result, it is important for organizations to have websites that live up to the expectations of the target users so as to achieve the intended goals (Iwaarden, Wiele, Ball, & Millen, 2004). Despite the fact that many websites lack the quality of satisfying their user's needs, the reliance on using websites for different purposes such as finding information, shopping online, communicating with people or performing other different tasks has augmented (Mebrate, 2010). Moreover, existing websites in different domains have become application oriented and not just the only document oriented anymore. Consequently, they are now complex systems (Luis Olsina, Lafuente, & Rossi, 2001). Afterward, there are increasing concerns and challenges about website design, implementation and evaluation techniques, (Mustafa & Al-Zoua'bi, 2008; Olsina*, Godoy, Lafuente, & Rossi, 1999) while the quality of the website is determined by how well the design meets the satisfaction of users and how

well the design of a website is (Zhou, 2009). The website is considered to have failed or may not attract any visitors if the quality standard is not taken into consideration during the development process of the website. Therefore, the choice of using or developing a high-quality website is of utmost importance (Mebrate, 2010).

The website needs to be evaluated in order to determine its quality (Fernandez, Insfran, & Abrahão, 2011; Wang & Senecal, 2007). Evaluating quality of a website requires having a good evaluation model that consists of essential quality characteristics and evaluation method which depends on the purpose of evaluation (Mich, Franch, & Gaio, 2003; Zahran, Al-Nuaim, Rutter, & Benyon, 2014; Zhou, 2009). There are several models for website evaluation, each highlighting different factors necessary to build a successful website. However, many quality models and tools are related to the business purposes such as SERVQUAL model, ISO9126 model, 2QCV3Q model, WEBQUAL, and WQ. In contrast, a few models are related to education such as University WEBQUAL, Web-site QEM, and Fuzz-web. There are several website design guidelines have been widely adopted in various studies by researchers, especially, in the academic domain for the purposes of improving the website design, development processes of websites, and website quality evaluation standards. Unfortunately, the models remained statically in the report or document and not largely used or applied to any website. The report just provides a list of broad quality characteristics structured in a hierarchical way (Mebrate, 2010), and this is such a waste of valuable tools that significantly may assist the organization in improving their website which may give the first impression or reflect their services to their stakeholders.

Many Higher Education Institutes (HEI) are utilizing websites in promoting their academic program, services, researches and expertise, knowing that they are far away from potential students and not simply around their geographical location. (Ahmad, 2013). There are a few reasons for the needs of the HEI websites. For instance, some related information such as academic programs is available on the websites that are helpful in earning potential students, while they are given an opportunity to select a program of their interests. In addition, the website is important because it is one of the criteria for measuring the HEIs ranking to ensure that the institution provides a good impression of their educational programs with acceptable quality and levels (Manzoor, Hussain, Ahmed, & Iqbal, 2012). Therefore, it is important to ensure all those information can be easily navigated and accessed. The evaluation of the website is necessary to identify the strengths and weaknesses of the website for further improvement in the future.

According to Mishra (2007), "Higher education is the backbone of any society and the quality of higher education determines the quality of human resources of a country". With the development of a higher education website, students, lecturers, faculties, guests and alumni will easily communicate. Therefore, this study aims to evaluate the quality of higher education institute websites to determine whether the website succeeds in providing a high level of quality that meets the students' needs.

1.2 Problem Background and Problem Statement

A website is an important benefit to all HEIs because it can give so much information to people all over the world about the HEIs. It is crucial in promoting the HEIs and gives the first impression to the potential user to choose these institutes (Ahmad, 2013; Jabar, Usman, & Awal, 2013).

The evaluation of website will determine if the website is delivering what it is intended for and for whom it is intended (Mebrate, 2010). Besides, the evaluation helps in identification of parts in a website that needs improvement and modification (Hasan & Abuelrub, 2011; Lin, 2010; Sife & Msoffe, 2013).

Despite the fact that the research on website quality is prolific, the quality of websites does not develop as well as their rapid development (Cherfi, Tuan, & Comyn-Wattiau, 2014). Furthermore, the following question is still available, "why is the quality of websites still poor and lack of quality characteristics causing user dissatisfaction in most websites?" (Ayoub, 2014; Zhou, 2009) Most of the websites do not fulfill the basic quality principles. This is due to several reasons, such as easy use of web-oriented languages, rapid evolution of technologies, tolerance of browsers to display and also incorrect code (Cimino & Micali, 2008).

Evaluating quality of a website requires having a good evaluation model that consists of essential quality characteristics and evaluation method which depends on the purpose of evaluation (Mich et al., 2003; Zahran et al., 2014; Zhou, 2009). The weakness of some website quality model that already exists is still being used as a general characteristic that cannot describe specific quality factors to evaluate particular software or particular website domain (Sugiyanto, Siti Rochimah, & Sarwosri, 2016). Academic website differ

from generic website because it serves particular needs of specific users (Sugiyanto et al., 2016). However, most of the HEI evaluation models are focusing on some aspects of quality such as usability or accessibility (Aziz, Isa, & Nordin, 2010; Jabar et al., 2013; Manzoor & Hussain, 2012; Mentes & Turan, 2012). Moreover, educational website users are mainly concerned with the following questions (Mustafa & Al-Zoua'bi, 2008; Okene & Enukpere, 2011):

- "Can I find the information I am looking for in my website easily?"
- "Can I find the information in a timely manner?"

This indicates that the users of educational websites are concerned about whether or not they can find the information they are looking for on the website and how long it would take them to find that particular information.

In generic domains, a quality model only provides a list of quality factors and sub-factors without considering the needs and expectations of a particular user. In the specific domain such as HEI websites, each user has different needs and expectations (Sugiyanto et al., 2016). So the HEI website needs to provide all information related to courses that are helpful to give the chance to students to immerse themselves in a subject that they are interested in. HEI website also must ensure that the education provided by the institute meets an acceptable level of quality (Manzoor et al., 2012). In addition, the HEI websites need to meet the needs and expectations of their users and need to meet the high level of quality (Bairamzadeh & Bolhari, 2010; Manzoor & Hussain, 2012; Mebrate, 2010; Sife & Msoffe, 2013). Some existing academic website quality models focus on the all groups of users not specific users like Sugiyanto et al. model (2016). Rizavi et al. (2011) focused on the youngest users who aged on 25 – 28. However,

Mebrate (2010) focused on only students but he used students from only one faculty with similar background of study. Thus, there is a need to design a model that can be used to evaluate the quality of HEI websites and determine the extent to which they meet the student needs and requirements.

1.3 Research Questions

To accomplish the targets of this research the following questions to be answered:

1. What are the current issues and factors of website quality for assessing the higher education websites?
2. How to construct a website quality evaluation model for higher education institutes?
3. What are the overall students' perceptions based on the identified website quality factors in Yemeni higher education websites?

1.4 Research Objectives

The main purpose of this research is to evaluate the quality of higher education institute websites from students' perspective. There are three objectives related to the main objective are summarized as below:

1. To identify the current issues and factors of website quality for assessing the higher education websites.
2. To construct a website quality evaluation model for higher education institutes?
3. To assess the overall students' perceptions based on the identified website quality factors in Yemeni higher education websites.

1.5 Research Scope

The research is limited for evaluating a quality of higher education websites from a student perspective. Therefore, the focus on the quality of HEI websites and the significant quality factors, that will be used to identify whether the selected websites is successful or not.

The selected HEI websites in this research are the top-five ranked in Webometrics out of 28 public and private universities in Yemen. These websites are Yemeni University of Science & Technology http://www.ust.edu/, Al-Nasser University http://www.al-edu.com/, University of Aden http://www.aden-univ.net/, Sana'a University http://www.su.edu.ye/, and Al Ahqaff University http://ahgaff.edu/.

The respondents of this study will be postgraduate (PG) and undergraduate (UG) Arab students in Universiti Utara Malaysia (UUM), who their native language is the Arabic language because the interfaces design of all selected websites in the Arabic language. The respondents will be visiting the websites to examine the quality.

1.6 Research Significant

Nowadays, increasingly studies call for website evaluation that takes the values of users into consideration. Despite, many previous studies on the quality of websites have mainly focused on the business websites, but only a few on academic websites. In Yemen, there is no study have been done on the quality of the higher education websites. According to Anaam, Alhammadi, and Kwairan (2009), the higher education in Yemen is rather new. The higher education re-established between 2001 and 2008, in this time

the quality assurance and accreditation systems had been established. Then many universities had been established until become 28 universities. This study is therefore set out to evaluate the higher education websites of the highest ranks of five universities in Yemen. Each of these universities has its website. These websites need to assess to know whether success or not to ensure the satisfaction of the users especially students in browsing and exploring the information on the website. This is important because HEI website is one of the platforms to promote the university programs, activities, and achievement in order to increase the university ranking and also to gain the trust of the educational program offered by the university. Therefore, universities should be taken into consideration the website quality factors in developing their websites. So, measuring the quality of a website can provide feedback to the university so as to take corrective actions and improve its website. In addition, using this evaluation study, other organizations can assess the quality of their websites, therefore, be able to know the degree of their users' overall perception about the quality of the website.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter provides a review of the literature regarding key topics in the study. It will explain about the definitions and past research that other researchers made about this study. More information will be gathered to help further understanding of this research. Such as concepts and ranking of higher education institutions; concepts and definitions of website quality and quality factors and models; explaining about website evaluation; website quality issues; and detailing of the existing studies in evaluating higher education websites.

2.2 Higher Education Institution

Higher education is determined by doing different things to different people. Generally, the areas covered in higher education are research, teaching, and extension. In all walks of life, higher education is considered the feeder or source system and thus, in the field of research, planning, designing, teaching and management supplies the much-needed human resource. Similar to the working class, the economic growth of a country and scientific and technological advancement of the country are dependent on the system of higher education. The higher education helps in the provision of opportunities related to lifelong learning, peoples, with the time being, are allowed for the enhancement of skills and knowledge on the basis of societal needs (Mishra, 2007). The higher education is defined as university level education. Varieties of qualifications are offered by higher

education which includes: Foundation Degrees, Honors Degrees, Higher National Diplomas, Post Graduate programs and Doctorates (Manzoor et al., 2012).

There are many reasons that higher education institution must own a website. Such as the information provided on the website of higher education will boost the earning potentials and career prospects of a student as they are given an option of selecting the subject of their interests. In order to be globally competitive, HEIs needs a website. The website will help in the evaluation of education provided by institutions of higher education that if it is of an acceptable level and quality (Manzoor et al., 2012).

2.2.1 Quality of Higher Education Institution

For any society, higher education is considered the most important component and the quality of a country's human resource is determined from the quality of higher education (Mishra, 2007). The design of quality higher education will ensure specific standards that the intended purpose is met, that are the goals and needs of stakeholders (Mishra, 2007). Besides social and economic well-being, country's quality higher education also determine the global status of the higher education system (Tarawneh, 2011).

The quality in HEI has an international perspective as "quality in higher education is a multidimensional concept, which should embrace all its functions, and activities: teaching and academic programs, research and scholarship, staffing, students, buildings, facilities, equipment, services to the community and the academic environment" (Sabio & Junio-Sabio, 2014).

Different reasons are mentioned for focusing on the quality of higher education. The list of the preferred reasons is listed below: (Akeusola & Ofulue, 2011; Mishra, 2007)

- In educational institutions, the competition is increased for students and funds by globalization and the GATS (Global Agreement on Trade in Services);
- The customer satisfaction is valued and quality teaching is provided which makes them capable of attaining competencies and employable skills;
- Standards are maintained which needs the struggle to enhance on provision of goods and services;
- Funds are efficiently and effectively used because of accountability;
- Quality goods and services are constantly provided which creates credibility;
- Image and visibility attract the support of stakeholders for institutions and, for graduates, quality employment placements are developed.

Tarawneh (2011) mentioned that different factors determine the quality of higher education:

1. Towards learning and teaching, the perception of society is changing.
2. There are social expectations from the graduate of higher education institutions.
3. In the development of higher education, activities and higher education's management balance are kept between studies and research.
4. The study programs' context and structure.
5. Practical implementation of the study procedure.
6. Conditions of the study.
7. Student's needs satisfaction.

2.2.2 Higher Education Institution Website Ranking

Ranking highly assures the quality of higher education, having the efficacy of evaluating the comparative data of HEIs, but other quality assurance technique like benchmarking and accreditation must be combined with in order to get a continuous enhancement of HEIs. Therefore, for continual improvement, HEIs must consider all available approaches and techniques (Kalanova, 2008).

Sometimes, the ranking is explained that it simplifies and clarifies a complex scenario for students and other interested parties. Even if the concept of ranking is covering many aspects, mostly, there is a common factor in ranking that indicators of quality are presented that produce a result which, in turn, is ranked and compared with all other similar results (Almgren, 2009). According to Sanoff, Usher, Savino, and Clarke (2007), the ranking of HEI contributes to the definition of "quality" of higher education institutions within a particular country.

Based on Kalanova (2008), following are the aims of ranking:

- To help in the process of decision-making of students and their parents; funding organizations; international organizations; government workers; and employers;
- To make HEIs more competitive;
- Within HEIs, creation and development of quality assurance are stimulated.

2.2.2.1 Webometrics Overview

For the measurement of information and documents, the web is considered as an important source by Webometrics (Thelwall, 2009). Cybermetrics lab, a research group and belongs to Consejo Superior de Investigaciones Cientificas (CSIC),

initiated this. In Spain, the largest public research body is CSIC. In Europe, it is considered among the first basic research organizations (Webometrics, 2015).

Cybermetrics lab is a part of CCHS (Centro de Ciencias Humanas y Sociales), which was developed in 2007 from the merge of various institutes and centers devoted to humanity and social sciences that are related to CSIC in one place. Webometrics or cybermetrics is considered an emerging discipline that uses the quantitative analysis of web content and the Internet (Webometrics, 2015).

Webometrics and Cybermetrics have become established within the infometric community, whilst there has been growth in the usage of the term 'webometrics' within the wider online community. The difference between the two terms was resolved by allowing cybermetrics to be more general—referring to non-web Internet research (Thelwall, 2009).

In Webometrics, the focus is on measuring the aspects of the web: words in web pages, web pages, hyperlinks, parts of web pages, and results of a web search engine. The clearest need for Webometrics is to support research into web phenomena. In addition, it is the largest ranking for Higher Education Institutes (HEI). Webometrics uses quantitative techniques, as in its definition "the study of web-based content with primarily quantitative methods for social science research goals using techniques that are not specific to one field of study." The purpose of this definition is to set Webometrics free from informatics and aim it at a wide social science audience while excluding field-specific methods such as linguistic analyzes of online language (Thelwall, 2009).

The basic aim of Webometrics ranking was the promotion of web publications, provision of electronic access to scientific publications and other academic material, and supporting open access initiatives (Webometrics, 2015). Table 2.1: the actual coverage of ranking is summarized in terms of a number of countries and higher education institutions around the world.

Table 2.1

Webometrics Ranking Coverage

Region/Countries	Top 100	Top 200	Top 500	Top 1000	TOTAL
NORTH AMERICA	**73**	**111**	**196**	**394**	**3466**
USA	67	95	172	356	3262
Canada	6	16	24	38	199
EUROPE	**16**	**58**	**221**	**413**	**5102**
United Kingdom	7	10	37	67	236
Germany	2	12	47	66	405
Netherlands	2	3	9	13	154
Italy	1	3	17	37	209
Switzerland	1	3	7	10	107
ASIA	**7**	**19**	**49**	**108**	**6177**
Taiwan	3	6	11	21	156
Japan	2	6	12	33	716
China/Hong Kon	1	5	14	19	1217
OCEANIA	**2**	**6**	**14**	**35**	**168**
Australia	2	6	12	28	103
LATINAMERICA	**2**	**5**	**17**	**40**	**3491**
Brazil	1	4	12	18	1441
Mexicc	1	1	1	5	899
ARAB WORLD		**1**	**2**	**5**	**600**
AFRICA			**1**	**5**	**398**
OTHER					**1**
WORLD					**19403**

(Webometrics, 2015)

2.2.2.2 Ranking Criteria

Only research centers and universities with independent web domain are considered because the institutional domain is the unit for analysis. If the institution use one or more domain, the different address will be assign to each entry (Webometrics, 2015).

The first web indicator is WIF (Web Impact Factor). Basically, WIF was based on link analysis that helps in combining the number of external inlinks and number of web pages. The ration between visibility and size is 1:1. Two indicators were added to the size component with the use of this ration by ranking, two indicators are: number of documents and the number of publications. A number of files in a web domain helped in determining the number of documents, and the database of Google Scholars helped in collecting a number of publications (Webometrics, 2015).

The main search engine provided four indicators that are:

1- **Size (S)**: number of pages were recovered from Bing Search, Google, and Yahoo.

2- **Visibility (V)**: in accordance to Yahoo Site Explorer, the total number of received external links (inlinks) by a site.

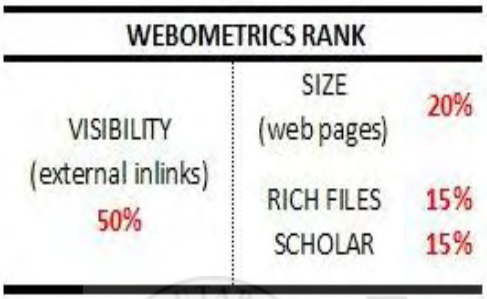
3- **Rich Files (R)**: the data extracted from bing, Yahoo, and Google was in the following format: Microsoft Word (.doc), Adobe Acrobat (.pdf), Microsoft Powerpoint (.ppt) and Adobe PostScript (.ps). The file format was selected after evaluation of its relevance and publication activities and also considered the volume of different file formats.

4- **Scholar (Sc):** The published data of time period 2006-2010 was gathered from Google Scholar and the global output from 2004-2008 was collected from Scimago SIR.

All the above four indicators maintain the ratio 1:1 but each of them have different weight. The half of ratio consists of external inlinks represented by visibility (50%), and the other 50% for the rest of indicators, size, rich files, and scholar as shown in Table 2.2.

Table 2.2

Webometrics Rank Ratio 1:1



(Webometrics, 2015)

The web is an appropriate platform for institution internationalization. So the universities can attract students and scholars from all world through a powerful and detailed web presence that provide an accurate structure and activities descriptions (Webometrics, 2015).

2.2.2.3 Current Yemeni Higher Education Institute Webometrics Ranking

The ranking of HEIs helps in improving the quality of higher education (Almgren, 2009). Higher education in Yemen is newly developed. Aden and Sana'a universities were the only two in the beginning. In the period of 2001-2008, MHESR (Ministry of Higher Education and Scientific Research) had been re-established. The contribution of Center for Higher Education Policy Studies (CHEPS) includes the re-engineering of the Ministry, quality assurance, in the strategic development plan for Higher Education System of Yemen and for policy and planning, the training of ministry staff, and funding

models. After that, both at the institutional and national level, the accreditation, and quality assurance system was developed by MHESR (Anaam et al., 2009; CHEPS, 2015). Yemen today has 28 HEI website in the Webometrics ranking. The top rank university has 5265 in the World Rank goes to Yemeni University of Science & Technology. On the other hand, the lowest rank goes to Alhikma University, which has 23650 in the World Rank. Table 2.3 and 2.4 show the latest edition in Webometrics of Yemeni HEI from 1 to 22 and 23 to 28 in respectively, which have been taken on 20th August 2015.

The ranking table has 8 columns that give details about the HEI ranks. These columns from left to right are Ranking, World Rank, University, Det. (Details), Presence Rank, Impact Rank, Openness Rank, and the last one is Excellence Rank. The order of HEI rank is given by the first column (Ranking).

Table 2.3

Yemeni HEI Ranking From 1 to 22

Yemen

ranking	World Rank	University	Det.	Presence Rank*	Impact Rank*	Openness Rank*	Excellence Rank*
1	5265	Yemeni University of Science & Technology		7171	7832	4719	4318
2	5410	Al Nasser University		12341	3425	5251	5490
3	8600	University of Aden		9423	13816	9366	3839
4	9988	Sanaa University		18201	15295	21671	2448
5	11801	Al Ahgaff University		12783	7498	21671	5490
6	12951	Al Eman University		15594	9717	19563	5490
7	14000	Hadhramout University of Science & Technology		23441	13084	21671	3656
8	14821	Saba University		9951	14507	17700	5490
9	14873	Al-Andalus University for Science & Technology		6317	17161	10485	5490
10	15726	(1) Hodeidah University		15757	19161	16903	4120
11	17048	University of Modern Sciences		3779	19649	13357	5490
12	18399	Future University		7646	19952	16277	5490
13	18493	Ibb University		22393	21877	18786	3093
14	20066	Queen Arwa University Yemen		12676	20837	17326	5490
15	21552	Taiz University		23441	22437	21671	3364
16	21785	Lebanese International University Yemen		21662	21886	16722	5490
17	21888	Yemenia University		14609	22498	13947	5490
18	22513	Al Jazeera University		21178	22190	21671	5490
19	22642	Yemen University		21880	22307	21671	5490
20	22767	Al Razi University		5832	23025	17267	5490
21	22801	Dar Al Salam University		23170	22387	21671	5490
22	22811	Amran University of Technology		16621	23025	21671	4318

(Webometrics, 2015)

Table 2.4

Yemeni HEI Ranking From 23 to 28

23	22975	National University		10985	23025	18640	5490
24	23101	Arabian University		23396	22795	18185	5490
25	23154	British University in Yemen		22671	22801	21671	5490
26	23327	International University of Technology Twintech		17027	23025	21671	5490
27	23577	The Civilization Private University		22614	23025	21671	5490
28	23650	Alhikma University		23151	23025	21671	5490

* Lower is better

(Webometrics, 2015)

2.3 Website Quality

The feature of a product or service that fully meets the consumers needs is a quality (Negash, Ryan, & Igbaria, 2003). According to Aladwani and Palvia (2002), Web quality is a multidimensional and complex measurement in nature. The International Organization for Standardization (ISO 9126-1) defines quality as *"the totality of characteristics of an entity that bear on its ability to satisfy stated and implied needs."* (ISO/IEC 9126-1, 2000)

Website and software are similar (i.e. it is used for an entity, or some prototype, or its architecture of information) defined in terms of a system of attributes (Zhou, 2009). Therefore, the quality of software determines the quality of a website. A good website may have these criteria such as user friendliness and accessibility; it also provide useful and reliable information for the needs and expectations of users, and also good in design and visual appearance (Zhou, 2009). According to Lilburne, Devkota and Khan (2004), website quality can be measured based on two perspectives: Programmers and End users.

Various organizations and experts have researched on a proposal regarding the improvement of website quality which includes: criteria, quality framework, usability guidelines, evaluation methodologies and metrics (Calero, Ruiz, & Piattini, 2005; Zhou, 2009).

The quality of website will be prone to subjective interpretation unless web quality model quantifies a website (Zhou, 2009). According to Fenton and Neil (1999), website quality model is a set of assessment attributes that a certain product possesses.

Therefore, the web quality model must set some standards for the quality of website which meet and satisfy the needs of users (Mich et al., 2003; Zhou, 2009). One of the quality standards is stated in the ISO 9126-1. This study will adapt the website quality criteria as stated in this standard document as a based theory.

2.3.1 Quality Models

According to ISO/IEC 25000:2005, a quality model is a "defined set of characteristics, and of relationships between them, which provides a framework for specifying quality requirements and evaluating quality."

The websites haven't specific quality standard. However, websites are considered specific software applications. Therefore, the software quality standards can be applied to web applications (Cherfi et al., 2014). In this section, ISO quality model and some of the website quality models are discussed briefly.

a- ISO Quality Model

In the mid-1970's, the first model for software quality identification was discovered. With the efforts of ISO – an international organization for standardization and IEC-international Electro-Technical Commission, ISO9126 was developed which was for software product Evaluation, Information Technology and quality characteristics and Guidelines. ISO9126 was developed as an international standard for software quality evaluation model from the perspective of the product. ISO 9126 is further divided into four parts which are: 9126-1 quality model, 9126-2 external metrics, 9126-3 internal metrics and 9126-4 for quality in use metric. The different dimensions of ISO 9126 are usability, functionalities, maintainability, efficiency, portability and reliability as

shown in figure 2.1 (Bevan, 1999; ISO/IEC 9126-1, 2000). Furthermore, there are 27 sub-characteristics of all characteristic, which are then, as a further step, divided into a group of indicators at the level number three. The quality of sub-characteristics determines the quality of characteristics and the quality of sub-characteristics is determined from its indicators. Benefits of ISO 9126 is that it helps in providing a framework for trade-offs between software product capabilities and the attributes can be applied to any kind of software even to computer programs and for the quality of software product, a consistent terminology is provided (Abran, Khelifi, Suryn, & Seffah, 2003; Aziz & Kamaludin, 2014). The disadvantage or weakness of ISO 9126 are vague architecture, there are no quality requirement standards, overlapping concepts, there is no guidance for assessing or evaluating the results of measurements, and ambiguous choice of measures (Abran et al., 2003; Aziz & Kamaludin, 2014).

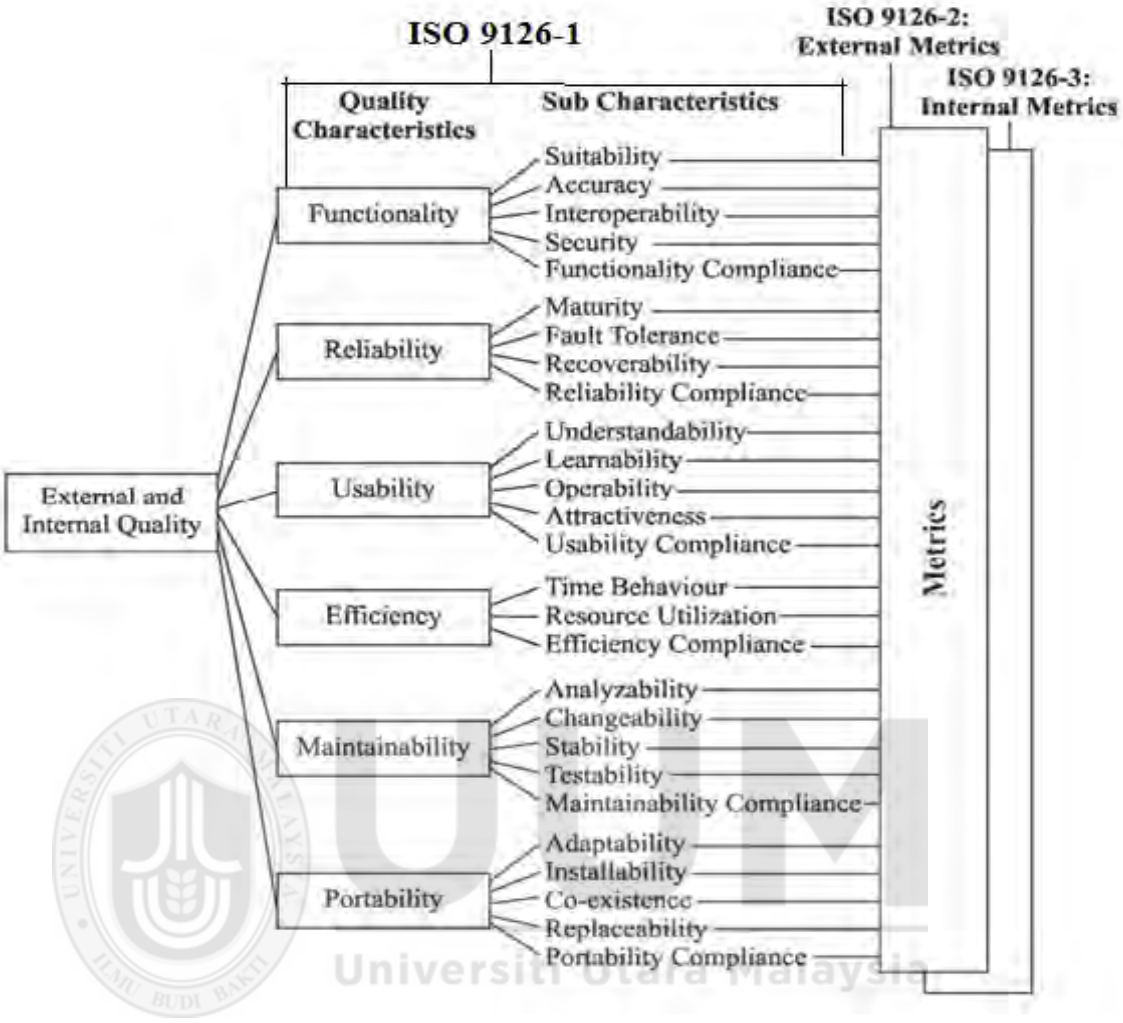


Figure 2.1 The ISO 9126 Model (Mebrate, 2010)

b- Website Quality Models

There have been significant developments in the Web Engineering, which shifted the focus of quality evaluation, from the offline world to the online world based on the basic software quality evaluation models (Mebrate, 2010).

1- QEM model

Olsina* et al. (1999) introduced a website quality evaluation method (web-site QEM) for academic sites and other domains, which shows a hierarchical and descriptive specification framework for characteristics, sub-characteristics, and attributes regarding the student's viewpoint. It contains 120 quality characteristics and attributes. The characteristics of this model are based on the ISO 9126 model. However two characteristics of ISO 9126 excluded from this model which are Maintainability and Portability. Therefore, the quality characteristics include usability, functionality, reliability, and efficiency. Figure 2.2 illustrates the process of web QEM.

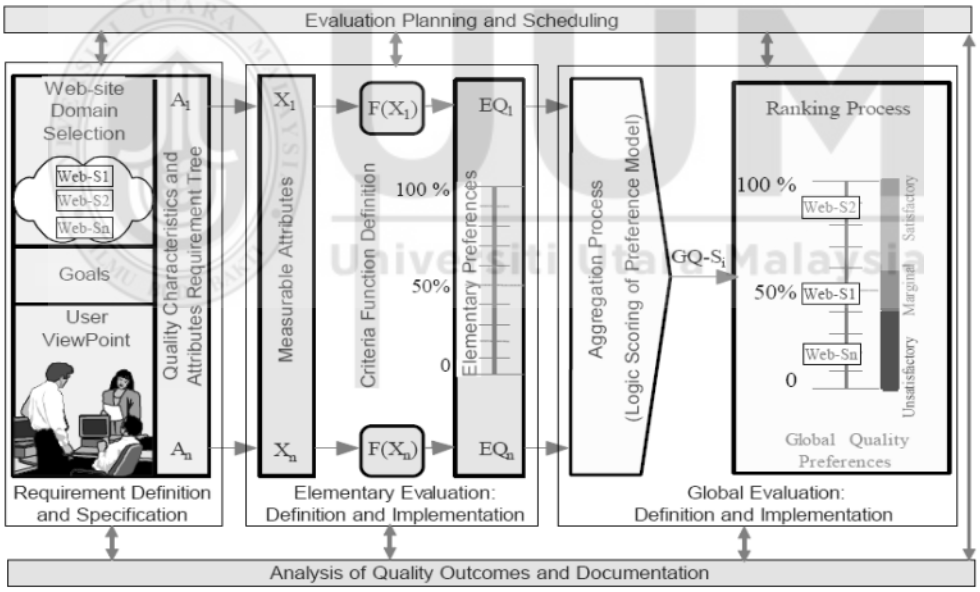


Figure 2.2 Web-site QEM Process (Olsina* et al., 1999)

2- 2QCV3Q model

2QCV3Q model was developed by Mich et al. (2003) and it was purposed for the support of owners and developers of the website, website quality is evaluated, and these

feelings are employed in the design of the website. Elements are highlighted by a 2QCV3Q model which allows through evaluation of website and guideline is developed. To the definition and measurement of website quality, this model provides an approach. This model explains that the user's needs must be well-designed and provide flexible functions that will provide web application with diverse content. There are seven dimensions of website quality in this conceptual model; why-when-who-what-how-where and feasibility (with what means and devices). This model takes its name from initials of the Cicerone *loci*, which begin with Quis (identity), Quid (content), Cur (services), Ubi (individuation), Quando (management), Quomodo (usability) and Quibus Auxiliis (feasibility) as it shown in Table 2.5. Furthermore, the model is a domain independent, general purpose, scalable, and usable. Moreover, the model furnishes the website owners with useful redesign suggestions.

Table 2.5

The 2QCV3Q Model

Ciceronian Loci	Attributes
Quis	**Identification**
(*Persona:* Who?)	Brand (organization or company); charisma (individual)
Identity	Image
	Characterization
	Design
	Personalization
Quid	**Coverage**
(*Factum:* What?)	Domain referred to owner's and users' goals
Content	Value of information and links
	Accuracy
	Quality of information
	Source(s), author(s)
Cur	**Functionalities**
(*Causa:* Why?)	Adequacy to owner's goals
Services	Adequacy to users' goals
	Control
	Correctness
	Security, ethics, and privacy
Ubi	**Reachability**
(*Locus:* Where?)	Intuitive URL
Location	Retrieval
	Interactivity
	Contact information
	Community building
Quando	**Currentness**
(*Quando:* When?)	Updates and revisions
Management	Dates
	Maintenance
	Check-up
	Tools
Quomodo	**Accessibility**
(*Modus:* How?)	Hardware and software requirements
Usability	People with disabilities
	Navigability
	Structure, orientation
	Download times
	Understandability
	Languages
	Level of terminology
Quibus Auxiliis	**Resources**
(*Facultas:* With what means and devices?)	Financial and human resources
Feasibility	Time
	Information and Communication Technology
	Hardware (computer, networks)
	Software (implementation, integration)

(Mich et al., 2003)

Moreover, some general guidelines are explained by 2QCV3Q model which helps in providing a problem-solving approach to quality evaluation. There are different phases in this process as the following and Figure 2.3 illustrates these phases (Mich et al., 2003).

a. **Initial setup phase-** it is comprised of specification and evaluation requirements analysis.

b. **Design phase-** it explains the techniques and evaluation plan.

c. **Realization phase-** survey techniques and measurement modalities specified are applied in this phase.

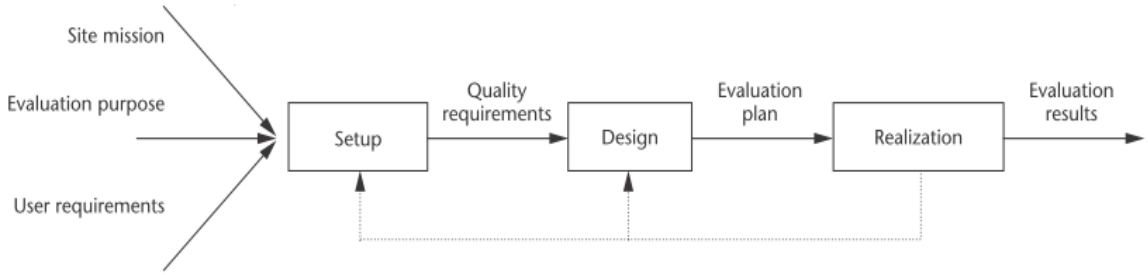


Figure 2.3 The 2QCV3Q Site Evaluation Process (Mich et al., 2003).

3- WQM model

Web quality model (WQM) was elaborated by Calero et al. (2005) to make the classification of quality metrics in a broad manner. From 1992-2004, many studies are conducted on this model. The focus was on covering the flaws and deficiency in the field of web metrics. There are three different dimensions of WQM: lifecycle process, web features, and quality characteristics, as well as a total of 385 web metrics were classified. The results of the studies found that 44% metrics were related to "presentations" and for usability, the percentage was 48%. In the process of the life cycle, 43.2% matrices, which is a majority, were related to operations and 30% were related to maintenance, as it shown in Figure 2.4.

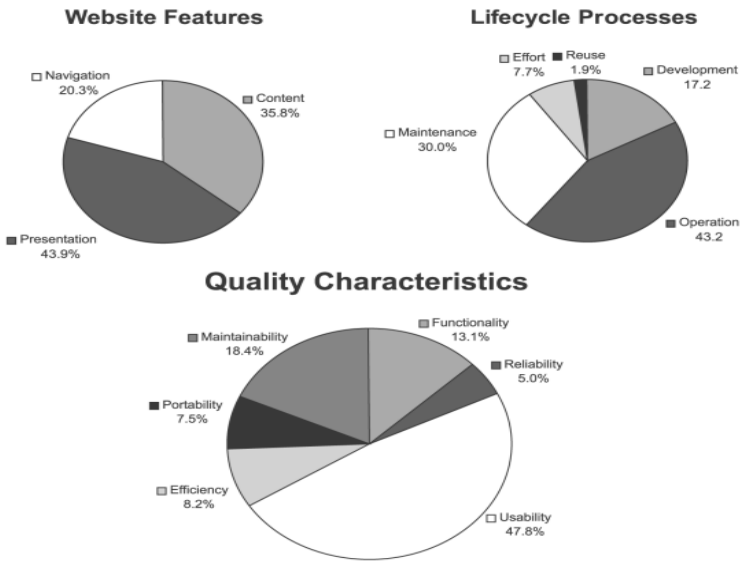


Figure 2.4 Metric Distribution Across WQM Dimensions (Calero et al., 2005)

2.3.2 Website Quality Metrics

In order to control and evaluate the quality of metrics, a good mechanism is to use appropriate metrics. Measurement method and measurement scale determine the website quality metrics (Calero et al., 2005; Zhou, 2009). In order to quantify the web quality attributes, since 1990's, a wide-ranging set of matrices has been proposed (Calero et al., 2005; Zhou, 2009).

A website is evaluated in different domains by a website metrics which are: academic, government, e-commerce and so on. A comparison is made between key performance indicator and every characteristic and is used for creating a website or marketing campaign's audience response (Zhou, 2009).

The study of Lilburne et al. (2004) proposed QCF (Quality compliance Framework) in the website quality metrics and the components of which are: quality measurement, quality characteristics, quality sub-characteristics, and measurable indicator (Figure 2.5).

Figure 2.5 Quality Compliance Framework (QCF) (Lilburne et al., 2004)

• Quality measurement is the achievement of quality in percentage value that shows the overall level of system's quality compliance.

• Quality characteristics are defined by high-level quality factors of a web application. There are many sub-characteristics of quality characteristics.

• Quality sub-characteristics is considered the criteria for lower level quality which further divides its main features into more measurable criteria.

• In QCF, quality indicators are considered the measurable units of quality. The relation of the quality attribute may be to one or more quality characteristics or quality sub-characteristics.

Quality measurement by QCF is provided in a simple quality compliance scale. The scale is from 0-100%, where 0% means poor quality compliance and 100% means excellent quality compliance. This shows the QCF score for a web application.

Bottom up approach is used by QCF works. The attributes metrics is converted into 0-100% scale. Then, the higher level QCF scores are calculated on the basis of QCF scores achieved by lower level children attributes, sub-characteristics, or indicators.

Quality measurement is the final score. Below given formula will explain the way quality measurement is calculated for various QCF components:

• Quality measurement: Quality Measurement = ∑Children's QCF/ No. of children.

• Characteristics and sub-characteristics QCF score: Quality Characteristic Score = ∑ Children's QCF/ No. of children

• Attribute QCF score: Quality indicator = (Earned Score/ Possible Score) ×100%

Here, in the Hierarchy, "children" represents quality characteristics, sub-characteristics, and indicators.

It is important to note that some characteristic's relative importance changes and it depends on the specific purpose of the website and also on the purpose of the page. Thus, all values achieved from the results must be weighted.

2.3.3 Website Quality Evaluation

The definition of evaluation that emphasizes the uses of evaluation is based on Patton (2008): "Program evaluation is the systematic collection of information about the activities, characteristics, and results of programs to make judgments about the program, improve or further develop program effectiveness, inform decisions about future programming, and/or increase understanding."

In the development cycle, the phase of website's evaluation is of utmost importance, often, modern web applications developers ignore it during the fast-faced development processes (Avouris, Tselios, Fidas, & Papachristos, 2003). Unfortunately, evaluation of websites is usually not given any public or economic attention by organizations given that many of the developers test the systems when only they fail or when there are crucial complications occurred (Zahran et al., 2014).

However, evaluation of websites can be implemented through the utilization of different methods. It can be implemented either manually or automatically according to certain criteria to achieving a high-quality website. Although the manual evaluation is including experts or real user testing, however, the automatic assessment is employing different software-testing applications. In such evaluation the output is a list of problems and recommendations which help to improve the tested website (Zahran et al., 2014).

Manual Evaluation

Knowing an evaluation purpose helps to choose the appropriate evaluation method. For evaluation, various manual methods can be used ranging from quality models to more generic usability methods. Moreover, there are further two categories in these evaluation

methods: expert focused and user-focused (Cherfi et al., 2014; Elling, 2012; Zahran et al., 2014). Quality judgments of communications or subject-matter experts like heuristic evaluation are considered in the expert-focused method. Users of the website are considered in user-focused method and gather data among them, for example, think-aloud method and user surveys (Elling, 2012; Zahran et al., 2014).

Elling (2012) presented five studies comparing user-focused evaluation methods. The comparison based on the users role and the context of the evaluation. The author can use very different techniques, such as questionnaires, eye-tracking methods, etc.

QEM (Quality Evaluation Method) was proposed by Olsina* et al. (1999) as an approach for the quality assessment of websites. A set of activities regarding the suggested methodology was applied for evaluating, ranking and comparing the quality of websites. The steps of evaluation process involve:

a- Selecting a website or sets of websites to compare or evaluate
b- Specifying evaluation goals and intended user's viewpoint
c- Defining the quality characteristics and sub-characteristic attributes requirement tree
d- Defining criterion function for each attribute, and applying attribute measurement
e- Aggregating elementary preference to yield the global website quality preference
f- Analyzing, assessing, and comparing partial and global outcomes

Some researchers such as Dominic and Jati (2010) proposed attractive approaches for quality evaluation rooted in Analytical Hierarchy Process to collective website quality

metrics value. They used website diagnostic tool to determine a website for Malaysia University. New Hybrid Model also was applied which is a process between FAHP (Fuzzy Analytical Hierarchy Process) model and LWM (Linear Weightage Model). Evaluation of educational websites was focused in another important group decision approach. This method is an evaluation assistance procedure which considers the participation of users. It uses fuzzy logic techniques for selecting proper criteria and the rating of every evaluated website is deduced (Lin, 2010; Rekik & Kallel, 2011).

Automatic Evaluation

A new chance for testing website quality is by web diagnostic tools. For example, there are online services like website performance tool and web page speed analyzer which provide the list of performance measured, link popularity website tool which will help in determining the amount quality of links gathered from different websites, checklink validators for monitoring the broken links in HTML code, to validate HTML code WC3's HTML validator websites is used, and accessibility testing software is used to test that if the tested WebPages are meeting the criteria for the access of disable people (Dominic & Jati, 2010; Mustafa & Al-Zoua'bi, 2008). Aziz et al. (2010) used automatic evaluation tool (EvalAccess 2.0) to evaluate the accessibility of the website. Another tool used for evaluating the accessibility of website named QualWeb Evaluator 3.0 which developed by (Fernandes, Costa, Duarte, & Carriço, 2012).

2.3.3.1 Website Evaluation Models

Website evaluation determines the quality of the website. Many factors or characteristics used to find out the quality of website or software (Fernandez et al., 2011; Wang & Senecal, 2007).

Following some of the website evaluation models will be presented which include different quality factors based on the type of website:

2.3.3.1.1 Commercial Websites

There are many studies to evaluate the commercial websites and many proposed models that used to evaluate these websites. The following some of these models:

a. The Web-Marketing Mix (WMM) Framework

WMM frameworks can help in designing and developing online commerce as it is used for the identification of critical elements while focusing on organizational, strategic, technical and operational issues. The strategies of every business must be considered in the development process of the evaluation framework. WMM considers the way a website applies its goals and objectives.

Chiou, Lin, and Perng (2010) designed WMM framework for commercial websites to ensure the consistency between web strategy and actual website presence. WMM focus on how the goals and objectives of a specific website will be applied. This framework designed after critical studies on a review of the literature from 1995–2006. They analyzed 83 articles from 23 journals by classifying them into IS, marketing, and combined approaches, and developed a criteria pool composite of 53 criteria categorized into five dimensions: Product, Promotion, Price, Place, and

Customer Relationship. The authors introduced a five-stage evaluation process to explain how using WMM for evaluating websites, as shown in Figure 2.6.

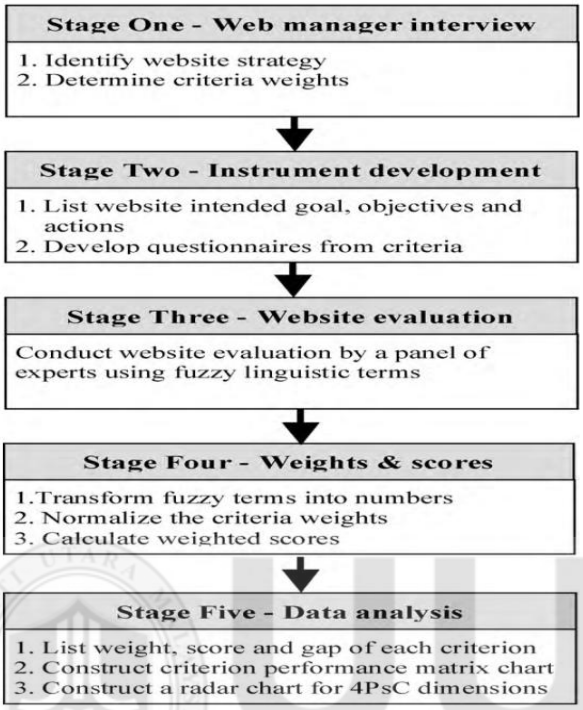


Figure 2.6 The Five-stage Evaluation Process (Chiou et al., 2010)

b. WebQual (Website Quality)

WebQual instrument developed based on Theory of Reasoned Action (TRA) and Technology Acceptance Model (TAM) for giving a strong conceptual basis for a link between user beliefs about a website and the behavior of reusing the website at a later time. The instrument composed of twelve unique dimensions of 36 items to measure the quality of the commercial website and would predict of website reuse. The dimensions of the tool include informational fit-to-task; tailored communications; trust; response time; ease of understanding; intuitive operations; visual appeal; innovativeness;

emotional appeal; consistent image; on-line completeness; and relative advantage (Loiacono, Watson, & Goodhue, 2002).

c. WQ (Web Quality)

Aladwani and Palvia (2002) focused on user perspective to measure website quality for general or well-known websites. A 25-element instrument was developed by them which has four dimensions: technical adequacy, content quality, appearance and specific content, which get key features of website quality from perspective of user. They conclude that the instrument also useful to organizations, web designers and to researchers in related web research because it provides an aggregate measure of web quality.

2.3.3.1.2 Academic Websites

Here some models related to measuring the quality factors of academic websites.

a. University WEBQUAL

According to Khawaja and Bokhari (2010), the quality factors that affect significantly in student satisfaction are only four factors from a nine-factor model which they developed. These factors are: ease of use, usefulness, information accuracy and web appearance, the rest five factors of the model (University WEBQUAL) are: reliability, navigability, responsiveness, efficiency, and functionality.

b. Fuzzy evaluation model

Two groups of online learners were focused by Lin (2010) and are related to course website quality factors. He identified 16 sub-criteria of course website quality and

categorized it into four dimensions including System quality, Information quality, Service quality, and Attractiveness, in order to evaluate the relative importance of course website quality factors. An evaluation model was proposed for developing Fuzzy evaluation model which focuses on the relative weights of course website quality that designers can easily understand the critical factors while implementing the successful course website. AHP (Analytic Hierarchy Process) and integrated triangular Fuzzy numbers help in the development of Fuzzy Evaluation model. The study showed that there are some similarities and differences between the groups of online learners (high- and low-experience groups) with regard to the evaluation of course website quality.

c. Singh & Kumar Web Evaluation Framework

Singh and Kumar (2014) concerned in Aesthetics and Reputation as major factors to propose the web evaluation framework for academic websites, where the study applied on Jawaharlal Nehru University website. The framework consists of five characteristics Aesthetics, Ease of Use, Multimedia, Rich Content, and Reputation, which broken into sub-characteristics as the second level, and these later broken into sub-characteristics as measurable criteria for evaluating the quality of websites. The authors have used two tools: web-QEM and QCF; Web-QEM (Web Quality Equation Model) helps in websites assessment, focuses on application supports to ensures that pre-requisites are met in the development of new web projects, and evaluate requirements in operational phases; Second is QCF (Quality Compliance Framework): it helps in the provision of quality measurements in a simple quality compliance scale.

2.3.4 Website Design and User Experience

In an online context, there will be creative attractive elements of designing any website that precisely comprise scheming the colors, images, shapes, and the utilization of photographs. Other features can emotionally contribute in providing the user with a feeling of the aesthetic and a confident impression as a result of the overall graphical framework of a website. It is widely known that emotions are essential elements to reflect individual's experiences. Recently, studies elaborately shed lights on the utilitarian aspects of designing the websites. In other words, such studies focus more empirically on the effectiveness of the elements to design a website. Consequently, these websites are displayed in a useful shape and in an easy way for users on one hand, and to entice the users to experience different emotions such as involvement, satisfaction and enjoyment on the other (Cyr, 2013).

Websites design is believed to arouse the users' emotions when it is accurately based on effective elements of designing. Additionally, websites' users would have a feeling of entertainment as long as the websites' graphical designs and their attractive colors will draw out the users' satisfactions, excitements and meet their needs and sensibility. More specifically, if the websites are creatively designed, the users will feel more loyal to browse them frequently (Cyr, 2013).

The User Experience (UX) is often a term that is used as an indication to refer to usability, user interface, customer experience, website appeal, interaction experience, interaction design, 'wow effect', emotion, general experience, or as an umbrella term that includes all or many of the above mentioned concepts (Roto, Law, Vermeeren, &

Hoonhout, 2011). However, UX and usability differ, usability, as perceived by the user, is typically considered as an aspect that is contributing to the overall of UX (Roto et al., 2011). Usability is defined as "extent to which a system, product or service can be used by specified users to achieve specified goals with effectiveness, efficiency and satisfaction in a specified context of use." (ISO 9241-11, 1998)

UX refers to an "overall designation of how people have experienced a period of encountering a system" and, according to ISO definition, it states "a person's perceptions and responses resulting from the use and/or anticipated use of a product, system or service". Whereas, user experience design (UXD) is a user-centered and interdisciplinary process and adds important dimensions to the challenge of implementing the human-centered design (HCD) in a mature form. ISO defined HCD as "an approach to interactive systems development that aims to make systems usable and useful by focusing on the users, their needs and requirements, and by applying human factors/ergonomics, and usability knowledge and techniques." (ISO 9241-210, 2010; Roto et al., 2011)

The central dimensions that is distinguishing UXD out of a traditional view of HCD including UX factors; methods, tools and criteria that are used in UX work; representation of the UX idea; and UX positioning in the organization (Roto et al., 2011).

Nevertheless, it is clear that the factors which affect UX are proved to be significantly broader and varied than the traditional ones that related to human-centered design. Meanwhile the traditional usability factors are essentially related to the performance and

smooth interactions, however, UX factors that are new relate to effect, interpretation and meaning. Still, a few UX factors, including social and aesthetic aspects, are possibly differ in characters rather than in traditional concerns (Roto et al., 2011).

Regards to HEI websites, the websites that offer the best user experience have an advantage of competitive. The universities can engage and impress the students and visitors by writing and presenting information effectively (Sherwin, 2015). Based on Sabatier (2014), in the annual High Ed Web Association conference, three of the top trends in 2015 for higher education had identified by the Eduvantis digital team. These trends focused on creating the best UX for visitors. The trends are:

- Responsive design instead of mobile, whereas HEI website needs to adapt to the user, no matter what device they are using.
- Visitors want to "experience" the website, they don't need to read it. Because people want to watch the videos, view photos, and will scan read some of the website content.
- Beautiful websites do not generate leads, but easy to use website do. Many of HEI websites are still dense and difficult to use, although, it have evolved significantly from a visual perspective.

Hence, we conclude that there is a directly proportional relationship between the website design and user experience of using the website. While the website design is more attractive and appropriate to the user, the user emotions will be enticed to experience. Thus, the website becomes more widely using and visiting more and more times by users, and vice versa. Furthermore, it is not enough for the HEI website to be appealing

or beautiful, it needs to be easy to use, satisfying, and meet the needs of the users to become more usable and loyalty.

2.3.5 Website Quality Issues

In the literature, many quality website models had been designed to measure the quality of websites. However, many of them depended on the purpose of the website. While many quality models and tools related to business purpose (e.g., SERVQUAL model, ISO9126 model, 2QCV3Q model, WEBQUAL, WQ), a few related to education purpose (e.g., University WEBQUAL, Web-site QEM). Some researchers have attempted to comprehend the diverse issues included in a quality of websites (e.g. Aladwani & Palvia, 2002; Barnes & Vidgen, 2000; Luís Olsina & Rossi, 2002; Olsina* et al., 1999). Some of the studies analyzed the importance of usability of the website quality with concentrating on the appearance and interface attributes (e.g. Aladwani & Palvia, 2002; Barnes & Vidgen, 2006; Khawaja & Bokhari, 2010; Ng, 2014; Luis Olsina et al., 2001; Rizavi, Khan, & Rizavi, 2011; Sife & Msoffe, 2013; Singh & Kumar, 2014). Furthermore, navigation issues related to the quality of website also recommended by many studies (Khawaja & Bokhari, 2010; Lin, 2010; Loiacono et al., 2002; Luis Olsina et al., 2001; Olsina* et al., 1999; Sauro, 2015; Singh & Kumar, 2014; Zhang & Von Dran, 2001). According to Fernandez et al. (2011), users feel comfortable and secure while browsing the website when the website has navigability. Ng (2014) said that ease to navigate is important to developing a high-quality education websites.

Another important issue related to website quality that is the accuracy of information and updating it. Aladwani and Palvia (2002), Hernández, Jiménez, and Martín (2009),

Khawaja and Bokhari (2010), Lin (2010), Mebrate (2010), Sife and Msoffe (2013), and many researchers recommended that the information in the website should be accurate and regular updated.

Service quality issue where the first significant contribution to measuring the online service quality was by Parasuraman, Zeithaml, and Berry, 1988. Delone and McLean (2003) concluded that the service quality is one of the success factors in the website.

2.3.6 Website Quality Factors

After an extensive review of the previous studies on the quality of the website, we have concluded that there are a lot of factors that may contribute to assessing the website quality. Most of these factors depend on the type of website and its purpose. Many studies mostly agreed on the importance of usability for website quality (Barnes & Vidgen, 2006; Lilburne et al., 2004; Mebrate, 2010; Mich et al., 2003; Luis Olsina et al., 2001; Luís Olsina & Rossi, 2002; Olsina* et al., 1999; Rekik & Kallel, 2011; Rizavi et al., 2011; Sauro, 2015). However, others have used this factor under the name "ease of use" (Hernández et al., 2009; Khawaja & Bokhari, 2010; Loiacono et al., 2002; Singh & Kumar, 2014; Zhou, 2009).

From this point of view, we can conclude that Usability has a significant effect on the quality of HEI websites (Hypothesis H1).

The researchers who addressed the issues that related to website quality attempt to explore the issues involving in the content of website, either commercial, governmental, business or education websites. For example, the study of Zhou (2009) mentioned that for the relationship of suppliers and potential customers, web content can be the best

tool. In addition, Aladwani & Palvia (2002); Mebrate (2010); Mich et al. (2003); and Luís Olsina & Rossi (2002) affirmed that the content is a critical factor in web quality. On the other hand, some researchers endorsed that the information on the website should be accurate and updated (e.g. Aladwani & Palvia, 2002; Barnes & Vidgen, 2006; Khawaja & Bokhari, 2010; Lin, 2010; Negash et al., 2003; Sife & Msoffe, 2013). In regards of educational websites, the content should be included the educational information, which distinguishes this type of websites from others (Rizavi et al., 2011).

From this, we have an argument that the content has a significant effect on the quality of HEI websites (Hypothesis H2).

Another feature is very important for the website quality which is Appearance (colors, fonts, images, browsing, etc.) of the website. The website is required to be appealing so as to attract target users to explore it. Many studies affirmed that and observed that student prefers to use the website if it apparently looks good (Khawaja & Bokhari, 2010; Ng, 2014; Sife & Msoffe, 2013). Web appearance is required also for other types of websites not only educational websites (e.g. Aladwani & Palvia, 2002; Loiacono et al., 2002; Luis Olsina et al., 2001; Sauro, 2015; Singh & Kumar, 2014; Zhou, 2009).

Here we have an argument that the web appearance has a significant influence on the quality of higher education institution websites (Hypothesis H3).

Functionality, Reliability and Efficiency features were affirmed and recommended from many researchers to build a high-quality education website (e.g. Khawaja & Bokhari, 2010; Mebrate, 2010; Olsina* et al., 1999; Rekik & Kallel, 2011). However, Lin (2010) stated Reliability as a sub-factor of Service Quality on his study that conducted to

measure the course website quality. Liu and Arnett (2000) explored that information and service quality, system use, playfulness, and system design as the factors for Web site success.

We conclude that the Efficiency, Functionality, and Service quality have effect on the quality of HEI websites (Hypotheses H4, H5, and H6)

This extensive overview of the previous studies was done in order to identify the quality factors that will be used to evaluate the higher education websites.

From previous studies of evaluating HEI websites, we found that the users of HEI websites, especially students, focus on some attributes on the university website, such as the usability of the website, where they need to use web site easily. Without a doubt, providing a good usability is a help to keep the time and effort of the student during using the website. In addition, students focus more on the information (content) that the website contain. Because the important attribute that distinguishes the academic website and that attract the users to the website is its content. The content used in some studies as "information quality" (Rizavi et al., 2011; Sife & Msoffe, 2013). Actually the students come to the website looking for particular information that related to their study. This information should be clear and relevant.

Therefore from the above justification, this study proposed six website quality factors for HEI websites evaluation: Usability, Content, Web Appearance, Efficiency, Functionality, and Service Quality, as shown in Table 2.6.

Table 2.6
Website Quality Factors

Factor	Sub-factors	References	Hypotheses
Usability	ease of use easy to understand Navigation easy to learn	(Aladwani & Palvia, 2002; Bai, Law, & Wen, 2008; Barnes & Vidgen, 2006; Barnes & Vidgen, 2000; Chiew & Salim, 2003; Chiou et al., 2010; Chiu, Hsieh, & Kao, 2005; Davis, 1989; Hernández et al., 2009; ISO/IEC 9126-1, 2000; Khawaja & Bokhari, 2010; Kim & Niehm, 2009; Lin, 2010; J. C.-C. Lin & Lu, 2000; Loiacono et al., 2002; Mebrate, 2010; Mich et al., 2003; Luis Olsina et al., 2001; Rekik & Kallel, 2011; Sauro, 2015; Zhang & Von Dran, 2001; Zhou, 2009)	H1: Usability has a significant effect on the quality of higher education institution websites
Content	Accuracy Completeness appropriate format Educational information	(Aladwani & Palvia, 2002; Bai et al., 2008; Barnes & Vidgen, 2006; Barnes & Vidgen, 2000; Chiew & Salim, 2003; Chiou et al., 2010; Davis, 1989; Hernández et al., 2009; Khawaja & Bokhari, 2010; Kim & Niehm, 2009; Li, Tan, & Xie, 2002; Lin, 2010; Liu & Arnett, 2000; Loiacono et al., 2002; Mebrate, 2010; Singh & Kumar, 2014; Sife & Msoffe, 2013; Rizavi et al., 2011; Zhou, 2009)	H2: Content has a significant effect on the quality of higher education institution websites
Web appearance	Attractive a clean and simple presentation	(Aladwani & Palvia, 2002; Barnes & Vidgen, 2006; Barnes & Vidgen, 2000; Chiew & Salim, 2003; Dominic & Jati, 2010; Khawaja & Bokhari, 2010; Kim & Niehm, 2009; Li et al., 2002; Lin, 2010; Loiacono et al., 2002; Mich et al., 2003; Luis Olsina et al., 2001; Sauro, 2015; Sife & Msoffe, 2013; Wolfinbarger & Gilly, 2003; Zhou, 2009)	H3: Web Appearance has a significant effect on the quality of higher education institution websites

Table 2.6 (continue)

Efficiency	Performance Accessibility	(Chiew & Salim, 2003; Davis, 1989; Dominic & Jati, 2010; Hernández et al., 2009; ISO/IEC 9126-1, 2000; Khawaja & Bokhari, 2010; Kim & Niehm, 2009; Lin, 2010; Mebrate, 2010; Mich et al., 2003; Luis Olsina et al., 2001; Rekik & Kallel, 2011; Sauro, 2015)	H4: Efficiency has a significant effect on the quality of higher education institution websites
Functionality	Search Suitability	(Bai et al., 2008; Barnes & Vidgen, 2000; Chiew & Salim, 2003; ISO/IEC 9126-1, 2000; Khawaja & Bokhari, 2010; Mebrate, 2010; Olsina* et al., 1999; Rekik & Kallel, 2011)	H5: Functionality has a significant effect on the quality of higher education institution websites
Service quality	Reliability Responsiveness	(Aladwani & Palvia, 2002; Barnes & Vidgen, 2000; Chiew & Salim, 2003; Chiou et al., 2010; Dominic & Jati, 2010; Khawaja & Bokhari, 2010; Kim & Niehm, 2009; Lee & Kozar, 2006; Lewis & Mitchell, 1990; Li et al., 2002; Parasuraman et al., 1988; Rekik & Kallel, 2011; Wolfinbarger & Gilly, 2003)	H6: Service Quality has a significant effect on the quality of higher education institution websites

1. Usability

In the field of HCI (Human-Computer Interaction), usability is considered the most important factor for making the system easy both in learning and usage (Wang & Senecal, 2007). Usability, according to Nielson (2003), is an attribute of quality that assesses the easiness of user interface. In the design process, usability can be the methods for enhancing ease of use (Nielsen, 2003). ISO 9126 defined it as "The capability of the software product to be understood, learned, used and attractive to the

user when used under specified conditions." Furthermore, Benbunan-Fich (2001), defined usability as " how well and how easily a user, without formal training can interact with an information system of a website". According to Dwivedi and Dubey (2014), web usability is "a set of parameter which lets a user understand, learn and use any website faster and efficiently without any hindrances right through the first encounter to the end of the process." However, ISO 9241-11 standard for guidance on usability which defined as "The extent to which a product can be used by specified users to achieve specified goals with effectiveness, efficiency , and satisfaction in a specified context of use." This usability definition turns out to be synonymous with "quality of use" (Bevan, 1999). On the other hand, according to Bavan (1999), the relationship between the quality in use and other quality characteristics depends on the type of user, for example, for the end user quality in use is mainly a result of functionality, reliability, usability and efficiency. as a result, the usability is one of the quality characteristics.

Usability decomposed into four important aspects - *ease of use* means being able to get around a site and find things (Barnes & Vidgen, 2000). *Easy to understand* indicates the capability of the website to assist users to understand how to use the website for specific tasks and conditions (ISO/IEC 9126-1, 2000; Mebrate, 2010). *Navigation* is a major activity performed by users interacting with websites and how quickly tasks can be completed (Fisher, Bentley, Turner, & Craig, 2004). According to Goi (2012), navigations measures the easiness in navigating around the site, ease of finding information, easiness in going back to the site's home page, and how many links will get you from one point to another on a website. *Easy to learn* refers to the website should

not be cumbersome for users to learn how to use it, but it should be easy to learn for the first time (Mebrate, 2010; Nielsen, 1994).

2. Content

Content indicates the quality of the information on the website, the relevance of the information, whether or not it is current, accurate and supports multiple language support (Mebrate, 2010). Based on Nielsen (2003), content is the most critical part of a website. The information on the website must be easily understandable and must easily and timely enhance the student issues that related to understanding, whereas their visiting to a website is to look for the needed information (Hernández et al., 2009). Moreover, the study of Kim and Niehm (2009) have mentioned that if website content is easily understood by the users then users rate website of high quality. The content split into *Accuracy, Completeness, Appropriate format and Educational information. Accuracy* indicates the correctness of the information on the website and whether it is not ambiguous to understand and it does not have grammar and spelling mistakes that could alter the meaning of the information (Mebrate, 2010). *Completeness* is the level of a website at which all needed information are made available (Lin, 2010). *Appropriate format* is the perception of users regarding the presentation of information, a website that clearly represent materials affect on user intention to continue using the website (Lin, 2010). *Educational information* refers to information that related to the education such as registration information, a program offered, course materials offered by the program, faculties information, student activities which distinguish educational websites from others (Mustafa & Al-Zoua'bi, 2008; Rizavi et al., 2011).

3. Web appearance

It is the attractiveness of the interface of the website, proper use of colors, fonts, graphics, good labeling, layout, and presentation (Mebrate, 2010). According to Lin (2010), the website that includes attractive design (e.g., flash presentation), will be appealing less experienced online users. Students prefer to use the website if it is apparently looking good (Khawaja & Bokhari, 2010; Sife & Msoffe, 2013). Web appearance decomposed into *Attractiveness* and *a clean and simple presentation. Attractiveness* points to the capability of the website to provide a pleasant interface to the users (ISO/IEC 9126-1, 2000; Lin, 2010). In addition, Singh and Kumar (2014) affirmed that images and colors attract more attention than other features. The second sub-factor of web appearance is *a clean and simple presentation* according to Lin (2010) that the users interface should be visually appealing and tidy, enabling users to easily use the website. Sauro (2015) suggests that website should be attractive and clean and simple presentation to be more usable.

4. Efficiency

ISO 9126-1 defines Efficiency as "a set of attributes that convey to the relationship between the level of performance of the software and the amount of resources used, under stated conditions". Based on Olsina* et al. (1999), efficiency split up into *performance* and *accessibility*. According to Grady in Mebrate (2010), *Performance* refers to performance of a product indicates the functional requirements of the product like speed, efficiency, availability, accuracy, response time, and recovery time. However, performance criteria involve an objective statement of some achievements, often in terms of time and errors (Shackel, 2009). *Accessibility* is concerned with

technical facilities web sites to provide to support users with different disabilities access the website (Mebrate, 2010). In addition, according to Hernández et al. (2009), accessibility is website's quality for easy identification and access for both current and potential users.

5. Functionality

ISO 9126-1 defines functionality as "the capability of the software product to provide functions, which meet stated and implied needs when the software is used under specified conditions". Lin (2010) found highly experienced users regards website functionality as a key element that affects website quality assessments. Functionality composed into *Search* and *Suitability* (Mebrate, 2010). *Search* refers to help users look for different kinds of information through various search options. Even though search is considered mostly as one type of navigation. It is sometimes considered as a separate functionality of a website to easily understand the two functionalities (Mebrate, 2010). *Suitability* is defined by ISO 9126-1 as "The capability of the software product to provide an appropriate set of functions for specified tasks and user objectives" (ISO/IEC 9126-1, 2000). That means students must be satisfied in the functionalities gave by the website to be utilized as a part of a specific context of use.

6. Service quality

Service quality is the difference between the expectation of customers regarding the service offered and perception of the customer after service is received (Parasuraman et al., 1988). Lin (2010) said that customer service success can be measured by service quality. In other words, the website must provide the right solution to user requests to

ensure user comfort using website services (Lin, 2010). Responsiveness and reliability will measure service quality dimension (Barnes & Vidgen, 2000; Lin, 2010). *Responsiveness* refers to the willingness of providers to help users and provide prompt service (Parasuraman et al., 1988; Wolfinbarger & Gilly, 2003). *Reliability* is defined as "A set of attributes that relate to the capability of software to maintain its level of performance under stated conditions for a stated period of time" (ISO/IEC 9126-1, 2000). According to Parasuraman et al. (1988), Reliability is the ability of the website to dependably and accurately perform a promised service.

2.3.7 Comparison with ISO 9126

Among the models reviewed, the ISO 9126-1 quality model was found to be more comprehensive than the rest of the models in the way it categorizes the quality factors and the descriptions it gives to the high-level quality factors and sub quality factors. In addition, most of the models of the website quality have a root in ISO 9126 model. Hence, it was used as based theory for this study and chosen for comparing with quality factors that selected in this study. Table 2.7 illustrates this comparison. While Usability, Efficiency, and Functionality are included in both, there is no mention in the ISO models for Content, and Web appearance, which differentiate websites from traditional software systems. While Reliability is considered a high-level quality factor in ISO, this study put it as a sub-factor under Service Quality. Maintainability and Portability are given much emphasis in ISO, where they do not need a front-line position in present day websites (Polillo, 2012), especially in our case, they are not relevant for

the educational domain (Olsina* et al., 1999). The ISO including Attractiveness under Usability, however, this sub-characteristic is under Web appearance in our study.

Table 2.7
Comparison with ISO 9126 Standard Model

Website Quality Factors in this study	**ISO 9126-1 Factors**
Usability	**Usability**
Content	
Web appearance	
Efficiency	**Efficiency**
Functionality	**Functionality**
Service quality	
	Reliability
	Maintainability
	Portability

From the above Table 2.7, we observed that the ISO 9126 do not covers Content, Web Appearance, and Service Quality. However, based on previous studies the factors are very important and will be included in this study.

However, the ISO 9126 quality standard has been replaced by new quality standard model ISO 25010. The new model has some amendments in the quality characteristics of the previous one. Where, the recently model has eight quality characteristics which are Functional suitability, Reliability, Operability, Performance efficiency, Security, Compatibility, Maintainability, and Transferability (ISO/IEC25010, 2011). Nevertheless, these characteristics are not reflecting our proposed quality factors. In addition, it is not including Usability. In contrast, the old model (ISO 9126) is reflecting our proposed quality factors, where it is including Usability, Efficiency, and Functionality. Therefore, the ISO 9126 quality standard used as based theory in this study.

2.3.8 Website Quality Instrument

Based on Table 2.6 (sec. 2.3.6), the website quality factors are usability, content, web appearance, efficiency, functionality, and service quality.

The web quality factors must be correlated with the existing instrument (Web Quality Instrument/ Web Usability Instrument) as presented in Table 2.8.

Table 2.8
Quality Factors Covered by the Web Quality and Usability Tools

Quality Factors	Quality Sub-factors	WQ	eQual	WebQual	WAMMI	SUS	TAM	WU	WUEM	UMUX	UMUX-LITE	WEBUSE	University WEBQUAL
Usability (ISO 9126)	ease of use	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	easy to understanding		✓	✓	✓		✓		✓			✓	✓
	navigation	✓	✓	✓	✓	✓	✓	✓	✓			✓	✓
	easy to learn		✓	✓	✓	✓	✓	✓				✓	
Content	Accuracy	✓	✓	✓	✓	✓		✓	✓	✓		✓	✓
	Completeness	✓	✓	✓				✓				✓	✓
	Appropriate format	✓	✓	✓		✓		✓				✓	✓
	Educational information												
Web appearance	Attractiveness	✓	✓	✓	✓				✓			✓	✓
	a clean and simple presentation	✓	✓	✓	✓	✓	✓		✓			✓	✓
Efficiency (ISO 9126)	Performance			✓	✓		✓				✓	✓	✓
	Accessibility	✓	✓				✓	✓			✓	✓	✓
Functionality (ISO 9126)	Searching	✓	✓		✓	✓	✓	✓	✓		✓	✓	✓
	Suitability					✓							
Service quality	Reliability	✓		✓	✓	✓				✓		✓	✓
	Responsiveness.	✓		✓								✓	✓

Although there are many instruments to evaluate websites such as, for website quality, WQ, eQual, WEBQUAL, and University WEBQUAL, for usability, WAMMI, SUS, TAM, WU, WUEM, UMUX, UMUX-LITE, and WEBUSE. But based on Table 2.8, the most appropriate instrument that fulfills the proposed HEI website evaluation criteria is WEBUSE. As a result, this study will adapt the WEBUSE instrument that includes all factors except two sub-factors, which are *Educational Information* and *Suitability*. Therefore, this study will include it. Because of *Educational Information* had been evaluated as a factor in some studies that related to HEI website (Mustafa & Al-Zoua'bi, 2008; Rizavi et al., 2011) and *Suitability* evaluated as a sub-factors for the quality of HEI website (Mebrate, 2010). So this will be as the contribution of the study.

As a result, the instrument that will be used in this study is constructing from 39 items extracted from two tools – WEBUSE and SERVQUAL. In addition, Mebrate (2010) study that titled "academic website quality evaluation framework" contributed in the extraction and used as based theory for this study with ISO 9126, (Rizavi et al., 2011), (Sife & Msoffe, 2013) and (J. P. Chin, Diehl, & Norman, 1988). While 20 items of the total items extracted from WEBUSE, 19 items from the rest five instruments.

2.3.8.1 Overview of WEBUSE instrument:

WEBUSE (WEBsite USability Evaluation Tool) is an evaluation questionnaire designed by Chiew and Salim (2003) that used to evaluate the usability of websites. It consists of 24 questions and 20 criteria which can be categorized into four groups (Figure 2.7), 6 questions for each group:

- Content, organization, and readability,

- Navigation and links,
- User interface design,
- Performance and effectiveness.

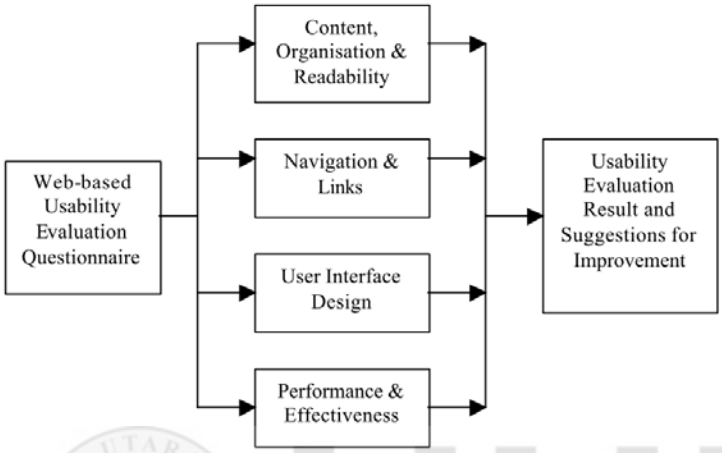


Figure 2.7 WEBUSE Model (Chiew & Salim, 2003)

The groups are related to each other where some criteria fall into more than one group. Five options for each question that takes merit values between 0 and 1 as the following Table 2.9.

Table 2.9
Options for WEBUSE Instrument and Related Merits

Option	Strongly Agree	Agree	Fair	Disagree	Strongly Disagree
Merit	1.00	0.75	0.50	0.25	0.00

(Chiew & Salim, 2003)

WEBUSE, according to researchers, is appropriate for any domain and website's evaluation. This tool is helpful to the developers for improvement of websites on the basis of received response from the intended website's users (Chiew & Salim, 2003).

This instrument also adopted by the study that evaluated the usability of Jordan's universities websites by (Mustafa & Al-Zoua'bi, 2008). But the authors added one more

category which is Educational Information with three criteria (Registration information, Faculties information, and Instructors information), so the usability criteria in their study become 23.

2.3.9 Conclusion

After reviewing the existing website quality models, evaluating the quality of a website requires having a good evaluation model that consists of essential quality characteristics and evaluation methods. There are several models for website evaluation, each highlighting different factors necessary to build a successful website. These quality evaluation models provide hierarchical lists of broad quality characteristics, sub-characteristics, and criteria. From these studies, we selected the factors that evaluated as essential quality factors, which frequents in the most website quality evaluation studies specifically HEIs' website studies. While, there are specific quality factors that exist in one model with one name and in another model with a different name, but still representing the same concept. In addition, some factors placed as a high-level quality factor in one study, in contrast, become sub-factor in another one. For example, "accessibility", which is a high-level factor in the Hernandez's study and a sub quality factor in Lin's study and Olsina's study. Table 2.6 contains the most significant factors for the website quality as discussed in the previous studies related to website quality evaluation. This study will adopt these factors to evaluate the quality of the higher education institutes websites.

2.4 The Existing Studies in HEI Websites Evaluation

There are several previous works that evaluate the general quality of academic websites. Selected previous studies are described in this section. Table 2.10 illustrates the summary of the following studies.

Jabar et al. (2013) used WAMMI for evaluating the university's website usability with respect to students and found that if the area specification has any influence on factors of usability. WAMMI has five factors which are: controllability, attractiveness, efficiency, learnability, and helpfulness. For the pilot study, 30 undergraduate and postgraduate students were randomly selected from three random faculties in UPM (University of Putra Malaysia). 455 questionnaires were distributed and the number of respondents out of 455 is 364. The participants of postgraduate and undergraduate students were randomly selected from Faculty of Educational studies, Faculty of Computer Science and Information Technology and Faculty of engineering at UPM. The results of the study revealed that the websites of the university are good in terms of controllability, efficiency and helpfulness and usability level was reported poor in terms of learnability and attractiveness.

Another study for evaluating website usability was done by Mentes and Turan (2012) who said a healthy communication between the university and its stakeholders will be developed if the Usability of the website is well enough. The Website of NAMIK KEMAL University (NKU) was evaluated with the help of WAMMI. For the measurement of satisfaction and usability, Likert scale was used. Two different methods were used in this research. In the first method, internal stakeholders: students; faculty members and administrative staff, were asked to respond to the online questionnaire

which was posted to the website of NKU. Second, the email, including the questionnaire, was sent from NKU email system. A gift check of online bookstore worth 50 Turkish Liras (around 28$) was offered to participants which were a booster for participation. The study expressed positive relationship of usability with four factors. However, "controllability" was rejected. The study revealed that demographic factors like web experience and gender were tested and has a significant impact on usability perception of individual users (Mentes & Turan, 2012).

According to WUEM (Web Usability Evaluation Model), the higher educational websites in Asia are partly used in their informational structure, navigation and are also weak in accessibility. Also, the suggestion was made for improvement in these websites in order to make its usability of good quality. There are 17 measures in the model and have four different dimensions which are: navigation, web page design, accessibility, and web design. The evaluation of these websites was done in two phases: first; three different universities were considered for conducting an online survey through questionnaires and for this 30 students of these universities were selected. In the second phase, the results were analyzed and the website was the thoroughly examined for two months. Then WUEM was designed for top ten Asian engineering universities. Jakob Nielson's book helped in the development of WUEM. For accessibility, WCAG 2.0 standards were used which has many attributes for making the website more accessible (Manzoor & Hussain, 2012).

Aziz et al. (2010) used Nielson's factors (learnability, efficiency, memorability, control of errors, and satisfaction) to measure the usability of Malaysia Higher Education websites. Usability was evaluated with the help of making their focus on usability

features like; performance of web page, broken links, and page size. Many issues were found in these websites which were in need of focus and the recommendation was made that these websites' accessibility and usability needs more priority. Extending the recommendations, the improvement of online services and information for both normal and disable people must be focused. EvalAccess 2.0, an automatic evaluation tool, was used for accessibility evaluation and deadlink.com, 1-hitbrokenlinkchecker.com and web optimization were used for usability evaluation. 20th may 2009-20th July 2010 was the period of the evaluation process. Convenience sampling was used and with which 120 websites were selected MOHE (Ministry of Higher Education) portal. The only limitation was the use of WAG1.0 guideline instead of WCAG 2.0, because the limitation of automated evaluation tools that support WCAG2.0.

The evaluation of Jordan's universities websites is done with respect to Usability. Questionnaires and automated tools are the two methods used in this study. Two online automated tools are provided namely: HTML tool box and Web Page analyze. *HTML toolbox* is provided from Net Mechanic Inc and *Web page analyze* is provided by Website Optimization. These tools were helpful in the measurement of websites features that cannot be perceived by users as a time for downloading, the size of the HTML page, and HTML code errors. 23 usability criteria were made in the questionnaires and were further divided into five categories which are: navigation and links; content, readability, and organization; user interface design; performance and effectiveness; and educational information. The values assigned to each question are from 0-1. The number of participants of the questionnaire is 252 users representing nine different Jordanian universities. The number of online respondents is 56.7% while the number of the

respondent from paper version questionnaire is 43.4%. 80% of respondents were graduates and undergraduates and their ages between 18 and 25 from male and female. Moreover, the experience of participant related to the computer is four years. The result of the study showed that the websites usability, in general, is good. The study reported pointing out the strengths and weakness of these websites. So the authors provided suggestion to enhance the usability of these websites because there are some weaknesses in some aspects of the design, interface, and performance (Mustafa & Al-Zoua'bi, 2008).

Table 2.10
The Previous Studies Related to HEI Websites Evaluation

Author	**The title of study**	**The quality factors**
(Jabar et al., 2013)	"Assessing The Usability Of University Websites From Users' Perspective"	Attractiveness, Controllability, Helpfulness, Efficiency and Learnability
(Mentes & Turan, 2012)	"Assessing The Usability of University Websites: An Empirical Study on Namik Kemal University"	Attractiveness, Controllability, Helpfulness, Efficiency and Learnability
(Manzoor & Hussain, 2012)	"A Web Usability Evaluation Model for Higher Education Providing Universities of Asia"	Web design, Webpage design, Navigation, and Accessibility
(Aziz et al., 2010)	"Assessing the Accessibility and Usability of Malaysia Higher Education Website"	Learnability, Efficiency, Memorability, Control of errors, and Satisfaction
(Mustafa & Al-Zoua'bi, 2008)	"Usability of the Academic Websites of Jordan's Universities An Evaluation Study"	Content, organization, and readability; Navigation and links; User interface design; Performance and effectiveness; and Educational information

Table 2.10 (continue)

The above summarization table shows that there are some attempts to explore the critical criteria to evaluate HEI websites. Most studies of HEI websites evaluation focused on one feature of website quality which is usability while very a few studies that focused on the quality of HEI websites. Some of these studies evaluated the site by measuring internal attributes which related to developers' perspective and others to measure external attributes which related to users' perspective.

2.5 The existing quality evaluation models for HEI websites

There are a few studies that related to the quality of higher education institution websites. In this section will be present some of these studies which will be summarized in Table 2.11.

a. Sife and Msoffe Model

The study of Sife and Msoffe (2013) used an instrument of 22 items in Tanzania which was used to measure four different dimensions of web quality that are: information quality, technical adequacy, service ability and web appearance for the assessment of website's quality with respect to user's perspective. The proposed instrument was applied to five major public universities in Tanzania. They used 50 students pursuing Bachelor of Science in Informatics at Sokoine University of Agriculture (SUA) to evaluate the websites by sending the questionnaires via their emails during their vacation. Each respondent was asked to evaluate all five websites. The number of respondents was 41 and for data analysis, SPSS and MS Excel were used. It was revealed in the study's result that the mean range of website quality dimension is between 1.58 and 3.16 on the websites of all universities. For further enhancement of the

websites, the researchers give some recommendation to the observed HEI. They need to improve the web appearance and keep on updating the websites regularly to meet the user satisfaction (Sife & Msoffe, 2013).

b. Website Quality of Higher Education Websites Model

Rizavi et al. (2011) focused on the student perception for analyzing and studying the higher education website quality issues. But they just focused on students in between age 18 and 25 because they were the main users of the websites. They used WEBQUAL instrument with some modification to suited with the criteria for evaluating the higher education websites. However, they used different quality factors as compared to Sife & Msoffe (2013) such as usability, educational information, trust, interaction, information quality, and language. Whereas, the results showed that the most important factor for the quality of HEI websites from students' perspective is usability factor followed by the educational information.

c. Fuzz-Web Model

Rekik and Kallel (2011) presented fuzzy reduced evaluation method called Fuzz-web for assessing the quality of dynamic institutional websites. They tried to solve the problem of subjectivity and impression of the evaluation process by using the fuzzy logic, as in Figure 2.8. The characteristics of this model derived from ISO 9126 model, four high-level characteristics with 13 sub-characteristics, which are Usability, Functionality, Reliability, and Efficiency. The online tools used to analyze 30 websites of Universities and Engineering schools in Tunisia and foreign ones. The study results by this fuzzy method were just moderate.

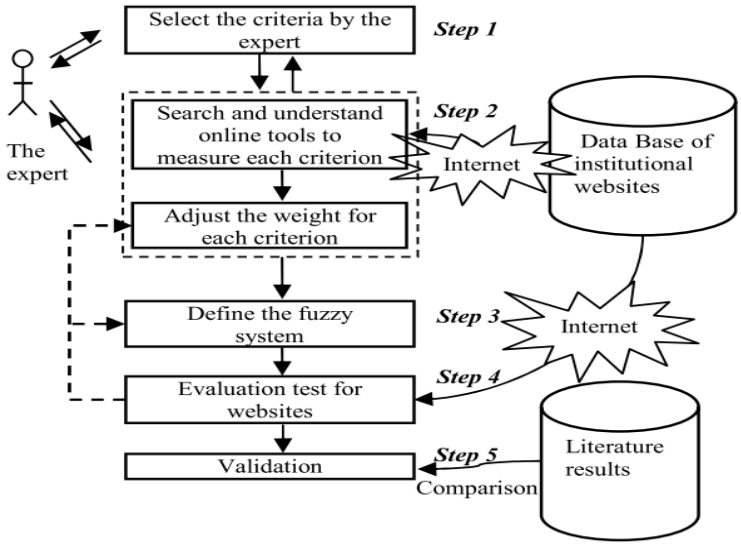


Figure 2.8 Flowchart of Fuzz-Web Methodology (Rekik & Kallel, 2011)

d. University WEBQUAL Model

Khawaja and Bokhari (2010) developed WEBQUAL instrument was used by the University for the assessment of university website and making their focus on student satisfaction. In this model, there are nine factors: responsiveness, navigability, ease of use, functionality, reliability, efficiency, information accuracy, usefulness, and web appearance, as in Figure 2.9. It comprises of 33 items: 29 items to find the view of students on dimensions and four items on user satisfaction. After refinement, it became 30 items. The authors used various research methods and tools to extract results. The research design is comprised of four main methods: True experiment, observational research, Quasi-Experiment and Co-relational research. However, for collecting data, they used the questionnaire in their paper titled "Exploring the Factors Associated with Quality of Website". They conducted a pilot study with 90 respondents to test the feasibility and usability of the instrument. The total respondents of the study were 150 and they got back 123 responses. Their study found only four factors that related

significantly to students satisfaction which was ease of use, usefulness, information accuracy, and web appearance. In contrast, there are different reasons for dissatisfaction which are: course and fee structure, incomplete details of programs, there was no FAQ to handle queries related to problem-solving and difficulties in finding the needed information on the website.

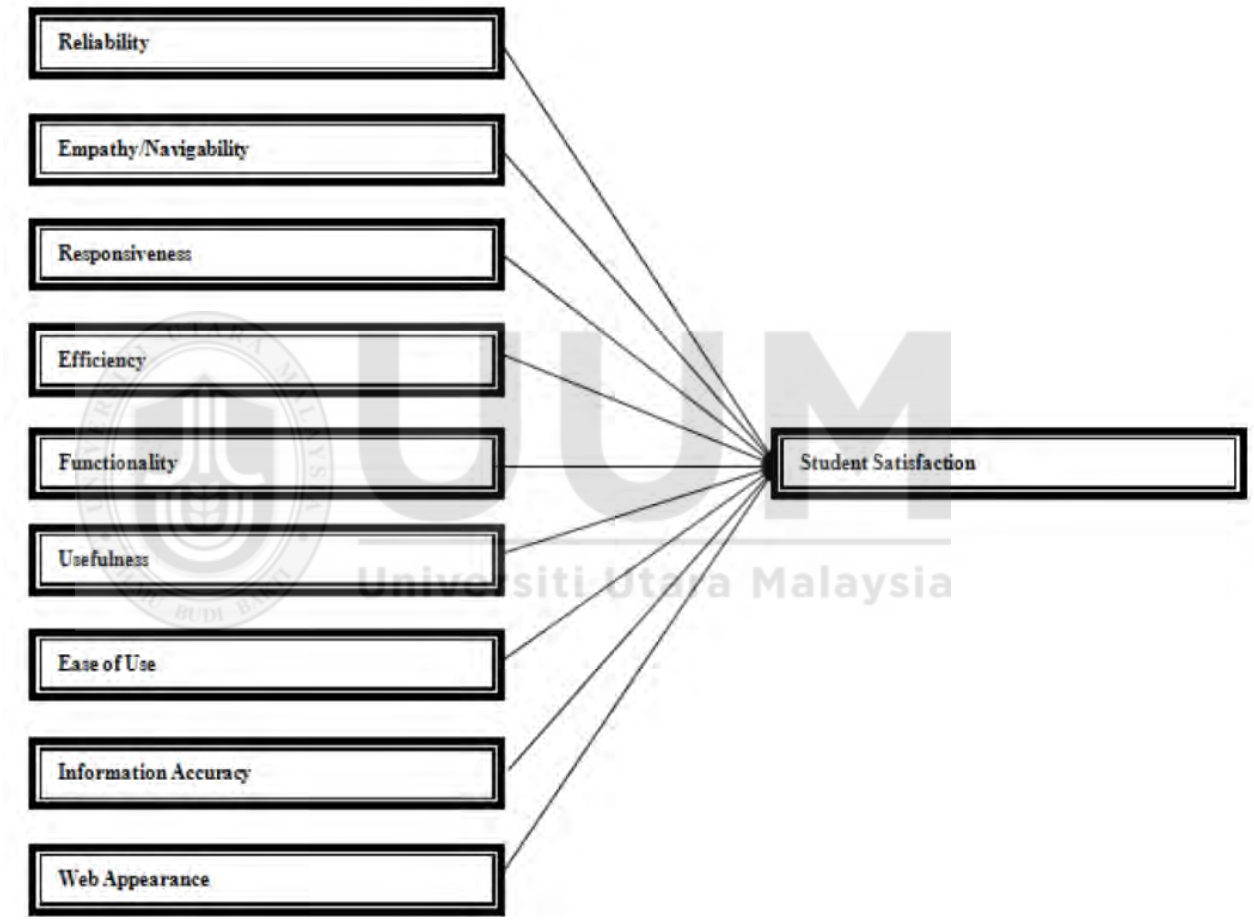


Figure 2.9 University WEBQUAL Model (Khawaja & Bokhari, 2010)

e. Academic Website Quality Evaluation Framework

Mebrate (2010) proposed a framework which was applied on Delft University website as a case study to assess its effectiveness and at the same time to evaluate the quality of the academic websites from students' viewpoint by using a questionnaire and interviews

survey. The questionnaire was designed as close-ended questions with pre-given answers to make questions more appealing and interesting to respondents. The study used the Likert scale and semantic differential scales. Before sending the questionnaire, a pilot study (five students) and a question utility checklist were used to revise and improve it. 50 students studying in Informatics and Electrical Engineering sections of the EEMCS faculty were chosen as a sample to conduct the evaluation case study. Data were analyzed by using SPSS 17 and Excel. Furthermore, the author used WEBUSE tool to make a more valuable analysis of the case study evaluation. The framework was constructed based on ISO 9126-1 model by taking four high-quality factors except content factor taken from other models. Thus, the quality factors of the framework are content, usability, reliability, efficiency and functionality, divided into 19 sub-factors, as in Figure 2.10. The result of this study showed that in comparison to the ISO 1926-1 evaluation model, the constructs of quality factors and subfactors in this framework is more appropriate. Also, with the addition of new quality factors in this framework provides more understanding of how to evaluate the website used for a case study. Moreover, there are recommendations provided to improve the proposed framework.

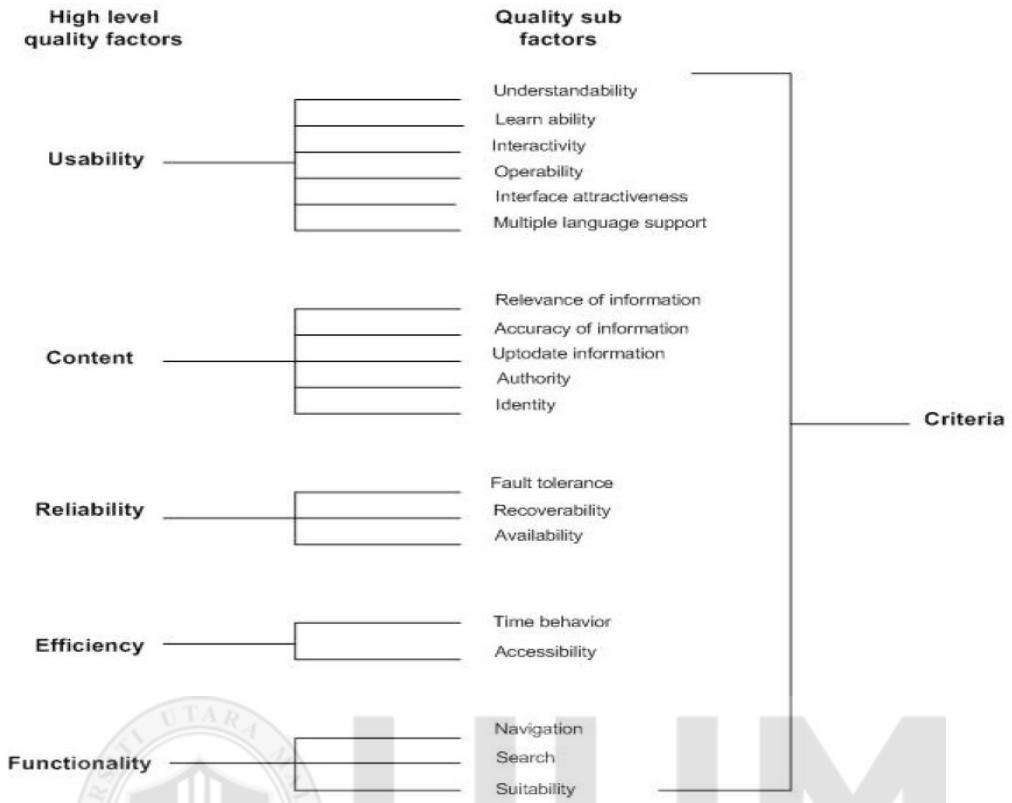


Figure 2.10 Academic Website Evaluation Framework (Mebrate, 2010)

Table 2.11
The Quality Models of Higher Education Institute Websites

Author	Title of study	The quality factors	Comments
(Sife & Msoffe, 2013)	"User-perceived Quality of Selected Tanzanian Public University Websites"	Technical adequacy, Information quality, Service ability and Web appearance	The factors are based on the study and instrument that developed by Djajadikerta and Trireksani (2006)
(Rizavi et al., 2011)	"Website Quality of Higher Education Websites: Young User's Perception"	Usability, Educational Information, Trust, Interaction, Information Quality, and Language	The factors are based on WEBQUAL instrument, but the researchers rename the factors and adding new factor which is "Educational Information"
(Rekik & Kallel, 2011)	"Fuzzy reduced method for evaluating	Usability, Functionality,	The factors are based on the website quality

Table 2.11 (continue)

	the quality of institutional web sites"	Reliability, and Efficiency	standard ISO 9126
(Khawaja & Bokhari, 2010)	"Exploring the Factors Associated With Quality of Website"	Reliability, Navigability, Responsiveness, Efficiency, Functionality, Ease of use, Usefulness, Information accuracy, and Web appearance.	The factors are adapting of SERVQUAL instrument
(Mebrate, 2010)	"A framework for Evaluating Academic Website's Quality From Students' Perspective"	Content, Usability, Reliability, Efficiency and Functionality	The factors are based on the website quality standard ISO9126, further the researcher added the "content"

Based on a summarization Table 2.6, the website quality factors are Usability, Content, Web Appearance, Efficiency, Functionality, and Service Quality. The most factors match with the website quality framework proposed by Mebrate (2010) as shown in Table 2.11 and ISO 9126 as shown in Table 2.7. Therefore, this study will be based on the theory of ISO 9126 and the proposed framework by Mebrate (2010).

2.6 Summary

This chapter describes the literature review related to this study. It was focusing on the higher education institute websites, website quality, website evaluation, concepts, methods, issues and models that relevant to the quality of websites are discussed well. In addition, this chapter explained the proposed website quality factors such as Usability, Content, Web Appearance, Efficiency, Functionality, and Service Quality, with ISO 9126 and the website quality framework proposed by Mebrate (2010) as the based

theory or standard of the proposed model. Previous studies also stated there are some significant correlations between each website quality factor and user perception of the website quality. However, there is no significant statistical evidence to show a significant correlation between those factors in Yemen Universities. Therefore, the six hypotheses are formulated that will be tested in this study focusing on the Yemeni Universities websites. Finally, the last section discussed past studies of the web site evaluation of the higher education institution.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

The main objective of this study is to evaluate the quality of Higher Education websites from a student perspective. This chapter discusses the research methodology used in this study. Research methodology is a strategy that creates research, which is a deliberate approach to get the goal of research. The research methodology helps the researcher to sort out and conduct their research using the recommended techniques to become a successful research. There are three main sections will be discussed which are: methodology, research procedure, and summary.

3.2 Methodology

A comprehensive analysis of website quality evaluation models and evaluation studies was done in this study. The literature discusses the website quality characteristics and quality models. This helped to identify the website quality issues and identifying the important website quality factors. Therefore, this study adapted Usability, Content, Web appearance, Efficiency, Functionality, and Service quality as website quality evaluation factors. The ISO 9126-1 and Mebrate (2010) study are adapted as a based theory in this study. The main objective of the study is to evaluate the quality of higher education websites.

Furthermore, this study adapted the instrument (WEBUSE) which developed by (Chiew & Salim, 2003) and other instruments. So, this study is a qualitative and a quantitative

approach by using content analysis and a questionnaire. The next section elaborates research procedure of the study.

3.3 Research Procedure

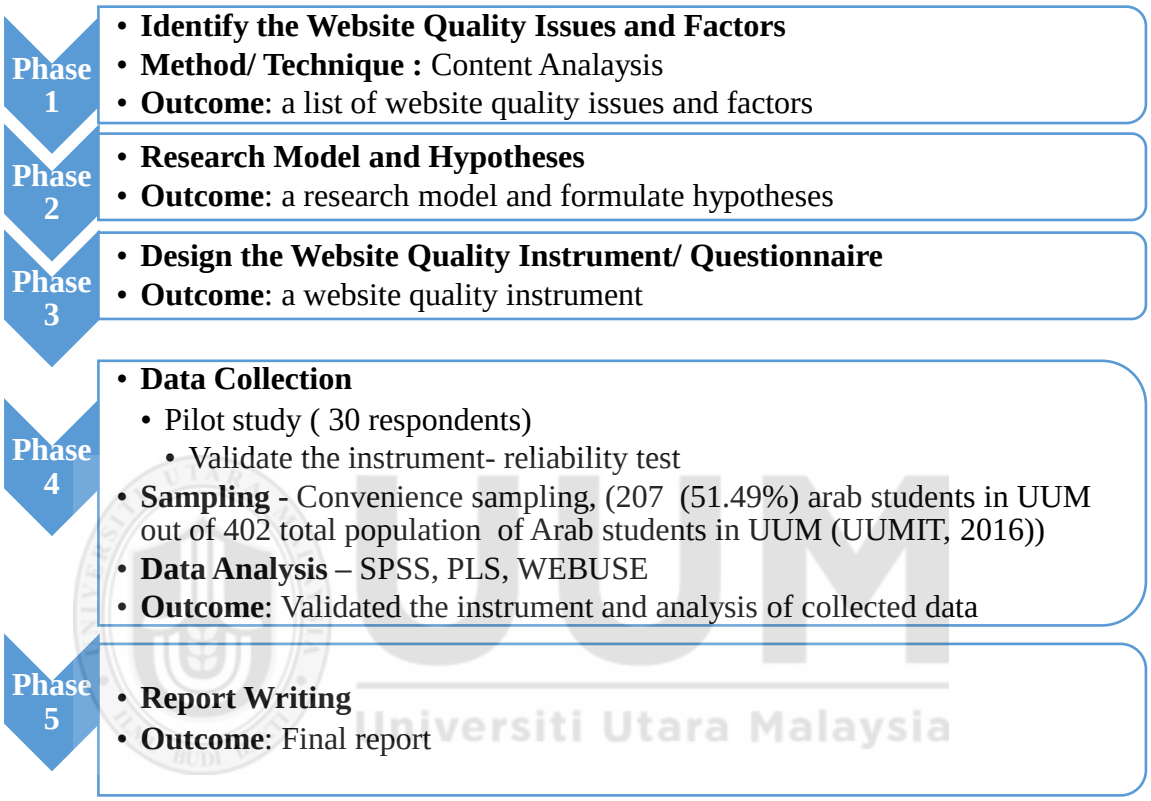


Figure 3.1 The Research Procedure

3.3.1 Content Analysis on Literature Review

Content analysis is a powerful data reduction technique. It is a widely used qualitative research technique. Content analysis as a research method is a systematic and objective means of describing and quantifying phenomena. Researchers regard content analysis as a flexible method for analyzing text data. Content analysis allows the researcher to test theoretical issues to enhance understanding of the data. The goal of content analysis is "to provide knowledge and understanding of the phenomenon under study" In this study,

a systematic review of the relevant research was used to identify the website quality issues and quality factors (Elo & Kyngäs, 2008; Hsieh, 2005; Stemler, 2003)

This study uses six steps to perform the content analysis and constructing the website quality model for HEI, as follows:

1. Find the articles on website evaluation, website assessment, and quality models.
2. Scan the articles by reading their titles, abstracts and sometimes introductions to select those relevant to quality evaluation.
3. Identify the website quality issues in the existing models of website quality from student perspective. The identification by reading the chosen articles that related to quality evaluation and website assessment (as in section 3.3.1.1 and details in chapter 2 sec. 2.3.5, p. 40 and 41).
4. Identify the quality factors that refer to the website quality issues (as in section 3.3.1.2 and details in chapter 2 sec. 2.3.6, p. 41 - 45).
5. Choose a quality model that will be used as a reference base. This study uses ISO 9126-1 quality standard model and Mebrate (2010).
6. Design the website quality evaluation model for HEI (as in section 3.3.2).

3.3.1.1 Identifying HEI Website Quality Issues

Based on the researchers' observation from the previous studies done recently in the last five years (Khawaja & Bokhari, 2010; Mebrate, 2010; Ng, 2014; Rekik & Kallel, 2011; Rizavi et al., 2011; Sife & Msoffe, 2013) on designing and evaluating the quality of higher education websites, it seems that creating a website for general purpose is not a difficult task. However, designing a high-quality Higher Education Institute website

need to include plenty of adequate characteristics. HEI's website requires being easy to use, easy to learn, and easy to understand for students. The potential student need be able to browse and surf all the goodwill. HEI's website must be also attractive, clear and simple. In addition, it necessitates to be efficient and accessible, as well asshould contain all information that students need, whether administrative procedures or academic information which is well-aimed and being updated regularly.

3.3.1.2 Identifying Website Quality Factors

After an extensive study on the related resources (Aladwani & Palvia, 2002; Barnes & Vidgen, 2000; Barnes & Vidgen, 2006; Khawaja & Bokhari, 2010; Lin, 2010; Loiacono et al., 2002; Mebrate, 2010; Mich et al., 2003; Negash et al., 2003; Luis Olsina et al., 2001; Luís Olsina & Rossi, 2002; Rizavi et al., 2011; Sauro, 2015; Sife & Msoffe, 2013; Singh & Kumar, 2014; Zhang & Von Dran, 2001), the following website quality factors have been identified: Usability, Content, Web Appearance, Efficiency, Functionality, and Service Quality, which are decomposed into 16 sub-factors. Table 3.1 describes the quality factors and their subfactors under each level and the sources that compiled by.

Table 3.1
The Sources of Arranging the Sub-factors into Their High-quality Factors

Quality Factor	**Quality Sub-factor**	**Source**
Usability	Ease of use Easy to understanding Navigation Easy to learn	(Barnes & Vidgen, 20
Content	Accuracy Completeness Appropriate format	(Lin, 2010)
Web appearance	Educational information Attractiveness A clean and simple presentation	(Rizavi et al., 2011) (Sauro, 2015)
Efficiency	Performance	(Luis Olsina et al., 20(

Table 3.1 (continue)

	Accessibility	Luís Olsina & Rossi, 2002)
Functionality	Search Suitability	(Mebrate, 2010)
Service quality	Reliability Responsiveness	(Barnes & Vidgen, 20 Lin, 2010)

3.3.2 Research Model

The website quality factors of higher education websites are Usability, Content, Web Appearance, Efficiency, Functionality, and Service Quality, as it shown in Figure 3.2.

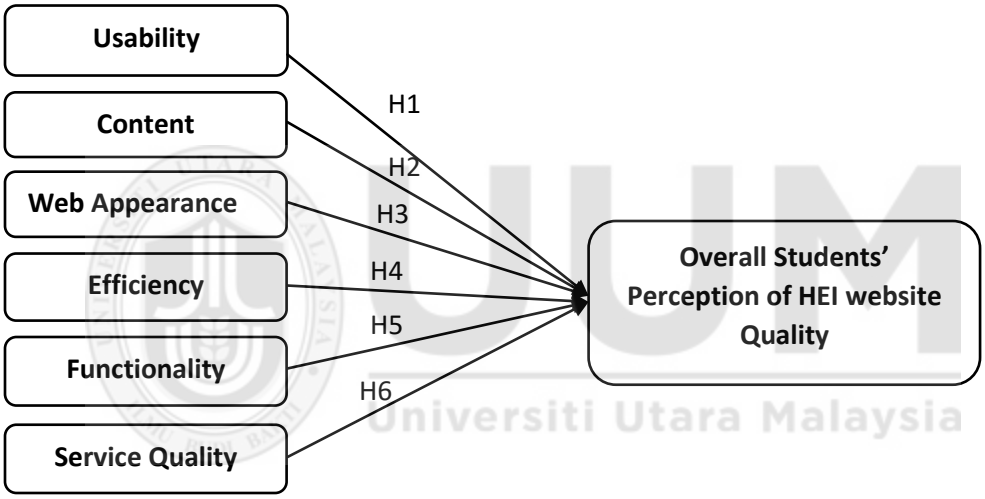


Figure 3.2 Quality Evaluation Model of Higher Education Website

3.3.2.1 Hypotheses

The hypothesis is a testable proposition about the relationship between two or more events or concepts (Saunders, Lewis, & Thornhill, 2011).The research predicts that all the proposed quality factors have a significant effect on the quality of the HEI websites, the hypotheses are clearly stated below:

H1: Usability has a significant effect on the Overall Students' Perception of the HEI website quality (details in chapter 2 page 41).

H2: The content has a significant effect on the Overall Students' Perception of the HEI website quality (details in chapter 2 page 42).

H3: Web appearance has a significant effect on the Overall Students' Perception of the HEI website quality (details in chapter 2 page 42).

H4: Efficiency has a significant effect on the Overall Students' Perception of the HEI website quality (details in chapter 2 page 43).

H5: Functionality has a significant effect on the Overall Students' Perception of the HEI website quality (details in chapter 2 page 43).

H6: Service quality has a significant effect on the Overall Students' Perception of the HEI website quality (details in chapter 2 page 43).

3.3.3 Questionnaire Design

The questionnaire is among the efficient data gathering mechanism if the researcher is aware of what is needed and the way of measuring the variable of interest. The questionnaire can be self-administered, mailed to the respondent or it can be electronically distributed (Sekaran & Bougie, 2010). This procedure of data collection is quite effective specifically in the case of big inquiries. Individuals, research workers, private and public organizations and even government are using this method. The

questionnaire is comprised of questions either written or printed in a clear order on a structure or set of structures (Kothari, 2004; Scheuren, 2004).

The questionnaire used in this study is an online questionnaire. Google Forms were used for designing this questionnaire. The questionnaire was adapted and designed based on the factors as identified earlier in the literature review: Usability, Content, Web appearance, Efficiency, Functionality, and Service quality, as website quality evaluation factors. As stated earlier, the ISO 9126-1 was adapted as a based theory in this study.

The questionnaire composes of two parts, the first one about users' profile which contains the general information of the participant. This includes gender, age, computer and Internet experience, and the educational level. The second part contains the items (questions) that related to the study. Most of the items of this instrument (twenty items) were adapted from WEBUSE instrument (Chiew & Salim, 2003). Actually, the dimensions of the instrument not the same dimensions in WEBUSE, but the items used were extracted from WEBUSE. In addition, five items related to "Educational Information" extracted from Rizavi et al. (2011) study. Furthermore, five items were taken from "Academic website quality evaluation framework" (Mebrate, 2010). Moreover, one item from SERVQUAL (Parasuraman et al., 1988) and one item from (Sife & Msoffe, 2013). Finally, seven items related to the overall student perception of HEI website quality are extracted from (J. P. Chin et al., 1988). So the total questions in this questionnaire become 39. Five options are available for each question assigned as "Strongly disagree =1" to "Strongly agree = 5"; as in appendix A. Table 3.2 illustrates the quality factors and the sources of its items.

Table 3.2

Website Quality Factors and Items Sources

Quality Factors	Source of Items
Usability	(Chiew & Salim, 2003; Mebrate, 2010)
Content	(Chiew & Salim, 2003; Rizavi et al., 2011; Sife & Msoffe, 2013)
Web Appearance	(Chiew & Salim, 2003)
Efficiency	(Chiew & Salim, 2003)
Functionality	(Chiew & Salim, 2003; Mebrate, 2010)
Service Quality	(Chiew & Salim, 2003; Parasuraman et al., 1988)
Overall Students' Perception	(J. P. Chin et al., 1988)

3.3.4 Data Collection

Data can be collected in different strategies, for example, questionnaire, interviews, observations and journals. The questionnaire is one of the most widely used data gathering instruments in many fields (Hazzi & Maldaon, 2015). The available facilities, researcher's expertise, the required level of accuracy, study's time period and other related costs and resources which are available for data gathering determine the strategy for data collection (Sekaran & Bougie, 2010). In this study, an online questionnaire is used for data collection (Appendix A).

3.3.4.1 Pilot Study

The study of Saunders et al. (2011), for pre-test of the questionnaire, made their focus on conducting a pilot study. The term of pilot study is defined as "a small-scale test of the methods and procedures to be used on a large scale …" (Porta, Greenland, Hernán, dos Santos Silva, & Last, 2014). The pilot study will help the researcher to get the validity of

questionnaire assessed (Saunders et al., 2011). The importance of the pilot study is prone as there is less chance that the website will be error free without conducting any pilot study. A well-conducted pilot study can help the researchers to design a clear roadmap they can follow (Hazzi & Maldaon, 2015). The pilot study will give the signal to continue the main study or stop it (Scheuren, 2004). In this regards, based on Hazzi and Maldaon (2015), although conducting a pilot study provides us with limited information comparison with the main study and does not guarantee success in the latter, but it does increase the likelihood. The pilot study use procedures similar to the actual test.

According to Baker and Risley (1994), a formal sample size calculation of 10 – 20% of the main sample size is a reasonable number for conducting a pilot study.

In this study, the pilot study was conducted among thirty of undergraduate and postgraduate Arab students in Universiti Utara Malaysia (UUM) to pre-test the questionnaire and to make sure that the instrument is without vagueness. Some ambiguities were identified by the pilot study, which the minor corrections were made. The pilot study was done on the website of Yemeni University of Science & Technology http://www.ust.edu/.

The reliability test was conducted by testing every factor through the calculation of the pilot study data. According to Hair et al. (2010), the main condition for the selection of past instruments is their individual internal consistency by calculating the Cronbach's alpha reliability coefficients. The Cronbach's alpha coefficient that was obtained from this pilot study of the whole items is 0.950 as in Table 3.3. According to George and Mallery (2003) rules of thumb which are "> .9 – Excellent, > .8 – Good, > .7

– Acceptable, > .6 – Questionable, > .5 – Poor and < .5 – Unacceptable", the reliability of this questionnaire is an excellent.

A detailed list of results for the Cronbach's alpha of all factors, ranging from estimates between 0.698 and 0.921, is depicted in Table 3.4; the estimates were higher than the acceptable value of 0.60, except one variable is 0.565 which is poor value. Following the pilot study, the attention of the researcher was brought towards the identification of probable issues with the questionnaire content. Required corrections were employed prior to conducting the actual empirical survey.

Table 3.3
Reliability Statistics of Pilot Study

Cronbach's Alpha	Cronbach's Alpha Based on Standardised Items	N of Items
.950	.953	39

Table 3.4
Factors Reliability Statistics of Pilot Study

The variables	Cronbach's Alpha	N of Items
Usability	0.863	7
Content	0.864	8
Web Appearance	0.781	5
Efficiency	0.699	5
Functionality	0.565	4
Service Quality	0.698	3
Overall Perception	0.921	7

3.3.5 Sampling

The websites that will be evaluated are the top-five ranked HEI websites in Yemen according to Webometrics. Thus, this study involves the UUM Arab students in the

academic year 2015 - 2016. The rationale behind using Arab students for this study is due to the fact that the websites interface which will be evaluated in Arabic language. Also, the study focuses on the student's perspective since the students are the most users of HEI websites. Furthermore, based on (Dragulanescu, 2002), university professors and students should be the most effective information evaluators.

The researcher should choose the appropriate sampling plan which is one of the important research design decisions (Sekaran & Bougie, 2010). However, sampling decisions should take account of the sampling design and sample size (Sekaran & Bougie, 2010). Hence, the researcher chooses Convenience Sampling, because according to Sekaran and Bougie (2010), this type of sampling point to a set of information from the population members who are conveniently available to provide it. The advantages of this type of sampling are the best way of getting some basic information quickly, efficiently, less expensive and the subjects are readily available. Furthermore, previous studies that evaluating the websites have shown that a convenience sampling approach is an efficient and acceptable method to adopt (M. A. Aziz et al., 2010; Kim & Niehm, 2009; Mentes & Turan, 2012). However, this sampling type is not generalizable at all (Sekaran & Bougie, 2010).

Determining sample size can be useful to the researcher in meeting the objectives of the study if it is adequate for the desired level of precision and confidence (Sekaran & Bougie, 2010). Sekaran and Bougie (2010) cited that Roscoe proposed some rules for determining sample size such as for sample size to be appropriate for research, it should be less than five hundreds and more than thirty, a minimum sample size of 30 for each category is necessary where the samples broken into subsamples, it should be several

times ten times or more as large as the number of variables in the study, and successful research is possible with samples as small as 10 to 20 in size.

In this study, the online questionnaire was sent to 207 (51.49%) Arab students in UUM out of 402 total population of Arab students in UUM (2015-2016).

3.3.6 Data Analysis

In this section, the data was collected through a quantitative method (questionnaire) and the data was analyzed by using Ms Excell, Statistical Package for the Social Science (SPSS) tool, Partial Least Squares Structural Equation Model (PLS-SEM), and WEBUSE analysis method.

According to Saunders et al. (2011), a quantitative data analysis enables a researcher to explore, present, describe and examine relationships and trends within the quantitative data collected. As a result, the quantitative analysis method was used to examine the relationship between the proposed website quality factors and the students' overall perception of the quality of HEI websites. Thus, the researcher enquires students to show their level of agreement to a given items. Several statistical techniques were used for analyzing data.

Descriptive Analysis: is used to summarize the data collected into tables for better understanding for the reader and for the researcher to easily examine the results. It analyzed the data collected from the questionnaires based on the demographic variables including gender, age, educational level, and the experience of using a computer and the Internet.

Validity and Reliability

The validity and reliability of measuring instrument (questionnaire) must be tested. Validity measures if the instrument measures what it is intended for (Saunders et al., 2011). Reliability will check the ability of an instrument that if it measures consistently or not (Saunders et al., 2011). Validity and reliability related together, an instrument must be reliable first, then, it will be valid (Field, 2013). Cronbach's alpha will be used in this study to test the reliability of the items in each of the quality factors for the consistency of the items in the scale; the alpha value is between 0 and 1. According to George and Mallery (2003) rules of thumb which are "> .9 – Excellent, > .8 – Good, > .7 – Acceptable, > .6 – Questionable, > .5 – Poor and < .5 – Unacceptable.

Data Screening: it ensures that no ambiguous data characteristics will negatively impact the results. This is done by two tests which will evaluate missing data and the identify outliers.

Normality Test: the purpose of this test is to determine if the data is normally distributed or not. It is defined as the shape of the data distribution for the individual metric value along its corresponding normal distribution (Hair, Black, Babin, & Anderson, 2010). Skewness and kurtosis can be used to validate an assumption and test normality.

Linearity: Linearity testing locates the association of independent variables with a dependent variable which predicts the hypotheses' right direction.

Multicollinearity testing among variables is highly recommended before beginning to test the proposed model (Hair et al., 2010). It indicates to the existence of relapse in the correlation matrix in which the independent variable is high and significantly correlated with another independent variable.

PLS-SEM Analysis Method

PLS is a basic method that is used to estimate path models. It involves latent constructs that is indirectly observed by multiple indicators. PLS model is normally identified by two different sets of distinction: 1- the measurement model refers to the relationships between the latent variables and the manifest variables, and 2- the structural model is that in which the hypothesized relationships between the latent variables are measured and whose interpretation for standardized regression coefficients (Carlson & Cass, 2010; Chin, 1998). Moreover, PLS is categorized as a method that has a power on analysis process because of its ability to show on handling small sample sizes, complex models with numerous endogenous and exogenous constructs and indicator variables, and non-normal data distributions (Hair, Hult, Ringle, & Sarstedt, 2014).

Measurement Model: will be used to ensure that the intended constructs can be justified, and to prevent variables that do not represent what they were intended to measure are included in the final model.

Structural Model: will be used to test the hypotheses of the study. In other words, it will be used to investigate the relationship between dependent variable (the overall students' perception of the HEI website quality) with independent variables.

Furthermore, to explore which of quality factors is more impact on the quality of HEI websites.

WEBUSE Analysis Method

WEBUSE analysis method will be used to make a more valuable analysis of the case study evaluation. This method basically was applied practically for evaluating the usability of websites by using questionnaire (Chiew & Salim, 2003; Mustafa & Al-Zoua'bi, 2008) and for evaluating the quality of websites (Mebrate, 2010) in the form of Likert scale items. The questions will be grouped into categories based on the quality factors they address. Then, a merit value for each response of the questions will be assigned according to the responses gathered as shown in Table 2.9.

Table 2.9
Options for WEBUSE Instrument and Related Merits

Option	**Strongly Agree**	**Agree**	**Fair**	**Disagree**	**Strongly Disagree**
Merit	1.00	0.75	0.50	0.25	0.00

Then the merit points for the quality factors will be accumulated as the following to produce the quality points (x) for that factor:

x = [Σ (Merit for each question of the quality factor)] / [total number of questions]

Finally, the mean value of the quality points for the quality factors is considered as the overall quality of the website. The quality level of the website will be determined based on the quality merit points, which ranged between 0 and 1, and divided into five groups/levels, as shown in Table 3.5.

Table 3.5
Quality Points and its Levels

Merit points, x	**0<=x<=0.2**	**0.2<x<=0.4**	**0.4<x<=0.6**	**0.6<x<=0.8**	**0.8<x<=1.0**
Quality level	Bad	Poor	Moderate	Good	Excellent

(Chiew & Salim, 2003)

3.4 Summary

This chapter explained the research methodology of this study, including details about the research procedure and how to cover the objectives of this study. There are five phases in the research procedure. The first phase lead to the identification of the list of website quality issues of the HEI websites, as well as identifying the list of website quality factors that are proposed for the study which are Usability, Content, Web appearance, Efficiency, Functionality, and Service quality. The factors are based on the theory or standard of ISO 9126 and the website quality framework proposed by Mebrate (2010). The second phase is about the design of the research model and the six hypotheses that will be tested in this study to see the correlation between the proposed website quality factors and overall students' perception of the HEI website quality. The third phase is on the design of the website quality instrument which consists of two parts, the first part related to the user profile and the second related to the website quality factors. The fourth phase is on the method of data collection which includes the pilot study to validate and test the reliability of the instrument. In this phase, the method of sampling that used in this study, that is a convenience sampling, will also be explained. This sampling technique is considered the best way of getting some basic information in

quick, efficient, less expensive and the subjects are readily available. The data collection involved 207 students. Moreover, the data analysis and the techniques that were used to analyze the data also were discussed in this chapter. The last phase is about report writing.

CHAPTER FOUR

DATA ANALYSIS AND FINDINGS

4.1 Introduction

In this chapter, all the results and findings of the data analysis that had been collected in this research will be described. Three main parts of results will be described in this chapter, the first one is testing by using SPSS which includes the result of the demographic profile of the respondents, describes the main variables, descriptive statistics, data screening, normality, linearity, and multicollinearity test. The second is the result of instrument validation with the recent study that employed Partial Least Squares Structural Equation Modeling (PLS-SEM) to assess the outer model, which is a precondition for the assessment of the inner model. The outer model is considered the part of the model that illustrates the relationship between the indicators and their variables. The inner model is the part of the model that illustrates the relationship between the variables that make up the model.

Above all, this study created the goodness of the measurement (outer) model related to the variables of this study namely; usability, content, web appearance, efficiency, functionality, service quality, and overall students' perception of HEI website quality. Once the variables validity was established, the next process was to examine the quality of the inner model and hypothesis testing was reported.

The third is the result of quality evaluation of the case study by using WEBUSE analysis method, which is used to make a more valuable analysis on the evaluation of the case study.

4.2 Response Rate

The questionnaire was made available online on November 23rd – December 10th, 2015. The questionnaire was sent to 207 postgraduate and undergraduate Arab students in different faculties of UUM. Within three weeks period of time, 125 valid responses were returned, thus making a response rate of 60.4%.

Furthermore, the sample size obtained for the study was appropriate according to the rules of thumb proposed by Roscoe as cited in Sekaran and Bougie (2010), whereby the sample size larger than 30 and less than 500 are appropriate for analysis (preferably 10 times or more) as large as the number of the variables of the study. In addition, Hair et al. (2010) also stated that the minimum sample size to pursue factor analysis is 50 and the preferable sample size should be 100 or larger. Therefore, the sample of 125 respondents is considered satisfactory. Table 4.1 shows the response rates summary of this study.

Table 4.1
Summary of Response Rates(N = 125)

Description	**No.**	**%**
The distributed questionnaires by e-mail	42	20.3%
Returned questionnaires distributed by e-mail	36	17.4%
The distributed questionnaires by Facebook	165	79.7%
Returned distributed questionnaires by Facebook	89	43%
Total distributed questionnaires	207	100%
Returned questionnaires	125	60.4%
Returned and usable questionnaires and response rate	125	60.4%

4.3 Demographic Profile of Respondents

The demographic profile of respondents who participated in the survey is presented in Table 4.2. The profile includes gender, age, the experience of computer using and the Internet, and educational level.

Table 4.2
Profile of Respondents (N = 125)

Variable	Description	Frequency	Percentage
Gender	Male	82	65.6
	Female	43	34.4
Age	Under 21 years	12	9.6
	21-30 years	57	45.6
	31-40 years	40	32.0
	41-50 years	14	11.2
	More than 50 years	2	1.6
Computer	Never	0	0
Experience	Less than 1 year	6	4.8
	1-3 years	9	7.2
	More than 3 years	110	88.0
Internet	Never	0	0
Experience	Less than 1 year	1	0.8
	1-3 years	8	6.4
	More than 3 years	116	92.8
Educational	Bachelor	31	24.8
Level	Master	62	49.6
	Doctoral	32	25.6

As shown, the total sample of the survey consisted of 125 respondents. The majority of respondents were male 82 while the female students who participated in the questionnaire were about one-third of respondents 43. Regarding the age, majority of respondents 45.6% were in the category of 21-30 years, and 32% were in the category of 31-40, while 11.2% were in the range of 41-50 years old, and whoever only 9.6% and 1.6% in the ages under of 21 years and above of 50, respectively. 62 students who participated in the questionnaire were Master students, comprising 49.6%, 25.6% of the

response being Doctoral students, and the rest (24.8%) were Bachelor students. Moreover, most of the participants had computer and Internet experience for more than three years. For computer experience, 88% of the participants had three years or more and for internet experience about 92.8% of the participants had three years or more. 4.8% of the participants had less than one year experience with computers and 0.8% of them had less than one year experience with the Internet.

4.4 Descriptive Statistics Analysis

Sekaran and Bougie (2010) maintained that the descriptive statistics of the dimensions through the mean, standard deviation, and variance can give the researcher a detailed idea of the way that the respondents in the study have responded towards questions in the particular questionnaire. Consequently, a descriptive statistics analysis was performed to describe the main characteristics of a data set from the students' perspective on every variable namely; Usability, Content, Web Appearance, Efficiency, Functionality, Service Quality, and Overall Students' Perception of HEI website quality.

Table 4.3 illustrates the findings of descriptive statistics of the variables. Most of the variables have the mean above the average ranged from 3.344 to 3.637. Functionality has the lowest mean (3.344) while the highest mean is for web appearance (3.637). In addition, the standard deviation for all variables seems to fall between the ranges of 0.8807 to 0.9990, which reflects the existence of considerable acceptable variability within the dataset. Minimum and maximum responses on the variables are between 1 and 5, with sample size 125 respondents,

Table 4.3
Descriptive Statistics of Variables (N = 125)

Variables	Minimum	Maximum	Mean	Std. Deviation
Usability	1	5	3.624	.9435
Content	1	5	3.375	.9990
Web Appearance	1	5	3.637	.9092
Efficiency	1	5	3.475	.9744
Functionality	1	5	3.344	.9325
Service Quality	1	5	3.515	.9942
Overall Perception	1	5	3.616	.8807

Note: 1- Strongly Disagree, 2- Disagree, 3- Fair, 4- Agree, 5- Strongly Agree

4.5 Data Screening

The data screening method requires screening, which ensures that no ambiguous data characteristics will negatively impact the results. Hair et al. (2010) stressed that before processing the data, a researcher must evaluate missing data and detect outliers. In this study, 125 usable questionnaires were obtained. Data screening was performed before pursuing further statistical analyzes.

4.5.1 Missing Data

Missing data in any research undertaking is a common phenomenon and it is important to take note of the missing data before analysis (Hair et al., 2010). Missing data implies a situation where valid values of one or more variables are not available for data analysis (Hair et al., 2010). Sekaran and Bougie (2010) noted that a situation of this nature occurs when respondents fail to answer some items in the questionnaire, thus leaving the items blank. After data screening, there is no missing data were found, as shown in (Appendix D).

4.5.2 Detecting Outliers

The detection of outliers is the step following the identification of missing data, and it is a vital step that limits incorrect data entries, as this could lead to outliers. Outliers could also stem from the point that observations selected by respondents tend to be to the extreme inside their combination of values through the entire variables (Hair et al., 2010). One of most ways to detect outliers is Mahalanobis distance (D^2) which refers to the space of a case through the centroid of the remaining cases where the centroid would be the meeting point of the means of all variables (Tabachnick & Fidell, 2007). Hence, Mahalanobis distance is used to test the presence of outliers in the current study.

The maximum of Mahalanobis distance should not be more than the chi-square value (x^2) and alpha = 0.001. Any value more than chi-square ($x^2 = 72.06$) will be deleted, as they considered as outliers (Hair et al., 2010). The current study identified six cases out of 125 respondents considered as outliers because their Mahal distance1 and Mahal distance 2 are larger than the threshold value as indicated in the table of (x^2) chi-square statistics that is related to the 39 measurement items compared with the Mahalanobis distance (D2). Therefore, the rest analysis in this study used the remaining 119 samples in the data (Details are shown in Appendix E)

4.6 The Rationale behind Choosing PLS-SEM for this Study

The aim of this study is to examine the relationships between latent variables; therefore, the latent analysis technique was the right option. There was a choice to use covariance-based SEM technique, but the data must be normally distributed (Hair et al., 2010; Hair, Hult, Ringle, & Sarstedt, 2013). The following assumptions have been tested in SPSS before choosing the technique of the analysis.

4.6.1 Normality Test

Normality is the distribution shape of the data for the individual metric value along its corresponding normal distribution (Hair et al., 2010). Skewness as well as kurtosis tend to be the two ways which can be used to validate an assumption and test normality (Hair et al., 2010). The Skewness value provides an indication of the symmetry of the distribution while kurtosis value provides information related to the peakedness or flatness of the distribution (Hair et al., 2010).

According to Hair et al. (2010), the skewness values beyond the range of +1 to -1 are substantially skewed distribution. However, the suggested cut-off which will be acceptable should be between +3 and -3 (Kline, 2011). Similarly, Coakes and Steed (2003) suggested the values associated with kurtosis will be acceptable if it is into the range from -3 to +3, as illustrated in Appendix F.

In line with the discussion above, results show that a number of the values in skewness as well as kurtosis deviate to be normally distributed. Therefore, to manage to handle non-normal and skewed data to find out the hypothesized relationships, this study utilized SmartPLS 2.0 which is the distribution-free statistical modeling technique (W. W. Chin, 1998).

4.6.2 Linearity Test

Linearity testing locates the association of independent variables with a dependent variable which predicts the hypotheses' right direction; therefore, the positive values indicate the relationship is considered positive. Based on the suggestion of Hair et al. (2010), the partial regression plot was used for each variable when there is more than

one independent variable to guarantee the best representation in the equation. To achieve this purpose, the normal P-P plot of regression standardized residual plot was imposed for independent variables on the dependent variable. The results showed that the normal distribution was achieved. In Figure 4.1, the graph of the output for linearity test is attached.

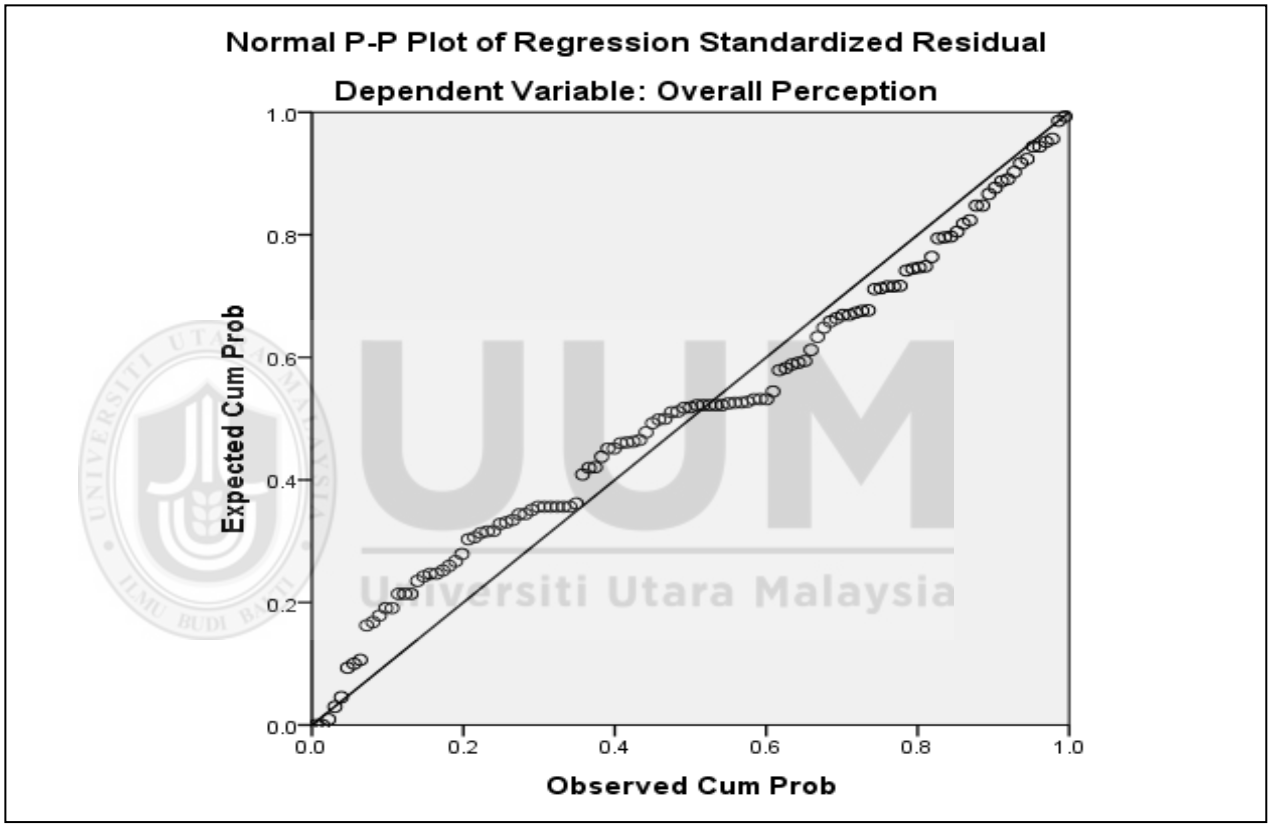


Figure 4.1 The Result of Linearity Test

4.6.3 Multicollinearity Test

The test of multicollinearity among variables is highly recommended before beginning to test the proposed model (Hair et al., 2010). It indicates the existence of relapse of in the correlation matrix in which the independent variable is high and significantly correlated with another independent variable. In addition, the revelation of

multicollinearity can be detected when the correlation value is more than 0.90 (Hair et al., 2010). The test of multicollinearity is facilitated by examining the variance influence factor (VIF) and the tolerance value.

Moreover, the value of the VIF is the amount of variability of the selected independent variable which is explained by other independent variables whereas the tolerance is the inverse of VIF (Hair et al., 2010). The VIF and tolerance values cut-off points are 10 and 0.10 respectively which indicates that VIF closer to 1.00 represents little or no multicollinearity.

Table 4.4 shows that the model highlights collinearity statistics for all independent variables. VIF values range between 3.137 and 5.709, whereas tolerance values range between 0.175 and 0.319. Therefore, the results reported that there is no violation of multicollinearity assumption.

Table 4.4

Multicollinearity Test

Variable	**Collinearity Statistics**	
	Tolerance	**VIF**
Usability	0.319	3.137
Content	0.285	3.512
Web Appearance	0.272	3.682
Efficiency	0.175	5.709
Functionality	0.218	4.595
Service Quality	0.294	3.396

Dependent Variable: Overall Perception

4.7 Measurement Model Testing

Examining the outer model was the first step in evaluating the PLS-SEM model (Hair et al., 2014). The measurement model results are the relationships between constructs and their indicator variables, such as path coefficients, which are the relationships between the constructs in the structural model, along with the R^2 values of an endogenous construct (Hair et al., 2014). The measurement model was assessed by using PLS-SEM.

Two procedures must be achieved to test the goodness of measurement. The processes started with construct validity, which includes factor loadings, the reliability of the measures (Cronbach's Alpha and Composite reliability), and convergent validity. Followed by, discriminant validity of the various constructs. Figure 4.2 shows the research model.

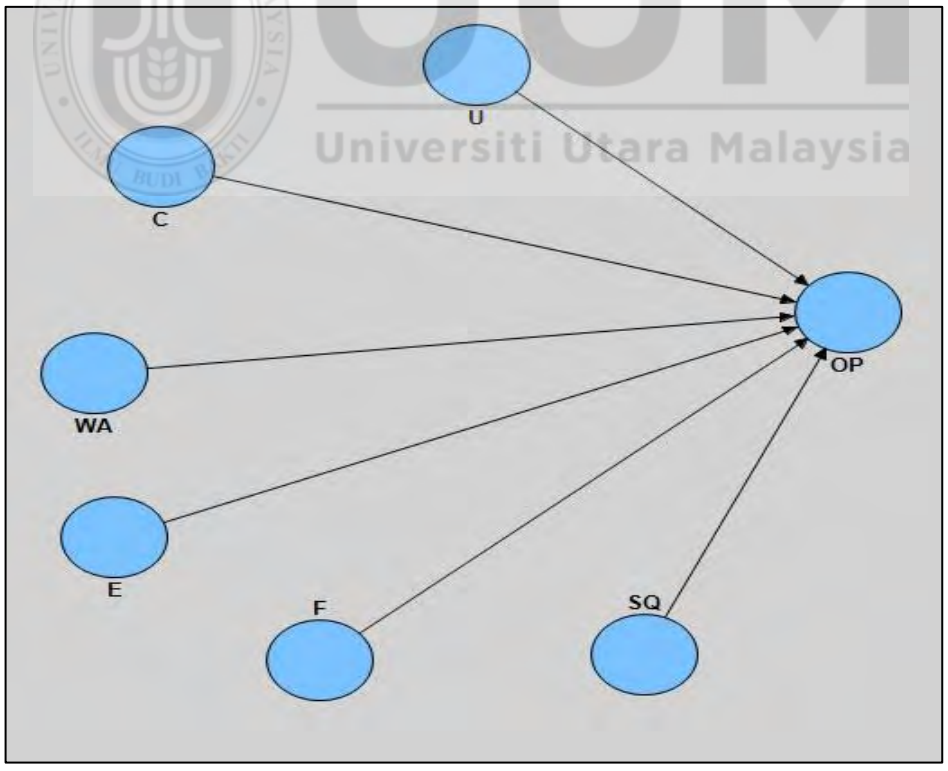


Figure 4.2 The research model

4.7.1 Construct Validity

Construct validity of items means the degree to which it measures what it really is supposed to quantify (Hair et al., 2010). Precisely, all the items designed to assess a construct ought to load higher on their own construct than their loadings on other constructs. Based on factor analysis, the items were correctly assigned on their constructs. The items revealed high loadings on their own constructs in comparison with other constructs as in Table 4.5 (Chow & Chan, 2008).

Table 4.5
Factor Analysis and Cross Loading of the Items

Constructs	Items	C	E	F	OP	SQ	U	WA
Content	C1	**0.78**	0.59	0.60	0.55	0.52	0.73	0.57
	C2	**0.78**	0.59	0.57	0.53	0.55	0.68	0.54
	C3	**0.85**	0.71	0.65	0.66	0.61	0.67	0.75
	C4	**0.85**	0.72	0.65	0.67	0.67	0.64	0.69
	C5	**0.88**	0.71	0.62	0.60	0.62	0.64	0.68
	C6	**0.85**	0.71	0.62	0.59	0.64	0.54	0.54
	C7	**0.89**	0.70	0.67	0.64	0.65	0.64	0.67
	C8	**0.87**	0.68	0.65	0.58	0.60	0.60	0.62
Efficiency	E1	0.67	**0.81**	0.64	0.65	0.65	0.62	0.72
	E2	0.72	**0.88**	0.70	0.79	0.67	0.69	0.76
	E3	0.63	**0.85**	0.79	0.68	0.65	0.52	0.60
	E4	0.74	**0.91**	0.80	0.77	0.73	0.73	0.78
	E5	0.71	**0.87**	0.79	0.68	0.73	0.55	0.66
Functionality	F1	0.73	0.81	**0.90**	0.78	0.75	0.62	0.71
	F2	0.40	0.50	**0.65**	0.55	0.45	0.47	0.59
	F3	0.64	0.76	**0.89**	0.68	0.71	0.55	0.56
	F4	0.68	0.78	**0.88**	0.80	0.75	0.58	0.68

Table 4.5 (continue)

Overall Perception	O1	0.67	0.75	0.81	**0.87**	0.73	0.61	0.74
	O2	0.62	0.73	0.78	**0.88**	0.69	0.67	0.70
	O3	0.66	0.80	0.79	**0.92**	0.71	0.67	0.72
	O4	0.58	0.68	0.66	**0.87**	0.65	0.76	0.71
	O5	0.59	0.67	0.68	**0.83**	0.62	0.70	0.74
	O6	0.64	0.70	0.68	**0.85**	0.70	0.63	0.68
	O7	0.64	0.73	0.79	**0.91**	0.73	0.65	0.68
Service Quality	S1	0.67	0.76	0.70	0.70	**0.89**	0.58	0.62
	S2	0.63	0.70	0.70	0.74	**0.90**	0.66	0.69
	S3	0.61	0.65	0.75	0.64	**0.86**	0.56	0.56
Usability	U1	0.65	0.60	0.55	0.65	0.60	**0.86**	0.66
	U2	0.61	0.51	0.52	0.56	0.53	**0.75**	0.58
	U3	0.61	0.63	0.57	0.64	0.54	**0.88**	0.69
	U4	0.63	0.62	0.58	0.65	0.57	**0.89**	0.68
	U5	0.70	0.66	0.64	0.64	0.64	**0.75**	0.58
	U6	0.60	0.58	0.50	0.63	0.55	**0.84**	0.61
	U7	0.64	0.61	0.54	0.68	0.54	**0.86**	0.73
Web Appearance	W1	0.72	0.78	0.77	0.82	0.74	0.74	**0.91**
	W2	0.74	0.72	0.69	0.73	0.65	0.68	**0.88**
	W3	0.69	0.77	0.66	0.76	0.61	0.71	**0.90**
	W4	0.56	0.62	0.55	0.55	0.52	0.60	**0.83**
	W5	0.44	0.55	0.53	0.51	0.44	0.55	**0.74**

4.7.2 Reliability Analysis

Reliability is conducted for the purpose of measuring the internal consistency among the items through using two criterion: 1- Cronbach's Alpha (CA), and 2- composite reliabilities (CR). Cronbach's alpha commonly serves as a coefficient of reliability to

measure the internal consistency among all items that make up the scale, and it is estimated using the reliability analysis procedure by calculating the data using SPSS. However, it tends to provide a conservative measurement in PLS-SEM. Composite reliabilities varies from Cronbach's alpha, which weighs all of the items equally without having factor loading considerations and is obtained from principal component analysis in PLS (W. W. Chin, 1998). Hair et al. (2010) suggest that Cronbach's alpha should be greater or equal to 0.80 for a good scale, 0.70 for an acceptable scale, and .60 for a scale for exploratory purposes.

Table 4.6 shows the Cronbach's alpha of the constructs is ranged from 0.85 to 0.95, while composite reliability values is ranged from 0.90 to 0.96. Since both values for all the variables are greater than the recommended value of 0.70, they are considered as good values (Hair et al., 2010). Overall, the reliability analysis undertaken on the items shows that all measurements are reliable and internally consistent.

4.7.3 Convergent Validity

It is important to note, therefore, that the present study follows Hair's et al. (2010) suggestions. In other words, this study has assessed the convergent validity with the use of factor loadings, composite reliability and average variance extracted (AVE). Regarding the factor loadings, the recommended value is 0.6, so all items exceeded this value. Therefore, all indicators in this study are related to their particular constructs (Chin, 1998). Values of Composite reliability show the degree to which the construct indicators indicate the latent construct ranged from 0.90 to 0.96 which exceeded the recommended value of 0.7 (Fornell & Larcker, 1981; Hair et al., 2010). The AVE reflects the overall amount of variance in the indicators accounted for the latent

construct are in the range of 0.70 and 0.78 which also exceeded the recommended value of 0.5 (Hair et al., 2010). Thus, the results of factor loadings, composite reliability and average variance extracted are sufficient evidence of convergent validity (see Table 4.6).

Table 4.6

Convergent Validity of Constructs

Variable	Items	Loading	Cronbach's Alpha	Composite Reliability	AVE
Content	C1	0.776	0.943	0.952	0.715
	C2	0.784			
	C3	0.849			
	C4	0.854			
	C5	0.882			
	C6	0.852			
	C7	0.890			
	C8	0.869			
Efficiency	E1	0.810	0.916	0.937	0.749
	E2	0.881			
	E3	0.853			
	E4	0.906			
	E5	0.874			
Functionality	F1	0.902	0.852	0.902	0.700
	F2	0.650			
	F3	0.886			
	F4	0.884			
Overall Perception	O1	0.868	0.949	0.958	0.767
	O2	0.878			
	O3	0.920			
	O4	0.867			
	O5	0.833			
	O6	0.848			
	O7	0.912			
Service Quality	S1	0.887	0.860	0.915	0.781
	S2	0.903			
	S3	0.861			
Usability	U1	0.861	0.927	0.941	0.697
	U2	0.749			
	U3	0.882			
	U4	0.888			
	U5	0.753			
	U6	0.842			

Table 4.6 (continue)

Web Appearance	U7	0.856	0.906	0.930	0.727
	W1	0.913			
	W2	0.877			
	W3	0.896			
	W4	0.827			
	W5	0.739			

4.7.4 Discriminant validity

Examining discriminant validity can be done by comparing the square of the intercorrelation between a construct and other constructs and variance extracted for the construct (Fornell & Larcker, 1981). Alternatively, the square root of the AVE of each construct should be greater than the correlations among the constructs. As shown in Table 4.7, the correlations for each construct are less than the square root of the AVE by the indicators measuring that construct indicating adequate discriminant validity. These findings provide evidence for discriminant validity. Altogether, the adequate convergent validity as well as the discriminant validity caused to confirm the measurement model.

Table 4.7

*Discriminant Validity of Constructs**

Constructs	**1**	**2**	**3**	**4**	**5**	**6**	**7**
1. Content	**0.845**						
2. Efficiency	0.802	**0.865**					
3. Functionality	0.745	0.861	**0.837**				
4. Overall Perception	0.717	0.828	0.848	**0.876**			
5. Service Quality	0.721	0.793	0.809	0.789	**0.884**		
6. Usability	0.758	0.723	0.668	0.765	0.680	**0.835**	
7. Web Appearance	0.754	0.816	0.760	0.810	0.709	0.777	**0.853**

*Square root of the AVE on the diagonal.

4.8 Goodness of Fit (GoF) of the Model

The geometric mean of the AVE and the average R^2 of endogenous latent variables is considered The goodness of fit. GoF was used to evaluate the global fit of the model (Tenenhaus, Vinzi, Chatelin, & Lauro, 2005). The following formula was used to estimate the GoF value:

$$Gof = \sqrt{(\overline{R^2} \times \overline{AVE})}$$

Global validation of PLS models use these cut-off values (Wetzels, Odekerken-schröder, & Oppen, 2009), $GoF_{small} = 0.10$, $GoF_{medium} = 0.25$, $GoF_{large} = 0.36$.

Table 4.8 shows the GoF value that our model obtained was 0.775, which exceeds the cut-off value of 0.36. As suggested by Wetzels et al. (2009), the measure of model's goodness of fit was large, representing an adequate level of global PLS model validity.

Table 4.8
Goodness of Fit of the Model

Constructs	**R Square**	**AVE**
Usability		0.697
Content		0.715
Web Appearance		0.727
Efficiency		0.749
Functionality		0.700
Service Quality		0.781
Overall Perception	0.820	0.767
Average	0.820	0.734
GoF	**0.775**	

4.9 Assessing Effect Size (f^2)

The effect size (***f²***) is a measure of the impact of a specific predictor construct on an endogenous construct. Specifically, the ***f²*** measures a variety of the R^2 value when a specified independent construct is absent from the model. It is used to evaluate whether the absent predictor construct has a pivotal impact on the R^2 values of the dependent construct (Hair et al., 2014). The following formula was used to compute the ***f²***:

$$f^2 = \frac{R^2\text{included} - R^2\text{excluded}}{1 - R^2\text{included}}$$

Effect size is assessed as small, medium or large when the value of f^2 is 0.02, 0.15 or 0.35 respectively.

Table 4.9 shows the critical impact of the six independent variables (exogenous) on the overall students' perception of the HEI website quality.

Table 4.9
The Impact of Quality Factors on the HEI Websites Quality

Construct	$\mathbf{R^2_{included}}$	$\mathbf{R^2_{excluded}}$	$\mathbf{R^2_{included} - R^2_{excluded}}$	$\mathbf{1-R^2_{included}}$	f^2
Usability	0.820	0.802	0.018	0.180	0.10
Content	0.820	0.815	0.005	0.180	0.03
Web Appearance	0.820	0.809	0.011	0.180	0.06
Efficiency	0.820	0.817	0.003	0.180	0.01
Functionality	0.820	0.788	0.032	0.180	0.18
Service Quality	0.820	0.813	0.007	0.180	0.04

As shown in Table 4.9, the most factors which effect on the R^2 value was functionality (0.18) assessed as a medium effect. Followed by usability had 0.10 near to medium.

Web appearance, service quality, and content had a small effect on the overall perception (0.06, 0.4, and 0.03, respectively). However, efficiency had the smallest effect on the R^2 value of the overall perception, where it is effect was 0.01 which is less than the cut-off value (0.02).

4.10 Prediction Relevance of the Model

According to Hair et al. (2014), researchers should examine the Q^2 value which is an indicator of the model's predictive relevance. To calculate Q^2 the cross-validated redundancy approach was used. Where, the path model estimates of both the structural model and the measurement model (Hair et al., 2014). To obtain the Q^2 value for endogenous construct (overall students' perception) blindfolding was run. The predictive relevance Q^2 value for our model of the overall students' perception was 0.607 (see Table 4.10), which more than zero that indicates the model has large predictive relevance based on the cut-off values, small = 0.02, medium = 0.15, and large = 0.35 (Hair et al., 2014).

Table 4.10
Predictive Quality of the Model

Endogenous	R Square	Cross-Validated Redundancy
Overall Students' Perception	0.820	0.607

4.11 Structural Model Results and Hypotheses Testing

After the measurement model is measured, the next step was to test the hypotheses of the study. Using the SmartPLS2.0, by running the PLS algorithm the hypothesized model was tested. As illustrated in Figure 4.3, the path coefficients of constructs were generated.

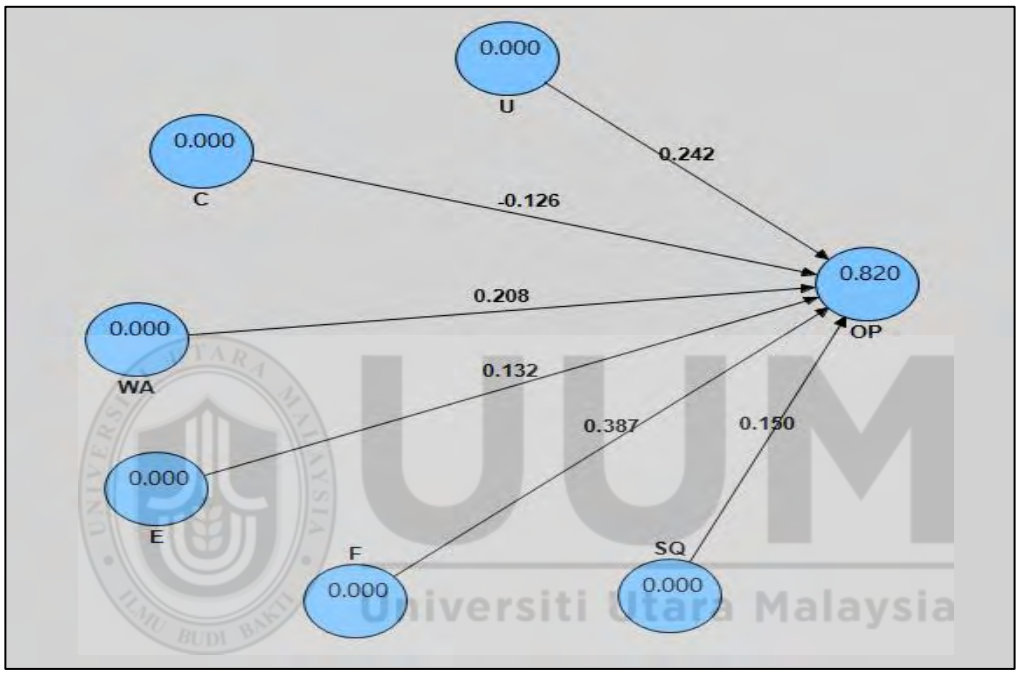


Figure 4.3 Path Coefficient Results

The bootstrapping techniques used for generating the t-values accompanying each path coefficient, then generate p-values to test the hypotheses of the study whether supported or not. To run the bootstrapping, the researcher used 119 cases equal to the observations. P-value is calculated by using function called (TDIST) in MSEXCEL, which including three parameters (t-value, degree-freedom, and tails type). Figure 4.4 shows the t-values of the constructs.

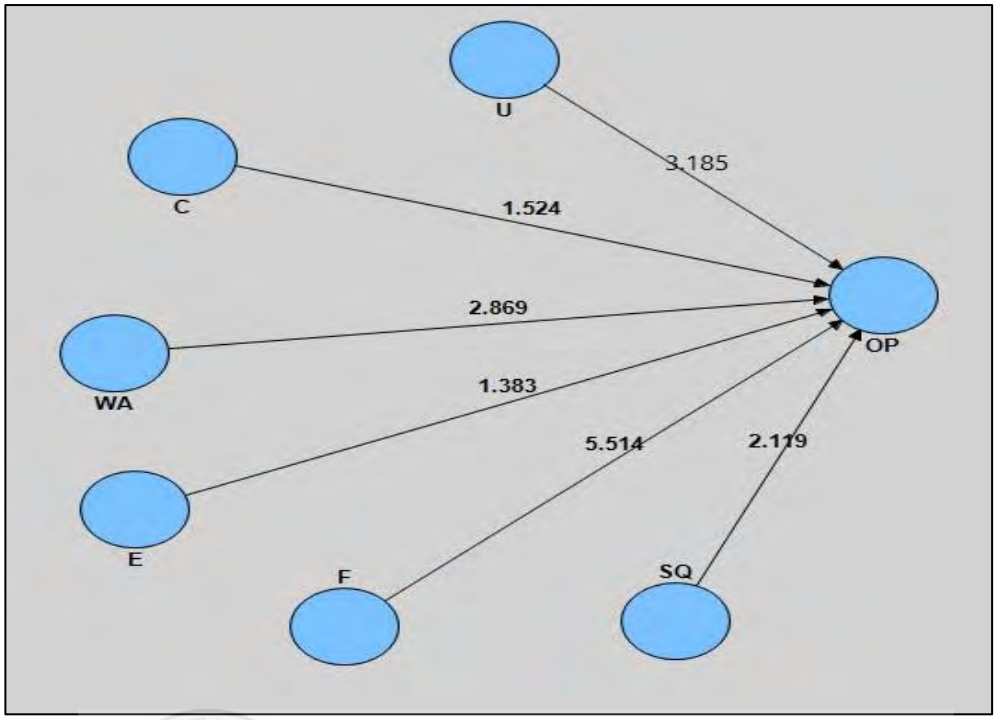


Figure 4.4 Path Coefficients T-values

Table 4.11 summarizes the hypothesis results of the model and illustrates the path coefficients between the exogenous (independent variables) and endogenous variable (dependent variable), standard errors, t-values and p-values.

Results showed that usability had a significant effect on the overall students' perception of HEI websites quality ($\beta = 0.242$, $t = 3.185$, $p < 0.01$). However, insignificant effect of the content on the overall student perception ($\beta = -0.126$, $t = 1.524$, $p > 0.10$). Similarly, the relationship between overall students' perception and efficiency was insignificant ($\beta = 0.132$, $t = 1.383$, $p > 0.10$). So, these two results indicated the hypotheses H2 and H4 not supported. On the other hand, the relationship between the overall students' perception and web appearance was a positive and significant impact ($\beta = 0.208$, $t = 2.869$, $p < 0.01$). In addition, there is a significant effect of functionality on the overall students' perception ($\beta = 0.387$, $t = 5.514$, $p < 0.01$). Moreover, services quality has a

significant effect on the overall students' perception (β = 0.150, t = 2.119, p < 0.05). Thus, the hypotheses H1, H3, H5, and H6 are supported in our study. Due to the t-values of all path coefficients of these four relationships were greater than the recommended value (t-value > 1.96).

Table 4.11
Results of the Structural Model

No	Hypotheses	Path Coefficient	Std. Error	T. value	P. value	Decision
H1	Usability -> Overall student's Perception	0.242***	0.076	3.185	0.002	Supported
H2	Content -> Overall student's Perception	-0.126	0.083	1.524	0.130	Not supported
H3	Web Appearance -> Overall student's Perception	0.208***	0.072	2.869	0.005	Supported
H4	Efficiency -> Overall student's Perception	0.132	0.096	1.383	0.169	Not supported
H5	Functionality -> Overall student's Perception	0.387***	0.070	5.514	0.000	Supported
H6	Service Quality -> Overall student's Perception	0.150**	0.071	2.119	0.036	Supported

*p < 0.1; **p < 0.05; *** p < 0.01

Researcher elaborates on the relevant website quality factors influencing the overall students' perception of the HEI websites quality. Researcher revised the model as shown in Figure 4.5

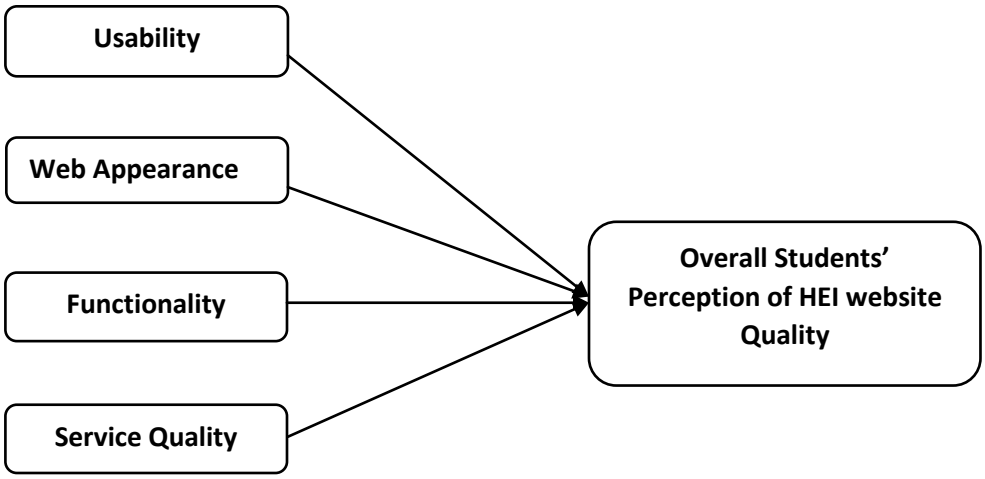


Figure 4.5 A Revised Model of Quality Evaluation of Higher Education Websites

4.12 WEBUSE Analysis Method Results

WEBUSE analysis used to make a more valuable analysis of the case study websites in terms of the proposed quality factors. The following sections provide a separate explanation for the quality factors results of the WEBUSE analysis and section 4.12.8 discusses the overall websites quality. Table 4.12 illustrates the whole result of WEBUSE analysis method for quality factors in each website of the case study.

Table 4.12
The WEBUSE Analysis Results

Factors	Sub-Factors	UST	AL-NASSER	ADEN	SU	AHQAFF	Factor Quality
Usability	EOU	.685	.710	.595	.615	.580	
	ETU	.710	.720	.620	.680	.640	
	Navigation	.660	.677	.600	.663	.643	
	ETL	.690	.760	.660	.710	.670	
		.686	**.717**	**.619**	**.667**	**.633**	**.664**
Content	Accuracy	.600	.590	.520	.570	.570	
	Completeness	.600	.570	.590	.590	.570	
	Appro_Format	.640	.680	.660	.610	.600	
	Ed_Info	.624	.658	.578	.542	.556	

Table 4.12 (continue)

		.616	**.625**	**.587**	**.578**	**.574**	**.596**
Web Appearance	Attract	.695	.695	.630	.630	.590	
	CSP	.690	.650	.693	.653	.647	
		.693	**.673**	**.662**	**.642**	**.618**	**.657**
Efficiency	Accessibility	.680	.580	.665	.655	.695	
	Performance	.600	.560	.617	.603	.593	
		.640	**.570**	**.641**	**.629**	**.644**	**.625**
Functionality	Searching	.567	.560	.587	.603	.567	
	Suitability	.600	.630	.620	.630	.590	
		.583	**.595**	**.603**	**.617**	**.578**	**.595**
Service Quality	Reliability	.570	.660	.650	.650	.650	
	Responsive	.595	.630	.630	.670	.600	
		.583	**.645**	**.640**	**.660**	**.625**	**.631**
Website Quality Point		**.633**	**.637**	**.625**	**.632**	**.612**	**.628**
Website Quality Level		**Good**	**Good**	**Good**	**Good**	**Good**	**Good**

Based on the results from WEBUSE, University of Science and Technology (UST) is good in term of web appearance (.693), followed by usability (.686). But the evaluation value of the website shows the weaknesses, in term of functionality (.583) and service quality (.583). On the other hand, Al-Nasser University (AL-NASSER) website is good in term of usability (.717), followed by web appearance (.673). However, the website shows their weaknesses in term of efficiency (.570) and functionality (.595). Efficiency (.641) is considered the second best factor in ADEN website after web appearance (.662), but the worst feature in the website is the content (.587). Similarly, content (.578) is the worst feature in University of Sana'a (US), however, all other features of the website are good. The power of this website in term of usability (.667), followed by service quality (.660). On the other hand, Ahqaff University website (AHQAFF) is good

in efficiency and usability (.644 and .633, respectively), but the website shows their weakness in term of the content (.574) and functionality (.578).

In sum, all websites are good in total (.628). However, the best website among all websites is AL-NASSER (.637). On contrast, the worst one is AHQAFF website (.612).

4.12.1 Usability

In respect to the results of usability quality of case study websites, the websites showed a good level of usability. This indicates all websites were easily used and understood by students. The navigation of websites also clear and easy, as well as, websites showed that learning how to use it by students not difficult.

Table 4.13 and Figure 4.6 showed that the highest point of usability (.717) gained by AL-NASSER website. While the lowest point of usability in ADEN (.619). However, all websites have a good level of usability.

Table 4.13
The Usability Quality of Yemeni HEI Websites

Factor	Sub-Factors	UST	AL-NASSER	ADEN	SU	AHQAFF	The average
Usability	EOU	.685	.710	.595	.615	.580	.637
	ETU	.710	.720	.620	.680	.640	.674
	Navigation	.660	.677	.600	.663	.643	.649
	ETL	.690	.760	.660	.710	.670	.698
		.686	**.717**	**.619**	**.667**	**.633**	**.664**

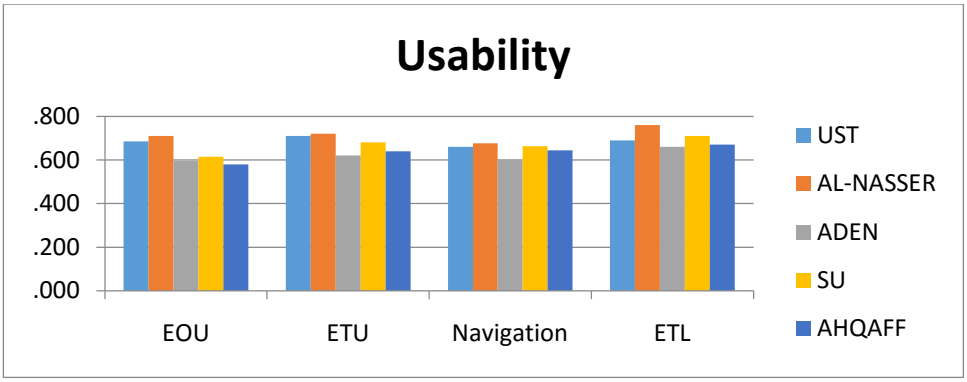


Figure 4.6 Usability Quality Levels

- **Ease of Use (EOU)**

  Good level in ease of use of websites in the whole (.637). In particular, EOU points ranged from .580 to 0.710, where the easiest website in use was AL-NASSER (.710). In contrast, ADEN and AHQAFF have the lowest points in ease of use (.595 and .580, respectively).

- **Easy to Understand (ETU)**

  The understandability of the websites showed a good quality level (.674). Hence indicating that the terms used in the websites might be clear to most of the students and the organization of the website elements is easily understood by students.

  AL-NASSER and UST have the highest values of ETU (.720 and .710, respectively). While the lowest value was .620 gained by ADEN website, means that students might be faced difficulty to use the website.

- **Navigation**

  The results of navigation were good for all websites of the case study, which were ranged of .600 to .677. This indicates that students were comfortable with the navigation structure as well as the surfing of websites.

- **Easy to Learn (ETL)**

  The easy to learn of all websites also showed the good level of quality, as in Table 4.13, means that students find easy learning of how to use the websites. The values of ETL of the websites ranged of .660 to .760.

4.12.2 Content

The overall quality of content of all websites was in moderate level. Two of the case study websites had a good quality level of content, whereas, three of them had a moderate level. This indicates that the students not more satisfied about the content in the websites which have a moderate level.

Table 4.14 and Figure 4.7 showed that the highest level of content quality in AL-NASSER website (.625), followed by UST (.616), both had a good level of content quality. The rest three websites (ADEN, SU, and AHQAFF) had a moderate level (.587, .578 and .574, respectively).

Table 4.14
The Content Quality of Yemeni HEI Websites

Factor	Sub-Factors	UST	AL-NASSER	ADEN	SU	AHQAFF	The average
Content	Accuracy	.600	.590	.520	.570	.570	.570
	Completeness	.600	.570	.590	.590	.570	.584
	Appro_Format	.640	.680	.660	.610	.600	.638
	Ed_Info	.624	.658	.578	.542	.556	.592
		.616	**.625**	**.587**	**.578**	**.574**	**.596**

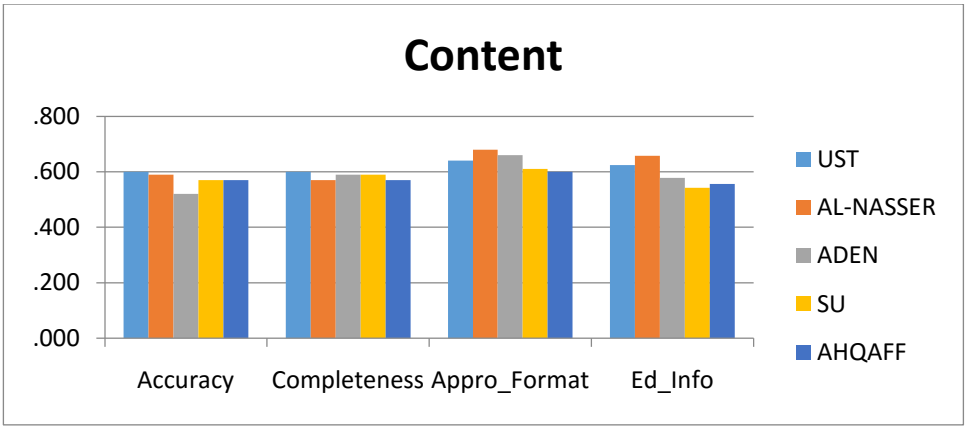


Figure 4.7 Content Quality Levels

- **Accuracy**

  The quality level of information accuracy in the websites of the case study was moderate level, while all websites had moderate levels of accuracy except UST has a good accuracy quality, which was .600. This result indicates that these websites provide not very accurate information to students.

- **Completeness**

  The content completeness of websites also has a moderate level of quality, whereas, all websites in moderate level their range of points between .570 and .590, except UST has a good completeness quality. This refers to the necessary information in these websites is incomplete.

- **Appropriate Format (Appro_Format)**

  The format of content in all websites have a good level of quality, this refers to the students found the effective presentation of information.

- **Educational Information (Ed_Info)**

  Table 4.14 illustrated that two websites have a good quality of educational information and three have a moderate level of quality. However, the overall

level of quality of educational information was moderate. This refers to students faced difficulty to get the educational information in these websites.

4.12.3 Web Appearance

Table 4.15 and Figure 4.8 show the quality level of web appearance. The results suggested that the students were comfortable about the web appearance in all five websites. So, all website gained a good level in its appearance. UST got the highest quality point of web appearance (.693). In contrast, AHQAFF got the lowest quality point (.618). However, the rest websites have quality points ranged .642 to .673.

Table 4.15
The Web Appearance Quality of Yemeni HEI Websites

Factor	Sub-Factors	UST	AL-NASSER	ADEN	SU	AHQAFF	The average
Web Appearance	Attract	.695	.695	.630	.630	.590	.648
	CSP	.690	.650	.693	.653	.647	.667
		.693	**.673**	**.662**	**.642**	**.618**	**.657**

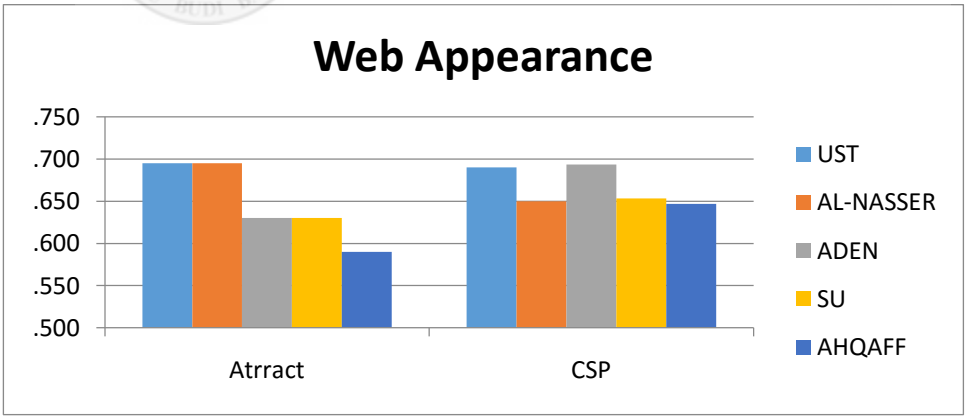


Figure 4.8 Web Appearance Quality Levels

- **Attractiveness**

  An attractiveness quality of websites has a good level. This indicates that students found the websites were visually pleasing. Four out of five websites were in a good design. However, AHQAFF website was not more attractive to students, which have a moderate level of quality.

- **A clean and Simple present (CSP)**

  All case study websites have a good level of clean and simple presentation. This indicates that students comfortable with the colors of these websites.

4.12.4 Efficiency

The results of the efficiency showed that all websites have a good quality level except AL-NASSER University, which its quality point in efficiency was .570 (moderate), as showed in Table 4.16 and Figure 4.9.

Table 4.16
The Efficiency Quality of Yemeni HEI Websites

Factor	Sub-Factors	UST	AL-NASSER	ADEN	SU	AHQAFF	The average
Efficiency	Accessibility	.680	.580	.665	.655	.695	.655
	Performance	.600	.560	.617	.603	.593	.595
		.640	**.570**	**.641**	**.629**	**.644**	**.625**

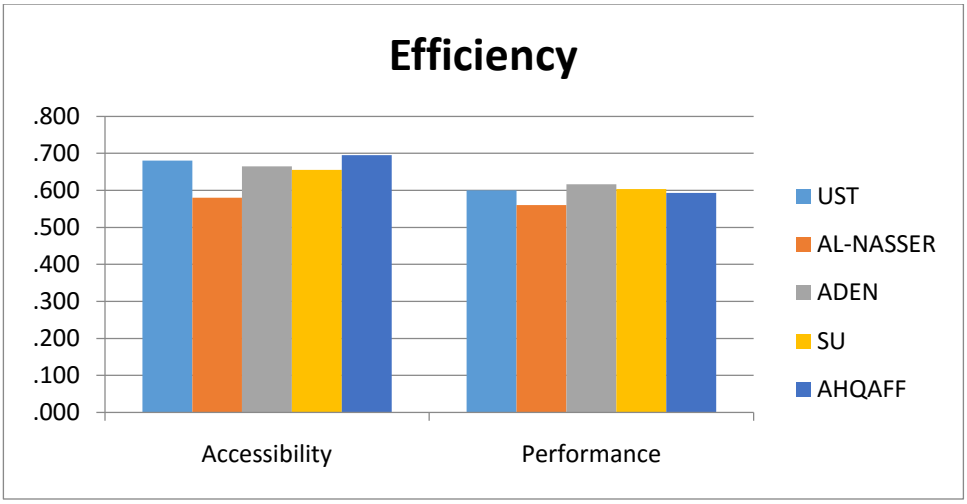


Figure 4.9 Efficiency Quality Levels

- **Accessibility**

  The results indicate that students comfortable about the accessibility of all websites except AL-NASSER website the students were not satisfied with the accessibility quality. They think this website takes a long time to download pages or files and not easy to access information on the website.

- **Performance**

  The performance quality of the websites was not good, it was moderate. This means that students think the websites takes a long time to perform any task and not give information to know how to proceed.

4.12.5 Functionality

In respect to the results shown in Figure 4.10, we noticed that there is a good variation in functionality points. This result shows that the case study websites are varying in term of quality and functions performed. This suggests that students are not comfortable with the searching functionality, as well as, the suitability characteristic of the website, which

indicates that the functionalities of the website do not have the appropriate degree of quality as expected by students.

The highest level of the functionality (.617) gained by SU website. Followed by ADEN which has .603 of functionality quality point, while other websites' functionality was in a moderate level. Table 4.17 and Figure 4.10 illustrated that.

Table 4.17
The Functionality Quality of Yemeni HEI Websites

Factor	Sub-Factors	UST	AL-NASSER	ADEN	SU	AHQAFF	The average
Functionality	Searching	.567	.560	.587	.603	.567	.577
	Suitability	.600	.630	.620	.630	.590	.614
		.583	**.595**	**.603**	**.617**	**.578**	**.625**

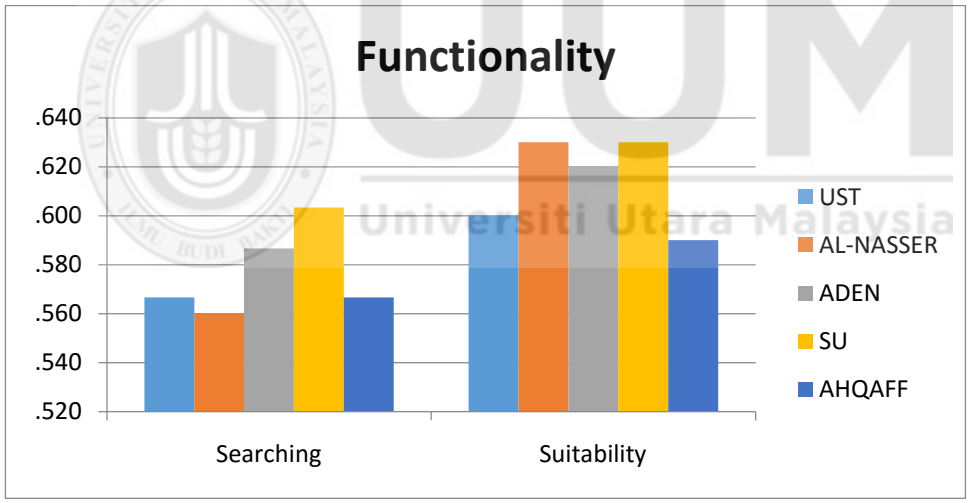


Figure 4.10 Functionality Quality Levels

- **Searching**

  The search functionality of the websites has a moderate quality. This refers that the students were not satisfied with the searching features in these all websites except SU has improved searching functionality, which its level was a good in searching.

- **Suitability**

  The results showed a good level of suitability of websites, which indicates that the websites functionalities have an appropriate degree of quality as expected by students. But only one website has less degree of quality than others, which is AHQAFF. It has a moderate level of suitability.

4.12.6 Service Quality

The results of service quality of websites showed the good level in all case study websites except UST. UST website had the lowest point (.583) of service quality that means the service quality was not satisfied for students on this website. In contrast, the highest point of service quality gained by SU (.660), as shown in Figure 4.11 and Table 4.18 all the points and levels of the service quality related to all case study websites.

Table 4.18
The Service Quality of Yemeni HEI Websites

Factor	Sub-Factors	UST	AL-NASSER	ADEN	SU	AHQAFF	The average
Service Quality	Reliability	.570	.660	.650	.650	.650	.636
	Responsive	.595	.630	.630	.670	.600	.625
		.583	**.645**	**.640**	**.660**	**.625**	**.631**

Figure 4.11 Service Quality Levels

- **Reliability**

  The reliability results showed good quality level, which indicates that the students are satisfied with the services that make them easy to communicate with officials. All websites of the case study have a good reliability except SU website which needs to improve.

- **Responsiveness**

  The level of responsiveness quality of websites is similar to reliability level, where all websites are in a good quality except SU was a moderate quality of responsiveness. In general, the quality of responsiveness is good in the case studies, and this indicates that websites respond to the expected actions of students, as well as provide prompt service.

4.12.7 Overall Students' Perception

Apart of the Likert-type questions, students were asked to give their perspective to the overall quality of the case study websites. Table 4.19 and Figure 4.12 showed the results of the overall students' perception of the HEI websites quality.

The responses collected showed that all websites were in a good level of quality. The top website was AL-NASSER and the last one was ADEN website. That means the quality of all websites, in general, is satisfactory from the students' perspective.

Table 4.19
The Overall Students' Perception of Yemeni HEI Websites Quality

Websites	UST	AL-NASSER	ADEN	SU	AHQAFF
Overall Perception	.656	.669	.640	.660	.646
Quality Level	Good	Good	Good	Good	Good

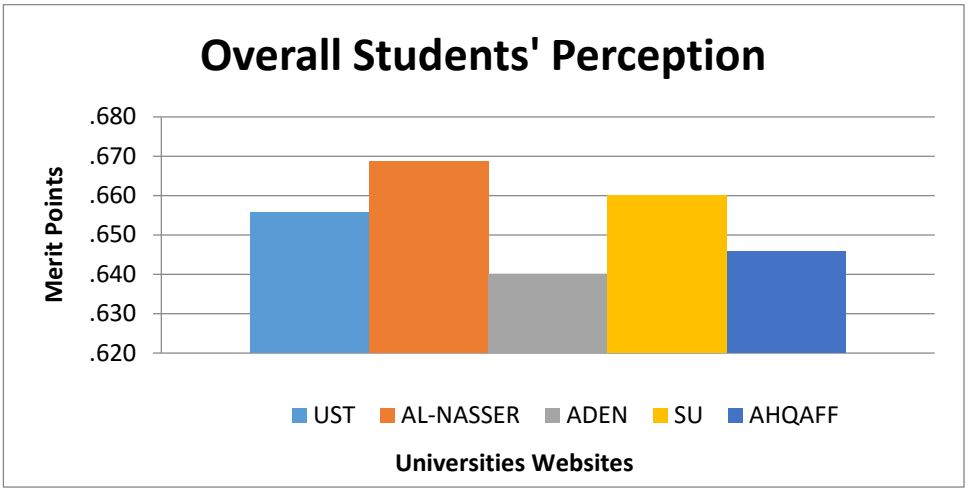


Figure 4.12 Overall Students' Perception of HEI websites Quality

4.12.8 Overall Quality

The cumulative quality according to the quality merit points for the six factors of the study was as follows, the highest quality point (.637) achieved by AL-NASSER, followed by UST and SU (quality point were .633 and .632, respectively), after that, ADEN University (the quality point was .625). Whereas, the lowest quality point (.612) was detecting in AHQAFF University.

The overall quality point of the higher education institute websites reached 0.628. Returning to the quality levels in Table 3.4 the case study websites quality rated as good quality websites. Table 4.20 and Figure 4.13 show the details.

Table 3.4
Quality points and its levels

Merit points, x	**0<=x<=0.2**	**0.2<x<=0.4**	**0.4<x<=0.6**	**0.6<x<=0.8**	**0.8<x<=1.0**
Quality level	Bad	Poor	Moderate	Good	Excellent

Table 4.20
The Overall Quality of Yemeni HEI Websites

Websites	**UST**	**AL-NASSER**	**ADEN**	**SU**	**AHQAFF**
Quality Points	.633	.637	.625	.632	.612
Quality Level	Good	Good	Good	Good	Good
Overall Quality Point and Level			**.628 Good**		

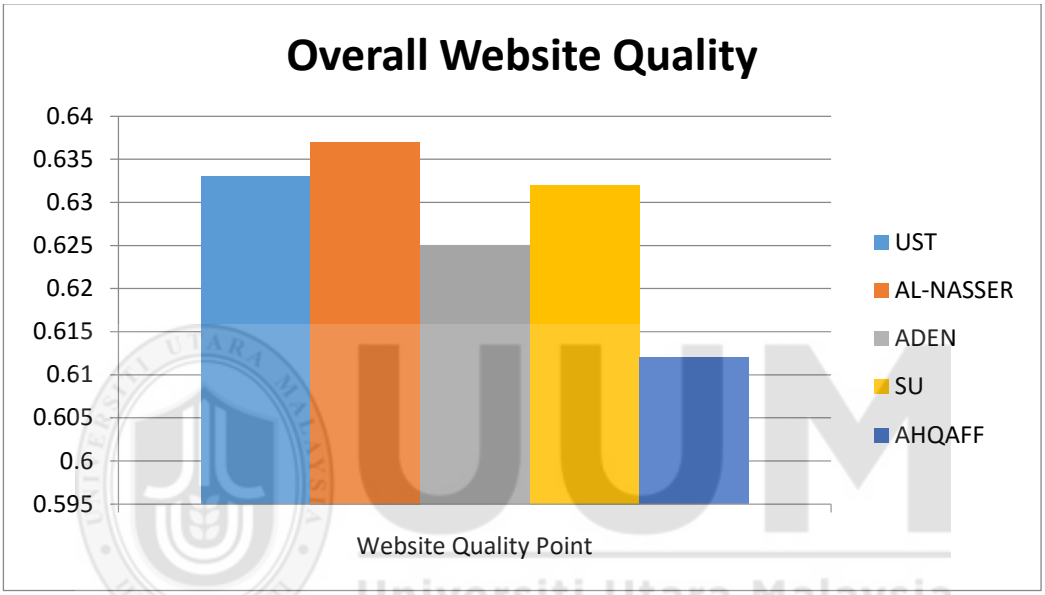


Figure 4.13 Overall Qualities of Yemeni Universities Websites

By comparing the result of the overall quality of all websites by WEBUSE analysis and the perception of students about each website, it is observed that both results are same in the levels of website quality. However, there is a bit little difference in the order of the websites. Whereas, in the overall quality by WEBUSE, the order of websites was AL-NASSER, UST, SU, ADEN, and AHQAFF, but in the overall students' perception, the analysis of the websites order was AL-NASSER, SU, UST, AHQAFF, and ADEN. In general, both results were equal in the levels of quality (Good).

4.13 Summary of the Findings

This research employed partial least squares structural equation modeling (PLS-SEM) as the major analysis technique. Since PLS-SEM is a relatively new analytical technique in construction. Then rigorous procedures were done to establish the validity and reliability of the outer model. Once the outer model was shown to be valid and reliable, the next step was to test the hypothesized relationships. Before examining the hypothesized relationships, the effect size of the constructs was calculated to know the effecting of each construct on the endogenous variable, followed by the predictive relevance of the model was investigated and reported and the goodness of the overall model was confirmed. After that, the structural model was examined and the results were reported in detail. As shown in Table 4.21, the hypotheses H_1, H_3, H_5, and H6 were statistically supported by the findings of the study, and the hypotheses H_2 and H_4 were not supported.

Moreover, WEBUSE analysis method was used to make a more valuable analysis of the case study websites, where the results showed all websites in a good level of quality. Table 4.22 summarizes the results of WEBUSE analysis method.

Table 4.21
Summary of the Findings

No.	Hypotheses	Decision
H1	Usability has significant effect on the overall students' perception of HEI website quality	Supported
H2	Content has significant effect on the overall students' perception of HEI website quality	Not Supported
H3	Web Appearance has significant effect on the overall students' perception of HEI website quality	Supported

Table 4.21 (continue)

H4	Efficiency has significant effect on the overall students' perception of HEI website quality	Not Supported
H5	Functionality has significant effect on the overall students' perception of HEI website quality	Supported
H6	Service Quality has significant effect on the overall students' perception of HEI website quality	Supported

Table 4.22
The Overall Quality Levels and Points of Yemeni HEI Websites

Variable	**UST**	**AL-NASSER**	**ADEN**	**SU**	**AHQAFF**
Usability	.686	.717	.619	.667	.633
Content	.616	.625	.587	.578	.574
Web Appearance	.693	.673	.662	.642	.618
Efficiency	.640	.570	.641	.629	.644
Functionality	.583	.595	.603	.617	.578
Service Quality	.583	.645	.640	.660	.625
Overall Perception	.656	.669	.640	.660	.646
Overall Quality Points	.637	.642	.627	.636	.617
Quality Level	Good	Good	Good	Good	Good
The Overall Quality Point and Level				**.632 GOOD**	

CHAPTER FIVE

DISCUSSION AND CONCLUSION

5.1 Introduction

This chapter will discuss the study findings that were produced in the previous chapter based on the objectives of the study. The main objective of this study is to evaluate the quality of higher education institute websites from students' perspective based on the proposed website quality factors. In order to reach the main objective of the research, two other objectives must be conducted. The first objective is to identify the current issues and factors of website quality for assessing the higher education websites. The second objective is to assess the overall students' perceptions based on the identified website quality factors in Yemeni higher education websites. Five Yemeni Universities websites were selected from the Webometrics rank and used as case studies to be evaluated using the proposed quality factors.

5.2 Higher Education Website Evaluation

The primary purpose of this dissertation is to evaluate the quality of HEI websites from a student's perspective. A particular focus is laid on constructing the website evaluation model for HEI websites and exploring the relationship between the website quality factors and the overall perception of students of the HEI websites quality. The findings of the measurement model evaluation of using PLS regression were supported by the proposed model.

After testing the relationships between the six proposed quality factors and the overall students' perception of HEI websites quality, the results showed that usability, web

appearance, functionality, and service quality had the significant effect on the overall perception of students. In contrast, content and efficiency did not have a significant effect on the overall students' perception.

Hypotheses H1 (Usability has a significant effect on the overall students' perception of HEI website quality), H3 (Web Appearance has a significant effect on the overall students' perception of HEI website quality), H5 (Functionality has a significant effect on the overall students' perception of HEI website quality), and H6 (Service Quality has a significant effect on the overall students' perception of HEI website quality) were being significant that leads to them being supported and accepted. In contrast, H2 (Content has a significant effect on the overall students' perception of HEI website quality) and H4 (Efficiency has a significant effect on the overall students' perception of HEI website quality) were not supported and rejected as a result of their insignificance. In total, four hypotheses out of six were supported.

Regarding our model, R^2 for the overall perception of students was 0.820; which means that the six quality factors explain 82 % of the variance in the overall students' perception. The factor that has the most influence on the quality of HEI website is functionality where its effect size was .18, followed by, usability and web appearance (.10 and .06, respectively), however, the rest factors have the small effect on the HEI website quality. In other words, the direct effect of functionality (0.378) was the strongest effect on the quality of HEI websites based on the students' perspective. These results indicate the importance of functionality of the HEI websites quality from student viewpoint. Usability comes as a second important factor. Furthermore, the model has

large predictive relevance (0.607). Moreover, the model has the large value of goodness of fit (0.775) which evaluate the global fitness of the model.

This research seeks to evaluate the quality of HEI websites from a student's perspective, in particular, based on ISO 9126 model and Mebrate study (2010) with the external factors (web appearance and service quality). The researcher elaborates on the relevant website quality factors influencing the overall students' perception of the HEI websites quality.

With regard to the findings of past studies, it was discovered that there is a significant relationship between usability, web appearance, functionality, and service quality and the quality of HEI websites (Khawaja & Bokhari, 2010; Mebrate, 2010; Ng, 2014; Olsina* et al., 1999; Rekik & Kallel, 2011; Rizavi et al., 2011; Sife & Msoffe, 2013; Singh & Kumar, 2014).

On the other hand, our findings that are related to content and efficiency contradict Mebrate study, who found there is a significant relationship between content and HEI websites quality. Furthermore, Rizavi et al. (2011) affirmed that the significant relationship between educational information and quality of HEI websites. But in our study, the content has an insignificant impact on the HEI websites quality from students' perspectives. This result might be due to the information of courses and programs with insufficient details, inaccurate information or the content is difficult to read.

Likewise, the past studies also found that there is a significant relationship between efficiency and HEI website quality (Mebrate, 2010; Olsina* et al., 1999; Rekik & Kallel, 2011). In contrast, Khawaja and Bokhari (2010) found that the efficiency was

insignificant as in our study. The reason why this relationship is not supported may be because the respondents lack enough knowledge of the relevance of efficiency.

This research provides several implications for the quality of HEI websites. According to the results of proposed model, functionality is to be considered a closer factor to HEI websites quality than the other quality factors, indicating the importance of functionality in promoting the overall students' perception of the quality of HEI websites.

In order to increase the quality of higher education websites, the designers and developers of these websites need to improve it more with a good usability, content, web appearance, efficiency, functionality, and service quality, which will influence the students' perceptions, evaluation and consequently, the quality of websites.

5.3 A Comparison of HEI websites

Based on the results and findings of WEBUSE analysis method as discussed in chapter four, the findings show that the best quality website is Al-Nasser website, followed by a University of Science and Technology (UST) website, after that, Sana'a University (SU) website. The worst websites are Aden and Ahqaff, as in Table 5.1. The websites can be improved as discussed in the next section.

Table 5.1
A summarization Table of the Website Evaluation Factors

Variable	UST	AL-NASSER	ADEN	SU	AHQAFF
Usability	.686	.717	.619	.667	.633
Content	.616	.625	.587	.578	.574
Web Appearance	.693	.673	.662	.642	.618
Efficiency	.640	.570	.641	.629	.644
Functionality	.583	.595	.603	.617	.578
Service Quality	.583	.645	.640	.660	.625
Overall Perception	.656	.669	.640	.660	.646

Overall Quality Points	.637	.642	.627	.636	.617
Quality Level	Good	Good	Good	Good	Good
The Overall Quality Point and Level				**.632 GOOD**	

5.3.1 Usability

AL-NASSER website has the highest quality point in terms of usability. UST website has the second level in usability, followed by SU website. However, the rest two websites have the lowest quality in usability. Based on the usability standard in ISO 9126-1, the website can be improved by the capability of the user to understand, learn, and use it easily. The weakness of the HEI websites is due to inability of students to use and navigate it easily. The websites do not follow the usability standard as suggested by ISO 9126-1. On the other hand, the learnability and understandability of the websites are acceptable.

5.3.2 Content

Based on previous studies, the content of HEI website can be improved by the relevance and accuracy of information, the format and languages of the content, the comprehensiveness of the information, and the educational information on the website. The HEI websites have weakness in the most parts of the content except the content format. The website's content is lacking in terms of information accuracy, completeness, and educational information. The website that has the highest quality point related on content is AL-NASSER, followed by UST. But the rest websites have the medium level in terms of content.

5.3.3 Web Appearance

Based on Table 5.1, the best quality regarding web appearance is the UST website. However, all the five websites have a good appearance. This indicates that the students are satisfied with the look and graphic design of the websites. In order to get an excellent degree of web appearance, the websites should be well-organized, attractive, and have a simple and clear design (Khawaja & Bokhari, 2010; Lin, 2010).

5.3.4 Efficiency

The results showed that AHQAFF website has the best efficiency among all five websites, followed by ADEN and UST. Based on ISO 9126-1, the websites' efficiency can be improved by providing the required performance. When the performance of HEI websites is not good, it leads to the weak point in the websites. The accessibility results of websites are good, and this indicates that the students feel that it is not difficult to access to the websites at any time.

5.3.5 Functionality

Based on the functionality in ISO 9126-1, the functionality of the website can be improved by its capability to provide the appropriate functions which meet the users' needs. The findings showed that SU website has the highest quality in functionality among other websites. However, all websites need to improve their functionalities, especially, the searching function. This suggests that the students are not satisfied with the searching features in these websites. So, we suggest improving this feature by, for example, putting key cues to facilitate getting the desired information.

5.3.6 Service Quality

Based on findings, the quality of service in HEI websites is good. The strongest website in services is SU and the lowest one is UST. The weakness of UST website is in its reliability and responsiveness to services. We can suggest improving the services in HEI websites by providing the prompt services as the students expected.

Based on the outcome of the first research objective which is ***to identify the current issues and factors of website quality for assessing the higher education websites,***

The findings found that the higher education websites influenced first by Functionality, then Usability, after that Web appearance, and lastly Service quality.

That means the characteristics of functionality (searching and suitability), usability (ease of use, easy to understanding, navigation, and easy to learn), web appearance (attractiveness and a clear and simple present) and service quality (reliability and responsiveness) have significant and positive effect on the quality of the higher education institute websites. On contrast, there is no significant effect of the content and efficiency on the quality of higher education institute websites.

It is worth noting that the effects of content and efficiency on the students' perceptions of HEI websites quality were not significant. This might be because the participants of the study are not familiar with the chosen websites, or because of the war status in Yemen which affects the improvement of the websites of the case study.

Based on the outcome of the second research objective which is ***to construct the website quality evaluation model for HEI,***

The findings found out that the quality factors that have influence on the HEI websites are four factors including usability, web appearance, functionality, and service quality. So the website quality evaluation model based on students' perspectives consists of these four quality factors.

Based on the outcome of the third research objective which is ***to assess the overall students' perceptions based on the identified website quality factors in Yemeni higher education websites,***

The chosen websites which were UST, AL-NASSER, ADEN, SU and AHQAFF were evaluated by 125 participants, 25 for each website. From the WEBUSE method, the overall quality points of all websites were higher than 0.60, which indicates that all websites have a good level of quality. AL-NASSER website was the best in quality, its quality point was .642. Meanwhile, the lowest quality point was .617 for AHQAFF website.

The quality points respective of their six factors were also determined. The highest quality factor was "Usability" with a quality point 0.664 (66%). The lowest quality factors were "Functionality" with a quality point 0.595 (60%) and "Content" with a quality point 0.596 (60%). While the highest value of functionality was .61 in SU website, the highest value of content was .62 in AL-NASSER website. On the whole, all points of quality factors were more than .62 except functionality and content were less than 60. This indicates that functionality and content features of websites need to be improved.

Regarding the overall students' perception of HEI websites quality, the participants rated that all websites have a good level of quality, where all quality point of the overall perception variable of all websites were more than 0.60. Where, the highest point of overall perception of students was .669 for AL-NASSER website, followed by SU, then UST, next is AHQAFF, and last is ADEN with its overall perception point of .640. By comparing the result of WEBUSE analysis (overall quality of websites) and the overall perception given by students, it is observed that both results are alike. In other words, all websites of case study have a good quality level in both results. From the results, we concluded that the best website among all websites of the case study was AL-NASSER website.

Based on the first and the second objectives, the main objective of this research was conducted. In sum, the overall quality of HEI websites was good, where the average of the quality of all websites was .632. Precisely, AL-NASSER website has the top quality point (.642), followed by UST and SU websites (.637 and .636, respectively), after that ADEN website (.627), and the last one is AHQAFF website which has .617 quality point.

5.4 Study Contributions

- This research assisted in identifying the quality factors that influence the students' perception of HEI websites quality. So the stakeholders can use this research as a guidance to develop the quality of their websites.
- This research demonstrated that the functionality, usability, web appearance, and service quality of HEI website are essential for appealing to students. It is truly

difficult to help encourage students to browse a university portal when the website offers insufficient functionalities.

- This research has assisted in identifying the strengths and weaknesses of Yemeni higher education websites quality. With this, the website designers could put more efforts on the weak design areas that merit more attention and reduce their exhausted efforts on design areas that do not need extensive focus.

5.5 Study Limitations

- This study focused on the perspectives of one type of users groups who are students, therefore, the problem was looked at from specific perspectives.
- The result is based on a single research as this research targets UUM Arab students.
- This case study research conducted on the Yemeni Universities websites, however, due to the situation in Yemen, the researcher used the respondents from UUM University rather than the students of Yemeni universities.

5.6 Recommendations

- The researcher recommends that this kind of study is carried out on different perceptions of different population, in particular, the perceptions of Yemeni University users (students, staff) in order to confirm the findings.
- The researcher requests from other researchers to target this field by performing more researches to investigate users' perceptions of (information system quality

evaluation, information system success assessment) in Arab region especially in Yemen.

- In study findings, content and efficiency are insignificant on HEI websites quality, so the researcher recommends that these factors are studied in future work with a large sample to provide additional evidence.
- The researcher needs another researcher effort for further assessment with the different population.
- The researcher recommends that higher education websites designers and developers should improve the functions of websites such as searching, usability, appearance, and services like online admission.
- The researcher recommends that further research is conducted to examine how other quality factors such as trust, system quality, and information influence the quality of the information systems (HEI websites) on students' perceptions.

5.7 Conclusion

The main objective of this study is to evaluate the quality of higher education websites from students' perspective. To achieve this objective, the existing evaluation and quality models were reviewed to identify the quality factors for HEI websites. Six quality factors were identified (Usability, Content, Web Appearance, Efficiency, Functionality, and Service Quality), four of them based on ISO 9126-1 and Mebrate (2010) and two "web appearance and service quality" from other studies. This research studied the effect of these quality factors on the overall students' perception of HEI website quality.

The PLS-SEM technique was used to test the measurement model and the inner model of the study. The results showed the measurement model was valid and reliable. In addition, the results of the inner model showed that four of the quality factors included in the proposed model have a significant influence on the overall perception of students. However, Content and Efficiency do not have influence on the overall perception of students of the HEI websites quality.

The Functionality was the most important factor on the HEI website quality from students' perception. Usability comes in a second important factor, followed by Web appearance, and the lowest effecting on the HEI websites quality was Service quality. The findings might be of great value to HEI websites to improve their websites to meet the student needs by focusing on these four quality factors that affect the quality of HEI websites from students' perspective.

Also, the WEBUSE method was used to get the overall quality of the top five Yemeni universities websites that have gotten high rankings in Webometrics, were used as the case study. The results showed that the quality of all studied websites was acceptable. Furthermore, the overall quality of websites was in a good level. Al-Nasser university website was the top quality among other websites. On the other hand, the lowest website quality was Al Ahqaff university website. However, there are some weaknesses in some aspects of these websites such as functionality and content that need some improvement in the future enhancement of the website.

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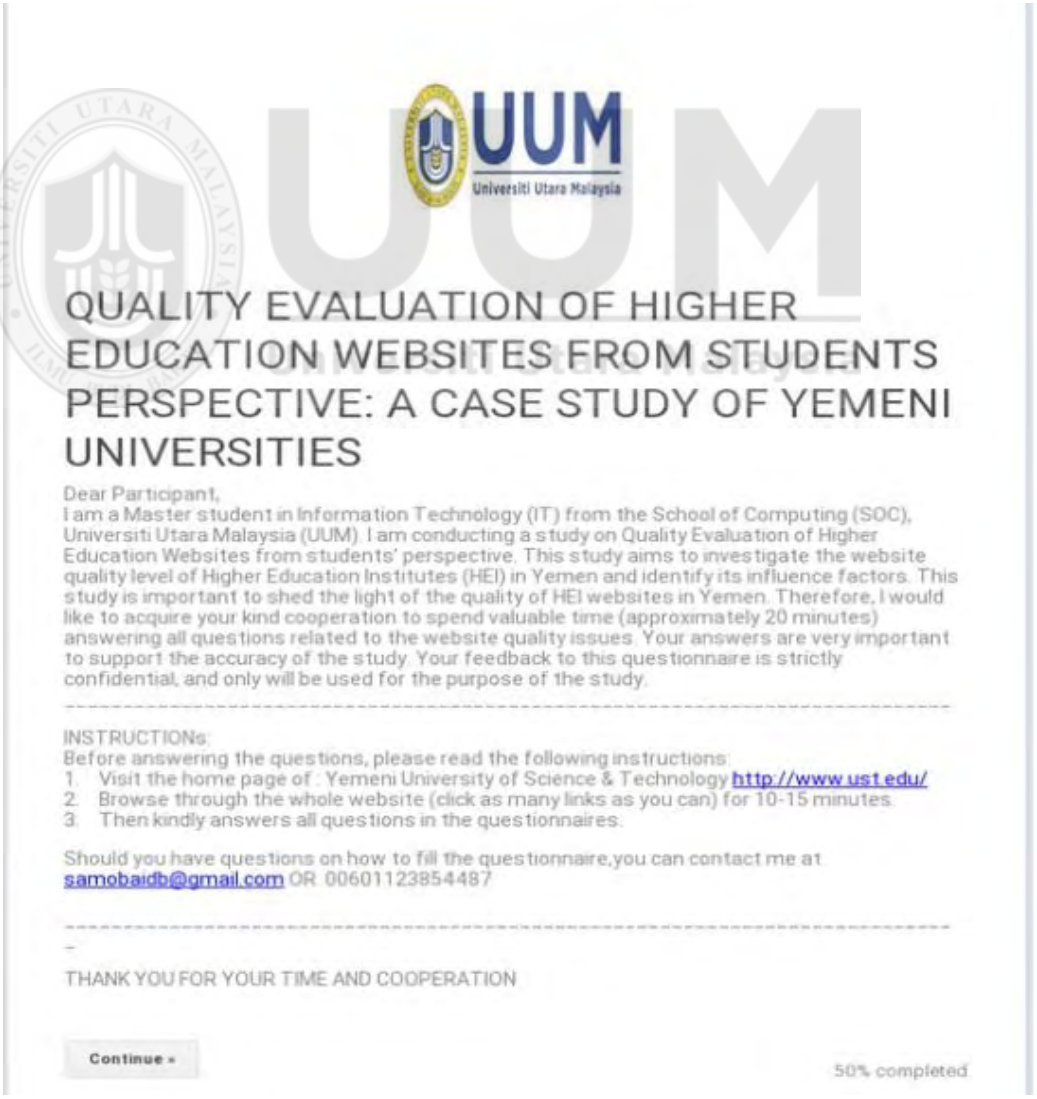
Appendix A

A Questionnaire

This appendix presents the questionnaire that used in this study. This is one of a sample questionnaire that used for evaluating five websites in this study. This questionnaire refers to Yemeni University of Science & Technology website http://www.ust.edu/. The other questionnaires based on Al Nasser University website http://www.al-edu.com/, University of Aden website http://www.aden-univ.net/, Sana'a University website http://www.su.edu.ye/, and Al Ahqaff University website http://ahgaff.edu/.



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Universiti Utara Malaysia

QUALITY EVALUATION OF HIGHER EDUCATION WEBSITES FROM STUDENTS PERSPECTIVE: A CASE STUDY OF YEMENI UNIVERSITIES

Dear Participant,
I am a Master student in Information Technology (IT) from the School of Computing (SOC), Universiti Utara Malaysia (UUM). I am conducting a study on Quality Evaluation of Higher Education Websites from students' perspective. This study aims to investigate the website quality level of Higher Education Institutes (HEI) in Yemen and identify its influence factors. This study is important to shed the light of the quality of HEI websites in Yemen. Therefore, I would like to acquire your kind cooperation to spend valuable time (approximately 20 minutes) answering all questions related to the website quality issues. Your answers are very important to support the accuracy of the study. Your feedback to this questionnaire is strictly confidential, and only will be used for the purpose of the study.

INSTRUCTIONs:
Before answering the questions, please read the following instructions:
1. Visit the home page of : Yemeni University of Science & Technology http://www.ust.edu/
2. Browse through the whole website (click as many links as you can) for 10-15 minutes.
3. Then kindly answers all questions in the questionnaires.

Should you have questions on how to fill the questionnaire,you can contact me at samobaidb@gmail.com OR 00601123854487

THANK YOU FOR YOUR TIME AND COOPERATION

Continue »

50% completed

USER'S PROFILE

Gender*

- ◯ Male
- ◯ Female

Age*

- ◯ Under 21 years
- ◯ 21 - 30 years
- ◯ 31 - 40 years
- ◯ 41 - 50 years
- ◯ More than 50 years

How long have you been using computer (Microsoft Application, play games, etc)?*

- ◯ Never
- ◯ Less than 1 Year
- ◯ 1-3 Years
- ◯ More than 3 Years

How long have you been using the Internet?*

- ◯ Never
- ◯ Less than 1 Year
- ◯ 1 - 3 Years
- ◯ More than 3 Years

Educational Level*

- ◯ Bachelor degree
- ◯ Master degree
- ◯ Doctoral degree

Usability

Ease of use, Easy to understand , Easy to navigate & Easy to learn

I can easily find what I want at this website*

	1	2	3	4	5	
Strongly Disagree	○	○	○	○	○	Strongly Agree

I can easy to switch between languages in the website *

	1	2	3	4	5	
Strongly Disagree	○	○	○	○	○	Strongly Agree

Organization of information in the website is easy to understand*

	1	2	3	4	5	
Strongly Disagree	○	○	○	○	○	Strongly Agree

I can easily know where I am at this website*

	1	2	3	4	5	
Strongly Disagree	○	○	○	○	○	Strongly Agree

The links at this website are well maintained and updated*

	1	2	3	4	5	
Strongly Disagree	○	○	○	○	○	Strongly Agree

It is easy to move around at this website by using the links or back button of the browser*

	1	2	3	4	5	
Strongly Disagree	○	○	○	○	○	Strongly Agree

I think it is easy to learn how to use the website*

	1	2	3	4	5	
Strongly Disagree	○	○	○	○	○	Strongly Agree

Add item

After page 3 Continue

Page 4 of 9

Content

Accuracy, Completeness, Appropriate format & Educational information

The website contains most of student interest material and topics and they are up-to-date*

	1	2	3	4	5	
Strongly Disagree	○	○	○	○	○	Strongly Agree

The content on the website is complete*

	1	2	3	4	5	
Strongly Disagree	○	○	○	○	○	Strongly Agree

The content on website is well organized*

	1	2	3	4	5	
Strongly Disagree	○	○	○	○	○	Strongly Agree

The website provides an educational environment*

	1	2	3	4	5	
Strongly Disagree	○	○	○	○	○	Strongly Agree

The website provides information on courses with material*

	1	2	3	4	5	
Strongly Disagree	○	○	○	○	○	Strongly Agree

The website provides online learning opportunities*

	1	2	3	4	5	
Strongly Disagree	○	○	○	○	○	Strongly Agree

I can download educational information*

	1	2	3	4	5	
Strongly Disagree	○	○	○	○	○	Strongly Agree

The website provides access to libraries and journal databases*

	1	2	3	4	5	
Strongly Disagree	○	○	○	○	○	Strongly Agree

Web Appearance

Attractiveness & A clean and simple presentation

The website's interface design is attractive*

	1	2	3	4	5	
Strongly Disagree	○	○	○	○	○	Strongly Agree

The website has a consistent feel and look*

	1	2	3	4	5	
Strongly Disagree	○	○	○	○	○	Strongly Agree

I am comfortable with the colors used at this website*

	1	2	3	4	5	
Strongly Disagree	○	○	○	○	○	Strongly Agree

The website contains no feature that irritates me such as scrolling or blinking text and looping animations*

	1	2	3	4	5	
Strongly Disagree	○	○	○	○	○	Strongly Agree

The website does not contain too many Web advertisements*

	1	2	3	4	5	
Strongly Disagree	○	○	○	○	○	Strongly Agree

Efficiency

Performance & Accessibility

I need not to wait too long to download a file or open a page*

	1	2	3	4	5	
Strongly Disagree	○	○	○	○	○	Strongly Agree

I can access this website most of the time*

	1	2	3	4	5	
Strongly Disagree	○	○	○	○	○	Strongly Agree

I can easily distinguish between visited and not-visited links*

	1	2	3	4	5	
Strongly Disagree	○	○	○	○	○	Strongly Agree

It is efficient to use this website*

	1	2	3	4	5	
Strongly Disagree	○	○	○	○	○	Strongly Agree

The website always provides clear and useful messages when I don't know how to proceed*

	1	2	3	4	5	
Strongly Disagree	○	○	○	○	○	Strongly Agree

Functionality

Search & Suitability

The website provides useful cues and links to get the desired information*

	1	2	3	4	5	
StronglyDisagree	○	○	○	○	○	Strongly Agree

The website does not open too many new browser windows when I am moving around*

	1	2	3	4	5	
Strongly Disagree	○	○	○	○	○	Strongly Agree

Search hints are provided when wrong keywords are used*

	1	2	3	4	5	
Strongly Disagree	○	○	○	○	○	Strongly Agree

I am satisfied with the functionalities of the website*

	1	2	3	4	5	
Strongly Disagree	○	○	○	○	○	Strongly Agree

Service Quality

Responsiveness & Reliability

The website make it easy to communicate with university officials *

	1	2	3	4	5	
Strongly Disagree	○	○	○	○	○	Strongly Agree

The website responds to my actions as expected*

	1	2	3	4	5	
Strongly Disagree	○	○	○	○	○	Strongly Agree

The willingness to help students and to provide a prompt service such as online admission*

	1	2	3	4	5	
Strongly Disagree	○	○	○	○	○	Strongly Agree

Overall Students' Perception of the HEI Website Quality

The website is wonderful*

	1	2	3	4	5	
Strongly Disagree	○	○	○	○	○	Strongly Agree

The website is stimulating*

	1	2	3	4	5	
Strongly Disagree	○	○	○	○	○	Strongly Agree

The website is flexible*

	1	2	3	4	5	
Strongly Disagree	○	○	○	○	○	Strongly Agree

The website is easy to use*

	1	2	3	4	5	
Strongly Disagree	○	○	○	○	○	Strongly Agree

The website is easy to navigate*

	1	2	3	4	5	
Strongly Disagree	○	○	○	○	○	Strongly Agree

I can easily obtain the intended information from the website*

	1	2	3	4	5	
Strongly Disagree	○	○	○	○	○	Strongly Agree

I am very satisfied with the website*

	1	2	3	4	5	
Strongly Disagree	○	○	○	○	○	Strongly Agree

Appendix B

Respondents Profile

Statistics

		Gender	Age	Computer Experience	Internet Experience	Educational Level
N	**Valid**	125	125	125	125	125
	Missing	0	0	0	0	0

Gender

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	**Male**	82	65.6	65.6	65.6
	Female	43	34.4	34.4	100.0
	Total	125	100.0	100.0	

Age

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	**Under 21 years**	12	9.6	9.6	9.6
	between 21 and 30 years	57	45.6	45.6	55.2
	between 31 and 40 years	40	32.0	32.0	87.2
	between 41 and 50 years	14	11.2	11.2	98.4
	More than 50 years	2	1.6	1.6	100.0
	Total	125	100.0	100.0	

Computer Experience

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	**Less than 1 year**	6	4.8	4.8	4.8
	between 1 and 3 years	9	7.2	7.2	12.0
	More than 3 years	110	88.0	88.0	100.0
	Total	125	100.0	100.0	

Internet Experience

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	**Less than 1 year**	1	.8	.8	.8
	between 1 and 3 years	8	6.4	6.4	7.2
	More than 3 years	116	92.8	92.8	100.0
	Total	125	100.0	100.0	

Educational Level

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	**Bachelor degree**	31	24.8	24.8	24.8
	Master degree	62	49.6	49.6	74.4
	Doctoral degree	32	25.6	25.6	100.0
	Total	125	100.0	100.0	

Appendix C

Descriptive statistics

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Gender	125	1	2	1.34	.477
Age	125	1	5	2.50	.876
Computer Experience	125	2	4	3.83	.488
Internet Experience	125	2	4	3.92	.301
Educational Level	125	1	3	2.01	.713
U1	125	1	5	3.58	1.137
U2	125	1	5	3.51	1.311
U3	125	1	5	3.70	1.116
U4	125	1	5	3.72	1.090
U5	125	1	5	3.45	1.103
U6	125	1	5	3.62	1.127
U7	125	1	5	3.79	1.095
C1	125	1	5	3.28	1.242
C2	125	1	5	3.34	1.099
C3	125	1	5	3.55	1.066
C4	125	1	5	3.37	1.125
C5	125	1	5	3.36	1.234
C6	125	1	5	3.27	1.340
C7	125	1	5	3.46	1.235
C8	125	1	5	3.38	1.330
W1	125	1	5	3.55	1.139
W2	125	1	5	3.63	1.074
W3	125	1	5	3.74	1.158
W4	125	1	5	3.60	1.063
W5	125	1	5	3.66	1.039
E1	125	1	5	3.54	1.118
E2	125	1	5	3.70	1.078
E3	125	1	5	3.33	1.288
E4	125	1	5	3.55	.987
E5	125	1	5	3.26	1.204
F1	125	1	5	3.48	1.082
F2	125	1	5	3.35	1.080
F3	125	1	5	3.09	1.308
F4	125	1	5	3.46	1.036
S1	125	1	5	3.54	1.147
S2	125	1	5	3.62	1.005
S3	125	1	5	3.38	1.229

O1	125	1	5	3.62	1.113
O2	125	1	5	3.39	.991
O3	125	1	5	3.59	1.078
O4	125	1	5	3.74	1.001
O5	125	1	5	3.70	.918
O6	125	1	5	3.68	.938
O7	125	1	5	3.60	1.063
Valid N (listwise)	125				

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Usability	125	1.00	5.00	3.6240	.94352
Content	125	1.00	5.00	3.3750	.99899
Web Appearance	125	1.00	5.00	3.6368	.90923
Efficiency	125	1.00	5.00	3.4752	.97440
Functionality	125	1.00	5.00	3.3440	.93253
Service Quality	125	1.00	5.00	3.5147	.99416
Overall Perception	125	1.00	5.00	3.6160	.88071
Valid N (listwise)	125				

Appendix D

Missing Data

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
Gender	125	100.0%	0	0.0%	125	100.0%
Age	125	100.0%	0	0.0%	125	100.0%
Computer Experience	125	100.0%	0	0.0%	125	100.0%
Internet Experience	125	100.0%	0	0.0%	125	100.0%
Educational Level	125	100.0%	0	0.0%	125	100.0%
U1	125	100.0%	0	0.0%	125	100.0%
U2	125	100.0%	0	0.0%	125	100.0%
U3	125	100.0%	0	0.0%	125	100.0%
U4	125	100.0%	0	0.0%	125	100.0%
U5	125	100.0%	0	0.0%	125	100.0%
U6	125	100.0%	0	0.0%	125	100.0%
U7	125	100.0%	0	0.0%	125	100.0%
C1	125	100.0%	0	0.0%	125	100.0%
C2	125	100.0%	0	0.0%	125	100.0%
C3	125	100.0%	0	0.0%	125	100.0%
C4	125	100.0%	0	0.0%	125	100.0%
C5	125	100.0%	0	0.0%	125	100.0%
C6	125	100.0%	0	0.0%	125	100.0%
C7	125	100.0%	0	0.0%	125	100.0%
C8	125	100.0%	0	0.0%	125	100.0%
W1	125	100.0%	0	0.0%	125	100.0%
W2	125	100.0%	0	0.0%	125	100.0%
W3	125	100.0%	0	0.0%	125	100.0%
W4	125	100.0%	0	0.0%	125	100.0%
W5	125	100.0%	0	0.0%	125	100.0%
E1	125	100.0%	0	0.0%	125	100.0%
E2	125	100.0%	0	0.0%	125	100.0%
E3	125	100.0%	0	0.0%	125	100.0%
E4	125	100.0%	0	0.0%	125	100.0%
E5	125	100.0%	0	0.0%	125	100.0%
F1	125	100.0%	0	0.0%	125	100.0%
F2	125	100.0%	0	0.0%	125	100.0%
F3	125	100.0%	0	0.0%	125	100.0%
F4	125	100.0%	0	0.0%	125	100.0%
S1	125	100.0%	0	0.0%	125	100.0%
S2	125	100.0%	0	0.0%	125	100.0%

S3	125	100.0%	0	0.0%	125	100.0%
O1	125	100.0%	0	0.0%	125	100.0%
O2	125	100.0%	0	0.0%	125	100.0%
O3	125	100.0%	0	0.0%	125	100.0%
O4	125	100.0%	0	0.0%	125	100.0%
O5	125	100.0%	0	0.0%	125	100.0%
O6	125	100.0%	0	0.0%	125	100.0%
O7	125	100.0%	0	0.0%	125	100.0%

Appendix E

Detecting Outliers

Residuals Statistics[a]

	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	4.02	111.48	63.00	24.309	125
Std. Predicted Value	-2.426	1.994	.000	1.000	125
Standard Error of Predicted Value	4.690	28.366	17.610	5.191	125
Adjusted Predicted Value	-21.10	157.70	62.98	30.875	125
Residual	-79.631	55.757	.000	26.862	125
Std. Residual	-2.454	1.719	.000	.828	125
Stud. Residual	-3.443	2.027	-.001	1.032	125
Deleted Residual	-156.701	114.424	.021	43.266	125
Stud. Deleted Residual	-3.690	2.066	-.004	1.046	125
Mahal. Distance	1.599	93.787	38.688	19.336	125
Cook's Distance	.000	.287	.018	.039	125
Centered Leverage Value	.013	.756	.312	.156	125

a. Dependent Variable: RespNo

Residuals Statistics[a]

	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	-2.17	117.74	62.59	24.058	121
Std. Predicted Value	-2.692	2.293	.000	1.000	121
Standard Error of Predicted Value	4.745	25.493	17.795	5.186	121
Adjusted Predicted Value	-35.23	147.87	62.74	30.874	121
Residual	-72.394	48.069	.000	26.477	121
Std. Residual	-2.246	1.492	.000	.822	121
Stud. Residual	-3.200	2.045	-.002	1.026	121
Deleted Residual	-146.872	99.612	-.154	42.473	121
Stud. Deleted Residual	-3.402	2.087	-.003	1.037	121
Mahal. Distance	1.610	74.096	38.678	18.727	121
Cook's Distance	.000	.263	.017	.032	121
Centered Leverage Value	.013	.617	.322	.156	121

a. Dependent Variable: RespNo

Residuals Statistics[a]

	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	-6.27	110.51	62.46	23.757	119
Std. Predicted Value	-2.893	2.022	.000	1.000	119
Standard Error of Predicted Value	4.769	25.008	17.865	5.175	119
Adjusted Predicted Value	-45.62	158.14	62.28	31.183	119
Residual	-76.487	51.536	.000	26.241	119
Std. Residual	-2.385	1.607	.000	.818	119
Stud. Residual	-3.418	1.903	.002	1.027	119
Deleted Residual	-157.140	92.167	.181	42.537	119
Stud. Deleted Residual	-3.680	1.936	.000	1.040	119
Mahal. Distance	1.618	70.759	38.672	18.469	119
Cook's Distance	.000	.308	.017	.034	119
Centered Leverage Value	.014	.600	.328	.157	119

a. Dependent Variable: RespNo

Appendix F

Normality Results

Descriptive Statistics

	N	Skewness		Kurtosis	
	Statistic	Statistic	Std. Error	Statistic	Std. Error
Gender	119	.703	.222	-1.532	.440
Age	119	.534	.222	.142	.440
Computer Experience	119	-2.846	.222	7.134	.440
Internet Experience	119	-3.887	.222	15.976	.440
Educational Level	119	.012	.222	-.973	.440
U1	119	-.561	.222	-.237	.440
U2	119	-.667	.222	-.657	.440
U3	119	-.878	.222	.339	.440
U4	119	-.801	.222	.088	.440
U5	119	-.421	.222	-.156	.440
U6	119	-.683	.222	-.035	.440
U7	119	-.727	.222	.126	.440
C1	119	-.383	.222	-.455	.440
C2	119	-.482	.222	-.253	.440
C3	119	-.628	.222	.184	.440
C4	119	-.478	.222	-.195	.440
C5	119	-.430	.222	-.568	.440
C6	119	-.315	.222	-1.026	.440
C7	119	-.547	.222	-.518	.440
C8	119	-.410	.222	-.847	.440
W1	119	-.714	.222	.067	.440
W2	119	-.417	.222	-.350	.440
W3	119	-.874	.222	.236	.440
W4	119	-.473	.222	-.224	.440
W5	119	-.377	.222	-.121	.440
E1	119	-.371	.222	-.340	.440
E2	119	-.599	.222	-.207	.440
E3	119	-.359	.222	-.859	.440
E4	119	-.390	.222	-.108	.440
E5	119	-.145	.222	-.944	.440
F1	119	-.517	.222	-.288	.440
F2	119	-.266	.222	-.386	.440
F3	119	-.323	.222	-.835	.440
F4	119	-.639	.222	.239	.440
S1	119	-.744	.222	-.009	.440
S2	119	-.544	.222	.123	.440
S3	119	-.455	.222	-.551	.440

O1	119	-.790	.222	.322	.440
O2	119	-.377	.222	.319	.440
O3	119	-.651	.222	.194	.440
O4	119	-.970	.222	1.361	.440
O5	119	-.833	.222	1.156	.440
O6	119	-.543	.222	.630	.440
O7	119	-.698	.222	.410	.440
Valid N (listwise)	119				

Appendix G

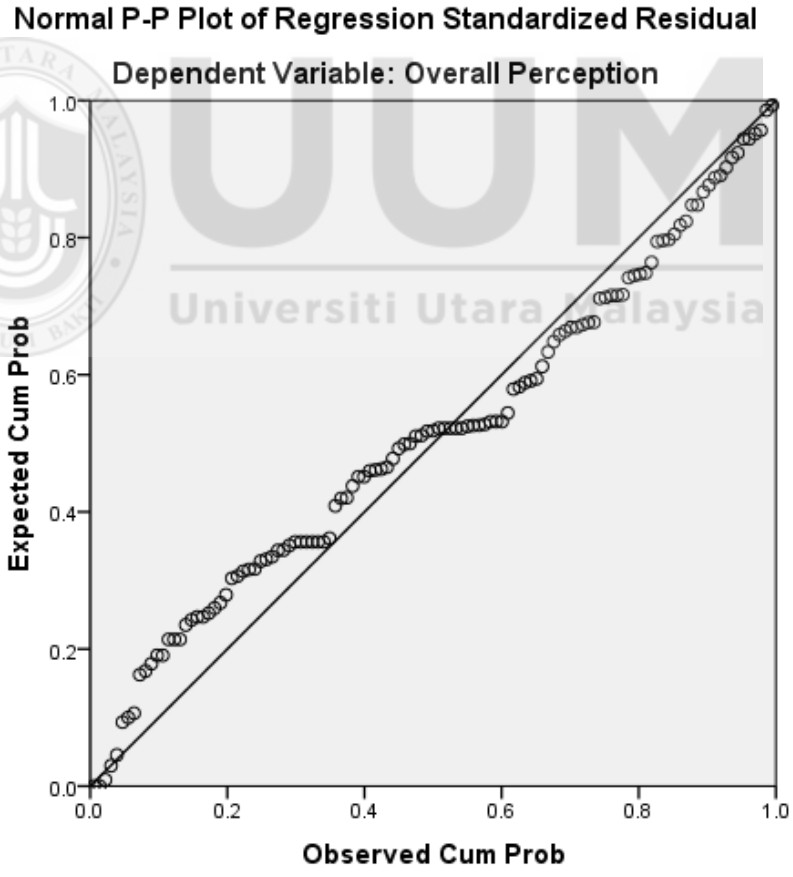
Linearity and Multicollinearity

Linearity Results

Residuals Statistics[a]

	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	1.3074	4.9900	3.6327	.77798	119
Residual	-1.66043	.95545	.00000	.37787	119
Std. Predicted Value	-2.989	1.745	.000	1.000	119
Std. Residual	-4.281	2.463	.000	.974	119

a. Dependent Variable: Overall Perception



Multicollinearity Results

Coefficients[a]

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
1(Constant)	.390	.158		2.469	.015		
Usability	.229	.068	.247	3.374	.001	.319	3.137
Content	-.092	.066	-.107	-1.384	.169	.285	3.512
Web Appearance	.171	.075	.181	2.291	.024	.272	3.682
Efficiency	.132	.087	.151	1.530	.129	.175	5.709
Functionality	.335	.083	.359	4.062	.000	.218	4.595
Service Quality	.142	.067	.162	2.131	.035	.294	3.396

a. Dependent Variable: Overall Perception

Appendix H

Measurement Model Results

Overview

	AVE	Composite Reliability	R Square	Cronbachs Alpha	Communality	Redundancy
C	0.714768	0.952388		0.942679	0.714768	
E	0.748863	0.937062		0.915866	0.748863	
F	0.700424	0.902025		0.851966	0.700424	
OP	0.766957	0.958354	0.819596	0.94914	0.766957	-0.150486
SQ	0.781294	0.914624		0.860088	0.781294	
U	0.69693	0.941282		0.926594	0.69693	
WA	0.726974	0.929782		0.906218	0.726974	

Cross Loadings

	C	E	F	OP	SQ	U	WA
C1	0.776383	0.589305	0.597926	0.554757	0.516621	0.725717	0.565103
C2	0.783631	0.587018	0.568016	0.527886	0.547682	0.681404	0.53514
C3	0.848904	0.712149	0.651821	0.662954	0.613515	0.668438	0.751107
C4	0.854397	0.715352	0.648857	0.673149	0.666082	0.636345	0.693033
C5	0.882421	0.706725	0.624202	0.595818	0.621643	0.642028	0.676972
C6	0.852179	0.708007	0.619719	0.589818	0.64328	0.537864	0.54471
C7	0.889588	0.700828	0.668086	0.637476	0.652568	0.644421	0.674731
C8	0.868574	0.684421	0.653042	0.584875	0.599093	0.601099	0.624084
E1	0.665779	0.809853	0.643292	0.649656	0.647226	0.617178	0.722398
E2	0.722814	0.881019	0.699339	0.792707	0.671567	0.694031	0.757454
E3	0.625666	0.852717	0.793377	0.676776	0.650032	0.523157	0.601835
E4	0.743218	0.90632	0.798034	0.769159	0.730795	0.727124	0.776279
E5	0.705176	0.873909	0.792002	0.679197	0.732084	0.548277	0.662707
F1	0.733464	0.810276	0.901882	0.776022	0.75171	0.624443	0.707985
F2	0.395922	0.497376	0.649972	0.552162	0.447326	0.465501	0.589826
F3	0.637083	0.755226	0.885872	0.68393	0.713938	0.549445	0.559948
F4	0.680631	0.776225	0.883782	0.796657	0.750331	0.584297	0.681068
O1	0.665317	0.748927	0.805147	0.868307	0.7331	0.612736	0.736322
O2	0.616235	0.732861	0.779285	0.87842	0.689299	0.671227	0.702401
O3	0.662361	0.804359	0.789853	0.919515	0.711804	0.666859	0.723069
O4	0.58247	0.679547	0.659207	0.867393	0.652804	0.756656	0.706274
O5	0.587863	0.668023	0.678535	0.833491	0.616691	0.704678	0.739848
O6	0.635877	0.704864	0.683084	0.847978	0.70478	0.627265	0.679462
O7	0.643643	0.732582	0.79429	0.91185	0.726849	0.652699	0.676238
S1	0.668354	0.759461	0.702904	0.70275	0.8865	0.578009	0.619581
S2	0.631709	0.695763	0.702533	0.740861	0.90339	0.659457	0.6892
S3	0.612581	0.645102	0.745012	0.644711	0.861328	0.56029	0.563243
U1	0.652253	0.600268	0.550448	0.650325	0.596609	0.860831	0.664706
U2	0.60599	0.513459	0.517064	0.560425	0.531264	0.749224	0.583684
U3	0.609245	0.625307	0.572258	0.642679	0.538213	0.881623	0.686368
U4	0.626504	0.623285	0.579568	0.652693	0.568568	0.887976	0.675707
U5	0.696563	0.664415	0.641862	0.641051	0.644845	0.753413	0.576087
U6	0.59852	0.581436	0.499543	0.632905	0.553127	0.842489	0.609085
U7	0.635825	0.607674	0.539955	0.676824	0.537388	0.856132	0.731837
W1	0.719441	0.777633	0.766938	0.823747	0.737436	0.738814	0.912582
W2	0.744399	0.72049	0.692579	0.733966	0.645467	0.681621	0.876879
W3	0.687059	0.769735	0.659388	0.755908	0.612307	0.707075	0.896291
W4	0.559384	0.621384	0.545329	0.551021	0.522559	0.602302	0.826929
W5	0.438585	0.545118	0.528515	0.509634	0.444348	0.553381	0.738917

Outer Model (Weights or Loadings)

	C	E	F	OP	SQ	U	WA
C1	0.776383						
C2	0.783631						
C3	0.848904						
C4	0.854397						
C5	0.882421						
C6	0.852179						
C7	0.889588						
C8	0.868574						
E1		0.809853					
E2		0.881019					
E3		0.852717					
E4		0.90632					
E5		0.873909					
F1			0.901882				
F2			0.649972				
F3			0.885872				
F4			0.883782				
O1				0.868307			
O2				0.87842			
O3				0.919515			
O4				0.867393			
O5				0.833491			
O6				0.847978			
O7				0.91185			
S1					0.8865		
S2					0.90339		
S3					0.861328		
U1						0.860831	
U2						0.749224	
U3						0.881623	
U4						0.887976	
U5						0.753413	
U6						0.842489	
U7						0.856132	
W1							0.912582
W2							0.876879
W3							0.896291
W4							0.826929
W5							0.738917

Latent Variable Correlations

	C	E	F	OP	SQ	U	WA
C	1						
E	0.801853	1					
F	0.745444	0.860521	1				
OP	0.717218	0.828315	0.848357	1			
SQ	0.721284	0.792971	0.809037	0.789348	1		
U	0.757736	0.723364	0.668244	0.764646	0.6798	1	
WA	0.753887	0.816308	0.760173	0.80962	0.70857	0.777007	1

Path Coefficients

	C	E	F	OP	SQ	U	WA
C				-0.125793			
E				0.132337			
F				0.387041			
OP							
SQ				0.150361			
U				0.242131			
WA				0.207529			

Blindfolding Results

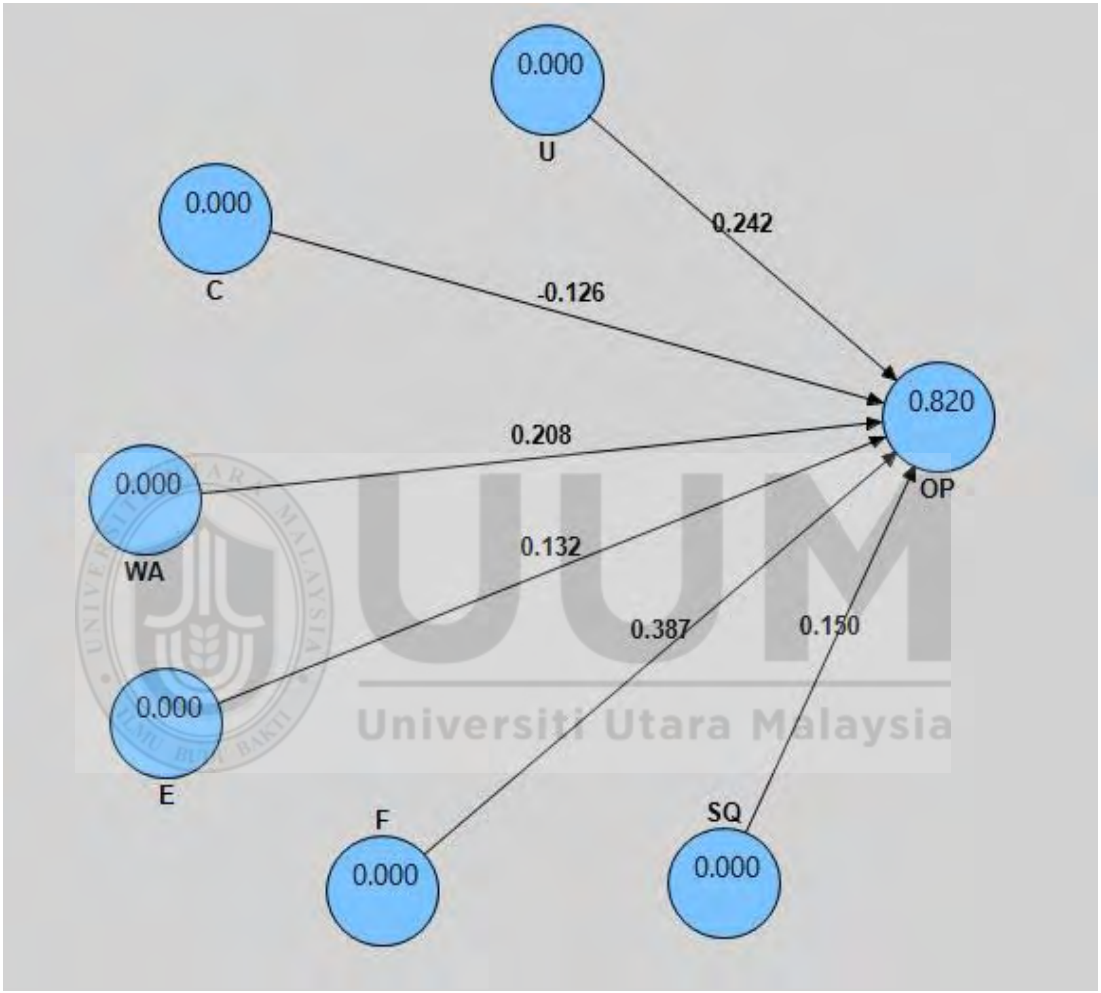
CV Red.

	1-SSE/SSO
C	0.714667
E	0.748648
F	0.699812
OP	0.607018
SQ	0.781049
U	0.696561
WA	0.726516

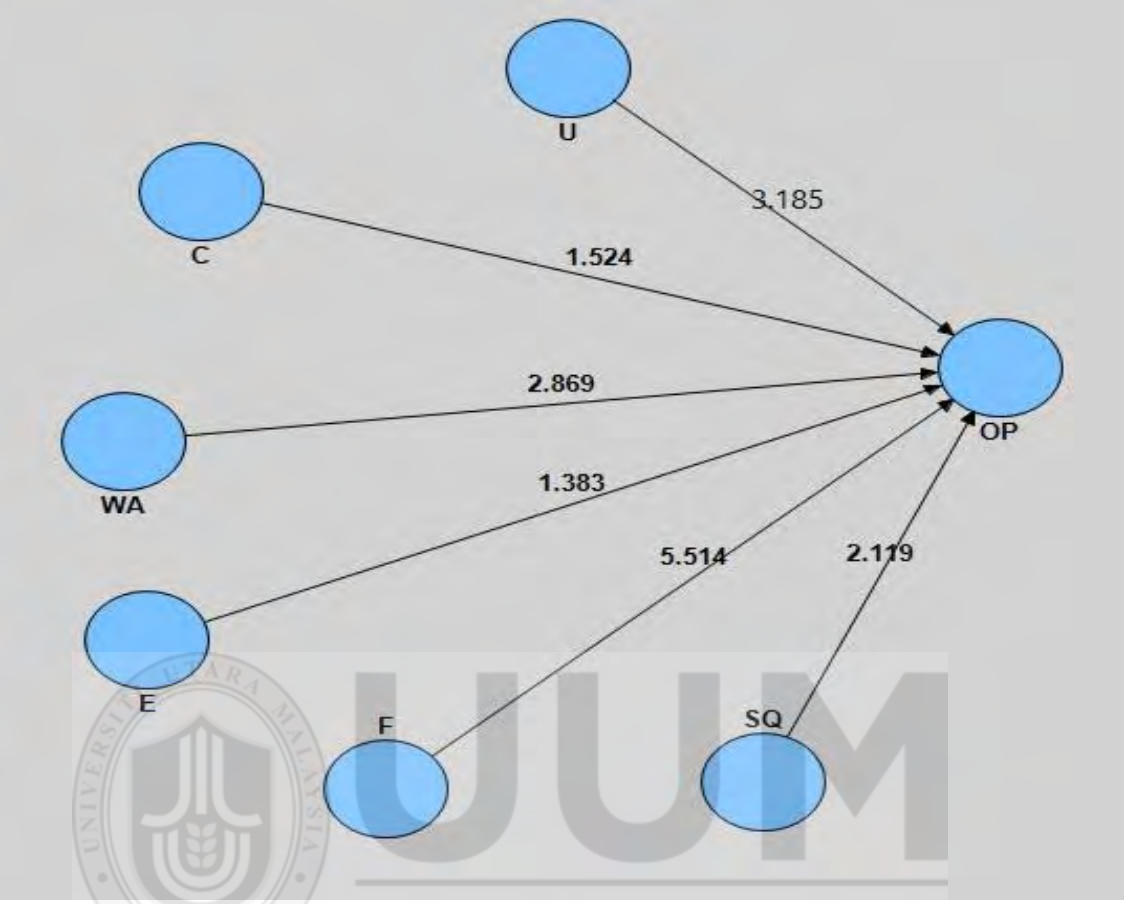
Appendix I

Hypotheses Results

Path Coefficients



Bootstrapping



Path Coefficients (Mean, STDEV, T-Values)

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	Standard Error (STERR)	T Statistics (|O/STERR|)
C -> OP	-0.125793	-0.117093	0.08254	0.08254	1.524025
E -> OP	0.132337	0.125712	0.095692	0.095692	1.382952
F -> OP	0.387041	0.387375	0.070196	0.070196	5.51368
SQ -> OP	0.150361	0.148214	0.070963	0.070963	2.118853
U -> OP	0.242131	0.239181	0.076025	0.076025	3.184909
WA -> OP	0.207529	0.210191	0.072337	0.072337	2.86891

Appendix J

WEBUSE Results

Yemeni University of Science & Technology (UST)

Descriptive Statistics

	N	Mean
EOU	25	.6850
ETU	25	.7100
Navigation	25	.6600
ETL	25	.6900
Accuracy	25	.6000
Completeness	25	.6000
Appro_Format	25	.6400
Ed_Info	25	.6240
Attract	25	.6950
CSP	25	.6900
Accessibility	25	.6800
Performance	25	.6000
Searching	25	.5667
Suitability	25	.6000
Reliability	25	.5700
Responsive	25	.5950
Valid N (listwise)	25	

Al Nasser University (AL-NASSER)

Descriptive Statistics

	N	Mean
EOU	25	.7100
ETU	25	.7200
Navigation	25	.6767
ETL	25	.7600
Accuracy	25	.5900
Completeness	25	.5700
Appro_Format	25	.6800
Ed_Info	25	.6580
Attract	25	.6950
CSP	25	.6500
Accessibility	25	.5800
Performance	25	.5600
Searching	25	.5600
Suitability	25	.6300
Reliability	25	.6600
Responsive	25	.6300
Valid N (listwise)	25	

University of Aden (ADEN)

Descriptive Statistics

	N	Mean
EOU	25	.5950
ETU	25	.6200
Navigation	25	.6000
ETL	25	.6600
Accuracy	25	.5200
Completeness	25	.5900
Appro_Format	25	.6600
Ed_Info	25	.5780
Attract	25	.6300
CSP	25	.6933
Accessibility	25	.6650
Performance	25	.6167
Searching	25	.5867
Suitability	25	.6200
Reliability	25	.6500
Responsive	25	.6300
Valid N (listwise)	25	

Sana'a University (SU)

Descriptive Statistics

	N	Mean
EOU	25	.6150
ETU	25	.6800
Navigation	25	.6633
ETL	25	.7100
Accuracy	25	.5700
Completeness	25	.5900
Appro_Format	25	.6100
Ed_Info	25	.5420
Attract	25	.6300
CSP	25	.6533
Accessibility	25	.6550
Performance	25	.6033
Searching	25	.6033
Suitability	25	.6300
Reliability	25	.6500
Responsive	25	.6700
Valid N (listwise)	25	

Al Ahqaff University (AHQAFF)

Descriptive Statistics

	N	Mean
EOU	25	.5800
ETU	25	.6400
Navigation	25	.6433
ETL	25	.6700
Accuracy	25	.5700
Completeness	25	.5700
Appro_Format	25	.6000
Ed_Info	25	.5560
Attract	25	.5900
CSP	25	.6467
Accessibility	25	.6950
Performance	25	.5933
Searching	25	.5667
Suitability	25	.5900
Reliability	25	.6500
Responsive	25	.6000
Valid N (listwise)	25	