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كلية الدراسات العليا

A Proposed User Centered Evaluation Model for Electronic Government Services in Sudan

نموذج مقترح متمحور على المستخدم لتقييم خدمات الحكومة الإلكترونية في السودان

A Thesis Submitted in Partial Fulfillment of the Requirements of M.Sc. in Computer Science

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الآيــــــة

{قُلْ هَلْ يَسْتَوِي الَّذِينَ يَعْلَمُونَ وَالَّذِينَ لا يَعْلَمُونَ إِنَّمَا يَتَذَكَّرُ أُولُو الْأَلْبَابِ}

سورة الزمر الآية 9

Dedication

Special dedication to my family members especially to my beloved father (Elbashir Abdalla) & my precious mother (Fathia Adam) who always gave me encouragement in my life, my study and enough power to finish my research.

To my Supervisor Dr. Nisreen Beshir, to all my classmates & all my friends.

Thank you for your support

Thank you for everything that you have given me during my studies and the knowledge that we shared together.

Abstract

Governments took the opportunity to make use of the massive internet network spread, to enhance and provide reliable services to their citizens, which strategically will save their time, reduce cost of accessing the services, improve turnaround times, and strengthen accountability and responsiveness. In Sudan, the lack of user centered governmental services resulted in provision of electronic services which are not suitable for its users propose. The research aims to analysis a model that insures websites services quality before and during development process, to design an evaluation model for the services of the e-government websites suites the intended users and to provide recommend on how to improve the website services quality. Across the evaluation of the E-government websites, many evaluation models exist but few of them focus and take consideration to the user perspective of the E-government and the quality of the provided E-services. In developing this proposed model several models have been observed and selected to be foundation for this research. The model was chosen on their relativeness to E-service user centered approaches. The dimensions of the proposed model were built on Delone & Mclean model. Based on the three main chosen dimensions (information quality, service quality, user satisfaction). Accordingly, after the determination of the main dimensions, the quality factors and their metrics; have been selected from multiple quality models have been observed and selected. After applying the proposed model on Police Traffic, Sudanese's Electricity Distribution Company and Experiment version of the Sudanese Electronic Portal, the major problems faced the participants were lack of the presented information which led some of websites to be not understandable for its users, consistency of representation and design structures, some service are usable and providing accurate and produced in adequate time. However, in other services the naming of service isn't clear and ambiguous and how its function compatible for people with disabilities for some websites. After analyzing the results, the websites were ranked according to the international standards, the Traffic Police website rated 53.6%, 66.5% for Sudanese's Electricity Distribution Company and 55.8% for the Experimental version of the Sudanese Electronic Portal. Hopefully, this research might help the designers in designing e-service and websites, better for the users and helping them to understand the importance of involving end user during design phase.

المستخلص

بسبب الانتشار الهائل لشبكات الإنترنت في السودان، قررت الحكومات الاستفادة من ذلك لتحسين وتوفير خدمات إلكترونية موثوقة تُناسب مواطنيها، حتى يصبحوا قادرين على توفير الوقت وتقليل تكلفة الوصول للخدمات مما يُحسن من وقت المعاملات وتعزيز المُساءلة والاستجابة. فى السوادن، تقل هذه الخدمات الحكومية المتمركزة حول المستخدم مما آدي إلي وجود خدمات إلكترونية غير مناسبة أو مخصصة لمستخدميها.

يهدف البحث إلى تحليل نموذج يضمن جودة خدمات المواقع الإلكترونية قبل وأثناء عملية التطوير لتصميم نموذج تقييم خدمات المواقع الإلكترونية التي تناسب المستخدمين المعنيين بها ولتقديم توصية بشأن كيفية تحسين جودة خدمات هذه المواقع.

عبر تقييم مواقع الحكومة الإلكترونية، وُجدت العديد من نماذج التقييم ولكن القليل منها يأخُذ بعين الاعتبار وجهة نظر المستخدم والحكومة الإلكترونية وجودة الخدمات المُقدمَة. أثناء تطوير هذا النموذج المُقترح تم ملاحظة العديد من النماذج واختيارها لتكون الأساس لهذا البحث والذي تم تصميمه على طراز نموذج ديلون وماكلين وكانت الأبعاد الثلاثة الرئيسية المختارة له هي (جودة المعلومات، جودة الخدمة ورضا المستخدم) وعوامل الجودة ومقاييسها التي تم اختيارها من النماذج التي تم دراستها.

بعد تطبيق النموذج المُقترح على مواقع شرطة المرور السودانية والشركة القومية لتوزيع الكهرباء وإصدار النسخة التجريبية من البوابة الإلكترونية السودانية، كانت المشكلات الرئيسية التي واجهت المشاركين هي قلة المعلومات المُقدمَة والتي أدت عدم فهم بعض المواقع لمُستخدميها واختلال التنسيق وهياكل التصميم. وُجدت أيضاً بعض الخدمات القابلة للاستخدام والتي توفر دقة وخدمة ملائمة في وقت مناسب. ومع ذلك فإن خدمات أخرى كانت غامضة وتسميتها غير واضحة ولا تتوافق وظيفتها مع الأشخاص ذوي الإعاقة في بعض المواقع الإلكترونية.

بعد تحليل النتائج، تم تصنيف المواقع الإلكترونية وفقاً للمعايير الدولية؛ وحقق موقع شرطة المرور 53.6% و 66.5% حققتها الشركة السودانية للكهرباء و 55.8% كانت نصيب النسخة التجريبية للبوابة الإلكترونية السودانية.

نأمل أن يساعد هذا البحث المصممين في تصميم خدمات ومواقع إلكترونية أفضل للمستخدم، ومساعدتهم في فهم أهمية إشراك المستخدم النهائي خلال مرحلة التصميم.

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List of Abbreviations:

Abbreviation	Terms
ICT	Information and Communication Technology
e-Government	Electronic Government
e-Service	Electronic Service
e-Business	Electronic Business
e-Commerce	Electronic Commerce
e-GovQual	Electronic Government Services Quality Model
ServQual	Service Quality
SOA	Service Oriented Architecture
EBS	Electronic Bank System
IEEE	Institute of Electrical and Electronics Engineers
NEC	National Electricity Corporation
G2B	Government to Business
G2C	Governments to Citizens
G2G	Government to Government

CHAPTER 1

1. Introduction

1.1   Background

The present century is an age of technology, the advancement and growing use of ICT has enabled governments of many countries to adapt themselves to e-governments. It helped in improving the activities of public sector organizations, these activities can be with other agencies, some government business, citizen or customers who are interested in a particular organization (Palvia and Sharma,2007).

The evaluation of the online websites quality has been the vocal point in many studies, but the area of the services of governmental websites of the developing countries is disregarded most of the times. This study has filled this gap by focusing on the assessment of three e-portals websites of a developing country, i.e. Sudan (Mahgoub, 2017).
A model is develop in order to help the government providing high quality services for their users, the results will help them to get an idea about the quality of the services portal from the users point of view. In addition, the results will enable them to take certain measure to improve the quality of e-portal services quality.

1.2   Problem Statement

Lack of user centered governmental services in Sudan which provide e-Services not intended for its users propose.

1.3   Research Significance

The study aims to design a quality evaluation model for the governmental e-Services and then evaluate it against multiple governmental websites to point out whether the Sudanese governance follows approaches suits their intended users.

It further highlights major problems faced by the users while interfering with the services. The research also provides suggestions for government bodies as how to improve the overall quality in order to make websites services more effective.

1.4   Research Questions

- Is the currently followed design approach works well from user opinion?
- What major problems do users of e-services face while using the websites services?
- How can the quality of the governmental e-service be enhanced?

1.5   Research Objective

- To analysis a model that insures websites services quality before and while development process.
- To design an evaluation model for the services of the e-government websites suites the intended users.
- To provide recommendations on how to improve the website services quality.

1.6   Research Scope

This study focuses on building a quality model to evaluate the service of the e-government websites. Experimental Version of Electronic Portal website, Sudanese's Electricity Distribution Company and traffic police websites are compared against the model.

1.7   Research Organization

This research consists of five chapters; chapter one describes the whole idea behind the theses, define the problem statement, why it is important, objective and scope research. c**hapter two** describes the Literature Review, which divided into two section. The first section takes the major concept about topic and the second section discuss the previous studies. **Chapter three** describes the research methodology, which represent the methodology of research that content: the way of building quality model, extract metrics and the questionnaire design. **Chapter four** describes the evaluation results discussion, which contains results after applying the model on the governmental websites and finally, **Chapter five** which highlights the research conclusion & recommendation.

CHAPTER 2

2. Literature Review

2.1 Introduction

This chapter reviews the literature related to key topics in the research, which is explained in a brief manner and will be shown into two sections.

2.2 Theoretical Background

2.2.1   E-Government

The massive entry of technology into all aspects of life have changed how people live, how they deal with every day issues, how business do their works and how the government avail their citizens. With the help of the IT vendors, governments realizing that by applying the e-business methods that they can achieve a recognized transformation to provide information and services citizens centered which resulted in the emergence of e-government (Re, 2010).

Like any other modern concepts there are many definitions of e-government but from a general view we can say its "using ICTs at various levels of the government and the public sector and beyond, for the purpose of enhancing governance" (Palvia and Sharma, 2007). The united nation had a different point of view as mentioned in their website, "E-government refers to the use of ICT such as Wide Area Networks, the Internet and Mobile Computing by government agencies".

Many studies and researchers define e-government, some definitions restrict e-government to internet-enabled applications only, while e-government mainly concentrate on all ICT applications not only internet to improve the activities of public sector organizations (li and Abdalla, 2014).

2.2.2   E-government Classification

A common classification concept in the e-service is connected to the interaction levels provided while using the Internet. The interaction can be classified into informative services, which is restricted to the presented information, one-way services which the

information of the service and the structured document are downloadable, two-way services in this category the complex workflows plus providing help to the citizens on how to submit and receive public administration information and documents and finally transactional services supports the inter and intra administration cases (Re, 2010).

One of the common classifications to the electronic services is related to the connectivity of the user to the government. Which are, Governments to Citizens (G2C) services in this category the government provide full support to the citizens they allowed to access to the information and services instantly, Government to Business (G2B) services the government providing services and channels with the private sector such as paying the taxes online, and the Government to Government (G2G) services which is the same as (G2B), but instead to government provide services to other governments departments, as for a fact governments depends on other level of governments to provide and deliver services (Re, 2010).

2.2.3   E-Government in Sudan

The concept of e-government appeared in the first time in Sudan in 1990, when the ICT dominated and the National Information Center is assigned as a former body that coordinate e government in Sudan since 2004 (Edrees and Khalifa, 2015). Previously it was difficult to investigate e-government in developing countries such as Sudan, due to their low levels of development government (Edrees & Khalifa, 2015). However, recent advances in these countries have made it possible to conduct studies and analyses to improve e-government.

Nowadays, there are some public sectors adopt and implement web services to provide, deliver and disseminate services and information to the public such as Ministry of Higher Education and Scientific Research, Electronic Bank System (EBS), National Electricity Corporation(NEC) and Ministry of Interior.

2.2.4   E-Service

Service concept have a different meaning according to the person, the word service originally comes from the Latin word "servus" which means slave, in computer science it means a program that offers a service to other programs through a well-defined user interface, such as in Service Oriented Architecture (SOA) (Jansen and Ølnes, 2016).

E-services, is a business concept developed by Hewlett Packard (HP), is the idea that the World Wide Web is moving beyond e-business and e-commerce (Scupola, 2008), from the government point of view, we can say e-service is the ability of the organization to provide their service for the customer by using web and electronic technologies. It is also known as digital service.

2.2.5   What is Quality

Quality is a thing hard to describe, it can have the term of intangibility. In our daily life, we use good or bad quality terms to assess any product quality, some people easily can assess some products quality but they find it hard to give a description for the term.
The IEEE software specialist defined the software quality as "the degree to which a system, component or process meets customer or user needs or expectations" (Galin, 2004). In the service context, the quality defined as meeting or exceeding customer expectations (Parasuraman, Zeithaml and Berry, 1985).

2.2.6   E-Service Quality

In the past years the researchers gave attention to e-services, and they found out its the key determinates in the e-commerce successful, the concept of service quality in e-commerce can be defined as the consumers over all evaluation and judgment of the excellence and quality of the e-service offering in the marketplace (Santos, 2003). In e-service, a customer can conveniently receive the service through the Internet at any place, contemporary it can be seen as providing electronic gates to the citizens to facilitate their transactions.

2.2.7   Software Quality

Software quality defined as conformance to the requirement and meeting the user needs. Conformance to requirements means the ability of the software to meet the predefined set of specifications and requirements set at the beginning of the development of the software. From the other hand meeting the user needs it is about the ability of the software to meet its intended user's expectations and needs. In general, quality of the final software product measured by its satisfaction to its user requirements and fulfilling its intrinsic product quality (Milicic, 2005).

2.3 Existing Software and E-Service Quality Models

2.3.1   Software Evaluation Models

1. **FURPS/FURPS+**

FURPS model originally presented by Robert Grady (Milicic, 2005) and extends by IBM rational software into FURPS+. FURPS stands for (Functionality, Usability, Reliability, Performance and Supportability). This model has two different categories: Functional (F)

and Non-functional (URPS). These categories used as both product requirements as well as in the assessment of product quality (Milicic, 2005).

2. Dromey's Model

Mainly focusing on the relationship between the quality attributes and the sub-attributes, in addition its attempts to connect software product properties with software quality attributes. The model architecture proposes a product based quality model for each product is different from one to another (Milicic, 2005).

2.3.2   E-Service Quality Models

1. Attribute Service Quality Model

The concept of this model set that if the organization meets customer preferences and expectations consistently, then we can say it has a high quality. The model dived into three basic attributes physical facilities and processes; people's behavior; and professional judgment, and each attribute have a several factors (Seth, Deshmukh, S.G & Vrat, 2005).

2. Model of Perceived Service Quality and Satisfaction:

This model is a modification to Oliver's model, it proposes to enhance the understanding of the perceived service quality and consumer satisfaction. Its main aim to highlight the effect of expectations, perceived performance desires, desired congruency and expectation disconfirmation on overall service quality and customer satisfaction, and each of the previous can be measured by several attributes (Seth, Deshmukh, S.G & Vrat, 2005).

2.4 Related Work

2.4.1   A Multiple-Item Scale for Assessing E-Government Service Quality

Papadomichelaki and Mentzas developed an E-Gov Quality model was developed based on e-GovQual, and the quality attributes was identified from different approaches some of them are E-S-QUAL, User-Perceived web quality, E-Qual and more. In order to select the model main criteria the Delphi method applied, so after two rounds six main criteria were determined with multiple attributes (Ease of use, Trust, Functionality of interaction environment, Reliability, Content & Appearance of information and citizen support) (Papadomichelaki, X. & Mentzas, 2009).

The model aims to take advantage of understanding citizen perceptions and expectations in order to develop high quality e-government information products and services, they found out reliability, efficiency, citizen support and trust. Each of the four factors had a significant impact on overall service quality and the organization had a better chance of gaining and serving much more citizens.

2.4.2   Framework for a Global Quality Evaluation of a Website

Rocha proposed a way to give high-level structure for global quality evaluation for websites, proposed structure divided into three portions content quality, service quality and technical quality. In content quality evaluation, the used technique was Likert scale, the analyser (users, linguists and experts) must focus on content of the page or the whole page and keep going until a predefined level of depth is reached, although he proposed that ISO/IEC 25012:2008 can be used as measurement structure. In service quality measurement, they used Likert scale method but another method have been proposed which is service quality scale developed by Parasuraman. In Technical quality, evaluation based on software quality models or standards and on methods focused on usability, methods developed through studies in the area of Human Computer Interaction (Rocha, A. ,2012).

The study aims to propose a high-level structure for a global quality evaluation of a website. The high-level structure helped in defining the website quality for the organization and the satisfaction of their clients, giving a good evaluation, comparison and improvement methodology.

2.4.3   SERVQUAL and Model of Service Quality Gaps: A Framework for Determining and Prioritizing Critical Factors in Delivering Quality Services

Shahin proposed a research on measuring the service quality, which has focused primarily on how to meet or exceed the external customer's expectations and has viewed service quality as a measure of how the delivered service level matches consumer's expectations. The SERVQUAL gap model applied in order to measure service quality. The model has seven gaps some for the external quality, some for the internal quality and other for the products, organization and management (Shahin, A. , 2004).

2.4.4 Assessment of E-government Service Quality Under User Satisfaction Orientation: The Establishment of E-Govqual Model

Shang imposed the essence of government is to offer better service to citizens, so an E-GovQual model been established to assess the e-government service quality regarding the user orientation. The study aims to establish an assessment model on e-government service quality under the customer satisfaction orientation after deep analysis on the previous research study related to this topic, four main dimensions selected which were usability, information quality, security and public responsiveness; moreover, suitable attributes were selected for each dimension. The study found that service quality has a direct influence on the users (Shang, S.S., 2014).

2.4.5 E-GovQual: A Multiple-Item Scale for Assessing E-Government Service Quality

An e-GovQual was conceptualized by Papadomichelaki and Mentzas for measuring e-government service quality. Then a multiple-item scale been identified from multiple different models, it aims to the delivery of services that better serve the citizen's needs. To measure the product capacity a usability testing (inception methods) was done to develop a measure that has desirable reliability and validity properties (Papadomichelaki, X. & Mentzas, 2012).

Delphi method was used to initially assess sample items in order to provide input for developing a conceptual model of e-government service quality, after two evaluation rounds 33 e-government quality attributes remained in the list classified under six main criteria determined as the e-government service quality dimensions, Ease of Use (navigation, personalization, technical efficiency); Trust (privacy, security); Functionality of the Interaction Environment (support in completing forms); Reliability (accessibility, availability);and Content and Appearance of Information and Citizen Support (Interactivity).

A questionnaire based on these criteria designed to elicit and assess information of the conceptual model, within e-GovQual, four dimensions are used: Reliability, Efficiency, Citizen Support, and Trust. Each of the four identified and verified dimensions had a significant impact on overall service quality (Papadomichelaki, X. & Mentzas, 2012).

2.4.6   E-Tax Website Quality: An Evaluation Framework

An evaluation framework been done by Qadar, Moazzam & Ansari to evaluate the e-tax portal of Pakistan based on its users, to identity the critical characteristics of quality that significantly exist in the portal and the one's need to be attention by the administrators; it also highlights the problems faced by the users. The developed evaluation model measures system quality and information quality, in addition, 16 items were used to assess the quality of the portal.

A triangulation research strategy used for the research. The selected population were professionals and non-professionals of the e-portal. Many users pointed out that, 11 elements have a strong and significant occurrence in the portal website (Qadar, S., Moazzam, A. & Ansari, N., 2015).

CHAPTER 3

3. Research Methodology

3.1 Introduction

This chapter is about showing the research followed methodology. By defining the dimensions of the e-government website, then selecting the main attributes of the dimensions, after that defining the factors or criteria of each attributes, last identify the metric for each criteria and illustrate the final model.

3.2 Methodology

There are many evaluation models exists for the E-government that is evaluate it from different perspectives. However, few of them focus and take consideration to the user perspective of the E-government and the quality of the provided E-services.

Several models has been observed and selected to be foundation for this research. The model were chosen on their relativeness to E-service user centered approaches. The dimensions of the proposed model were built on Delone & Mclean model to (Petter, DeLone and McLean, 2008). Based on the three main chosen dimensions (information quality, service quality, user satisfaction). Accordingly, after the determination of the main dimensions, the quality factors and their metrics; have been selected from multiple quality models have been observed and selected, which are "A Multiple-Item Scale for Assessing E-Government Service Quality", "SERVQUAL", "E-Govqual Model", "ISO 9126-1", "government of Abu Dhabi" and "User Satisfaction model".

This research used five steps: research design, attribute definition, quality factors definition, metrics definition and instrument deign and evaluation.
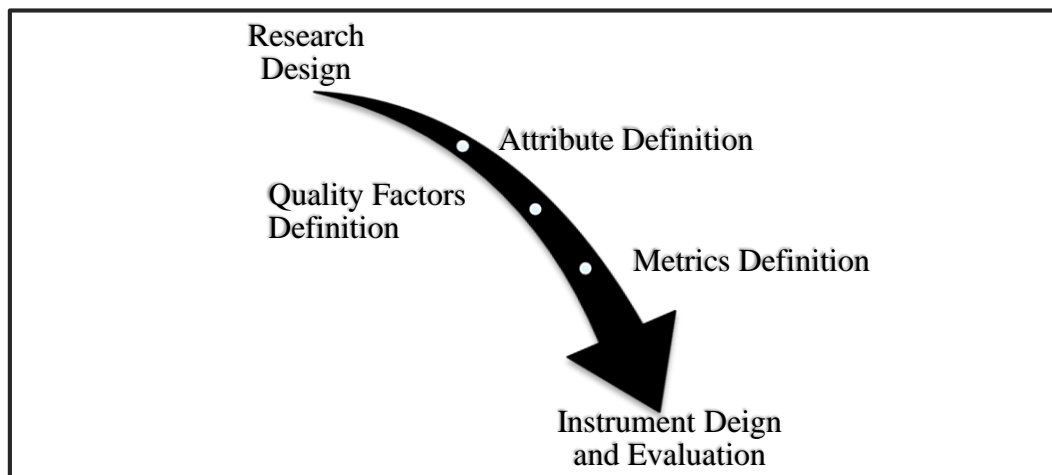
Figure (3.1): The Research Methodology

3.2.1 Research Design

In this phase, different evaluation models from different perspectives have been evaluated in order to determine the main characteristic that's effect the quality of the e-government websites. One of the main purposes of the e-government is to deliver information and the services to their user, that's why we can put it under the umbrella of the information systems. According to (Petter, DeLone and McLean, 2008) the success of the information systems have related dimensions according to the type it's been used for. The selected dimensions from the D&M model which are related to the e-government quality evaluation are:

- **System quality:** represent the desirable characteristics of an information system.
- **Information quality:** represent the desirable characteristics of the system outputs.
- **Service quality:** represent the quality of the support received from the IS department.
- **System use:** represent the degree in which users utilize the capabilities of an information system.
- **User satisfaction:** represent the users' level of satisfaction.

Note: only the information quality, service quality and user satisfaction dimensions are going to be the focus of the E-services evaluation from the user perspectives.

After the determination of the main dimensions, we can determine the quality factors and their metrics. Then the phase of the questionnaire building and evaluation.

3.2.2 Attribute Definition

3.2.2.1 Information Quality

Most people they use websites to seek information about specific things, and if the information is corrupted in any way this will influence directly on user judgment and the services as well, this is come up because in some cases the information provider perspective may be different from the one the user have. According to (Katerattanakul and Siau, 1999; Lee, Strong, Kahn and Wang, 2002) there are four main dimensions to assess the information quality of the E-government websites, which are:

- **Contextual:** focus on context of the presented information, its completeness and value added for example.
- **Intrinsic:** focus on the main purpose of the information and its precisions.
- **Representational:** focus on the look and feel of the website and presented information.
- **Accessibility:** focus on the provided techniques for people with disabilities and information security.

3.2.2.2 Service Quality

The quality of the provided service is the number one indication for the websites in the toke of its users. There are main criteria's any website should have in order to provide a good service according to:

- **Usability:** covers the aspects which make the service more usable such as ease of use.
- **Performance:** covers the service performance such as is it performed accurately, whether it take so much time and others.
- **Reliability:** it's an important criteria and have a massive effect on the services such as whether its performed accurately or is it available**.**
- **Trust:** the user's confidence to provide sensitive information without any worry.

United Arab Emirates recently published a manual for the identification and documentation of its electronic services. The manual had apart on the service declaration and written based on the cultural difference of its intended users. From it the last attribute elicited is the **Familiarity**.

3.2.2.3 User Satisfaction

The satisfaction of the user is important criteria to look on while developing any websites especially if it's intended for user interaction. So (Shang, 2014) develop

a model for analysing user satisfaction from it the main criteria were elicited, which are:

- **Usability:** covers the attributes which make the user to easily have usable web interaction.
- **Information quality:** indirectly have an effect on the user satisfaction, which is already been determined before.

3.2.2.4 System Quality

According to ISO 9126-1 software quality model, which is international standard for the evaluation of external systems quality, the model has 6 characteristics which are: Functionality, Reliability, Usability, Efficiency, Maintainability and Portability (Padayachee, Kotze and van Der Merwe, 2010). So, the system quality of the E-government according to ISO 9126-1 will be all its attributes expect the portability, because the web site doesn't have to be transferred from one machine to another.

3.2.3 Quality Factors Definition

3.2.3.1 Information Quality

1. Contextual

Denotes the requirements that information quality must be considered within the e-task context. In order to do that, the criteria to look on are the information **completeness**, the **timeliness** whether it is up to date to or not, the ease of the **understandability** to the users, and whether the intellectual state of the user will change after the seen information under **value add** criteria (Lee, Strong, Kahn and Wang, R.Y., 2002).

2. Intrinsic

Denotes that the information has the quality in itself, many studies set the main criteria for this attribute is the information **accuracy** (Katerattanakul and Siau, 1999). Moreover, from another perspective the **objectivity** of information to the e-service is an important criterion also.

3. Representational

Denotes aspects related to the presentation of the information that falls under it the **consistent** and **conciseness** representation from one page to another, and the **format, look suitability**. Moreover, its meaning to the user, which represented in the **ease of understanding** of the presented information (Lee, Strong, Kahn and Wang, R.Y., 2002).

4. Accessibility

Denotes that the provided information must be accessible and secure for the sensitive information, the accessibility issues can be listed in the providing enough and easy **navigation tools**, plus look on the **information structuring** in logical unites to how the user will anticipate it. Moreover, taking care of the individual's **access security** because their sensitive date can't be seen the others (Katerattanakul and Siau, 1999).

3.2.3.2   Service Quality

1. Usability

Denotes to how much the website is usable when the users interact with it. Many researchers have noted the important of this attribute before, however when restricting the usability to the e-government the important criteria are, the **ease of use** of the website, and considering that any user can make mistake, that is why the retreat must be easily and clearly. **Content and appearance of information,** considering the presented services information and media will it contribute in the user usefulness and the **functionality of the interaction environment**, all the users at some point will have any kind of inquiries that is why it's preferable provide a communication way to the users to answer their inquiries (Papadomichelaki and Mentzas, 2009).

2. Performance

Subjectively the **timeliness** is used as determination user's subjective assessment to the service performance. It refers to the service user judgment, whether its meet the deadlines or not, knowing that the timeliness judgment is different from one to another (Burkon, 2013).

3. Reliability

Denotes to the user's confidence to the e-government website while using the e-services. Reliability is about performing the promised service **accurately**, emphasis of the service **availability** 24/7 and its **accessibility**. The users of the e-government have different capabilities, that why the service should be usable by many people as possible without any modification, due to the accessibility importance (Papadomichelaki and Mentzas, 2009).

4. Trust

Denotes to the user's freedom and confidence to use the e-service without no risk or doubt. Both **privacy** and **security** are its criteria's; the first refers to the user trust in the e-government website to protect their personal information. In addition, the last refer to protecting the users from any fraud or financial loss; by protecting

their financial information and ensuring the transaction is going as it is supposed to do (Papadomichelaki and Mentzas, 2009).

5. Familiarity

Denotes to the aspects, which will help the users to perceive a better understanding of the e-service and facilities it to the limit. The criteria which related to this attribute are, **Services Naming Clarity**; users are most likely to interpret what they see to their mental state; that's why the service name must reflect what the user understand not the work done by the service provider. Second, **using user language**, any government in the world have people from around the world living in its borders, this has led to a cultural interference within its citizens, that's why the government need to provide the services to the users in their own language. Finally, **unifying the used language** in the website and service; to cause no confusion to the users ("government of Abu Dhabi", 2016)

3.2.3.3   User Satisfaction

1. Usability

Denotes to make better websites, to make it more usable for the users. Usability is important to the users to get their expected effective information, so improving the usability will lead to increasing in the user satisfaction (Flavián, 2003). In order to increase it, the criteria has to look on, is simple **navigation** between webpages, supporting **multi-language** presentation and easy diversion. the presented **media design** must be related to the presented information, the **aesthetics** of the overall website design taking under consideration all the criteria's related to the design, according to (Akakandelwa, 2011), visual effect of website has more influence on users especially when people interact with website.

2. Responsiveness

Denotes to the e-government to response quickly and positively to the users encountered issues periodically, by any communication way provided. This will make the user feel more important and involved (Burkon, 2013).

3. Information quality

This attribute derived from the information quality dimension because the presented information have a major effect on the satisfaction of the user.

3.2.3.4   System Quality

1. Functionality

Denotes to the system capability to do exactly what it intended to do from the users under specific conditions. When the users of the e-service interact with it, they expect the task to go as required, is their information will be prevented, from any unauthorized access and accurate results. From the previous, the criteria are **suitability**, **security** and **accuracy** (Padayachee, Kotze & van Der Merwe, 2010).

2. Reliability

Denotes to the system capability to maintain a specific level of performance under specific conditions. While doing transactions, users sometimes have some concerns about the system capability to handles errors or mistakes and if there, any kind of system failure; is data will be restored or not. From the previous, the criteria are **fault tolerance** and **recoverability** (Padayachee, Kotze & van Der Merwe, 2010).

3. Usability

Denotes to the system capability to be while the use effortless under specific conditions. The better the system usability the better user interaction and satisfaction. The criteria's of this attribute are derived from the of the service quality and user satisfaction usability. The criteria's are **operability,** which is the user ability to use the system effortlessly, **attractiveness**, looking at the design of the interfaces, **learnability**, which is the user ability to learn the system easily and **understandability**, which is the perceive how to use the system (Padayachee, Kotze & van Der Merwe, 2010).

4. Efficiency

Denotes to the system capability to provide the desired performance under specific conditions and time. Users use the e-services online that is why the important criteria is the **time behavior** of the system, which is the how quickly the system responds to the user requests (Padayachee, Kotze & van Der Merwe, 2010).

3.2.4 Metrics Definition

Since the evaluation of the e-services is taken from the user perspective (what the user perceive), the metrics of the criteria are in sentence form.

Table (3.1): Attributes, Factors & Metrics of The Proposed Model

Dimension	Attribute	Factor (Criteria)	Metrics
Information Quality			
	Contextual		
		Completeness	• Quantity of information provided in the Web site is appropriate. • Provided any contact information or not.
		Timeliness	• Information is up to date.
		Understand Ability	• information is clear and easy to understand for the user
		Value Add	• Intellectual state of the user is changed positively after reading the topic
	Intrinsic		
		Accuracy **(contents, navigation or hyperlinks)**	• Exists any inaccurate information and grammatical and spelling errors. • Individual Web site contains any broken link.
		Objectivity	• Supporting media and information is relevant to the e-service.
	Representational		
		Consistent Representation	• Design of every web page is consistent throughout the individual Web site or not.
		Conciseness Representation	• Individual web site is too large or not.
		Format/Look Suitability	• Proper use of fonts, colors or graphics. • Proper use of language/style. • Exist a style consistency.

			• Exist a color consistency.
		Ease of Understanding	
	Accessibility		
		Accessible **(navigation tools, information structuring)**	• Exists enough navigation mechanisms and easy to observe. • Website information structured in logical units.
		Access Security	• Sensitive information visible and accessible to other users after the end of the session.
Service Quality			
	Usability		
		Ease Of Use	• Easy, simple to use and recoverability from mistakes quickly and easily.
		Content and Appearance of Information	• Information displayed in plain, simple and concise text. Easy from reading from normal viewing distances. • The combinations of image, voice and video contribute to site's usefulness and ease of use.
		Functionality of The Interaction Environment	• Exists any Interactive feedback between users and the organization (messages e-mail or phones).
	Performance		
		Timeliness	• Selected service performed in a suitable time without no delay and no breaks.
	Reliability		

		Accuracy	• Service performed correctly from the first time.
		Availability	• Needed web page always available. • Hyperlinks available and works correctly.
		Accessibility	• Website accessible for people with disabilities. • All content are accessible and is there a high page loading.
	Trust		
		Privacy, Security	• The user confidence of providing their personal and financial information.
	Familiarity		
		Services Naming Clarity	• Service name is clear, with a reflection to its function from the user perspective and have no punctuation marks.
		Use User Language	• Used language understandable and readable to the user.
		Use Unified Language	• Content of the website page appeared in one language.
User Satisfaction			
	Usability		
		Navigation	• the navigation from page to page is simple
		Multi-Language	• Support and diverts to multi languages easily.
		Media Design	• media related to the selected service or subject
		Aesthetics	• Attractiveness of the web design.

	Information Quality		• Already measured
	Responsiveness		• Exists responses to user requests by e-mail or other means. • The problems encountered quickly resolved.
System Quality			
	Functionality		
		Suitability	
		Security	
		Accuracy	
	Reliability		
		Fault Tolerance	
		Recoverability	
	Usability		
		Operability	
		Attractiveness	
		Learnability	
		Understand Ability	
	Efficiency		
		Time Behavior	

3.2.5 Proposed Model

The following figures illustrate the proposed model. Figure (3.2) illustrate the e-service evaluation model from both government and user perspective as a general outline. Both of figure (3.3) and figure (3.4) illustrate the e-service from the user perspective in details, the model divided in to figures for its large size.
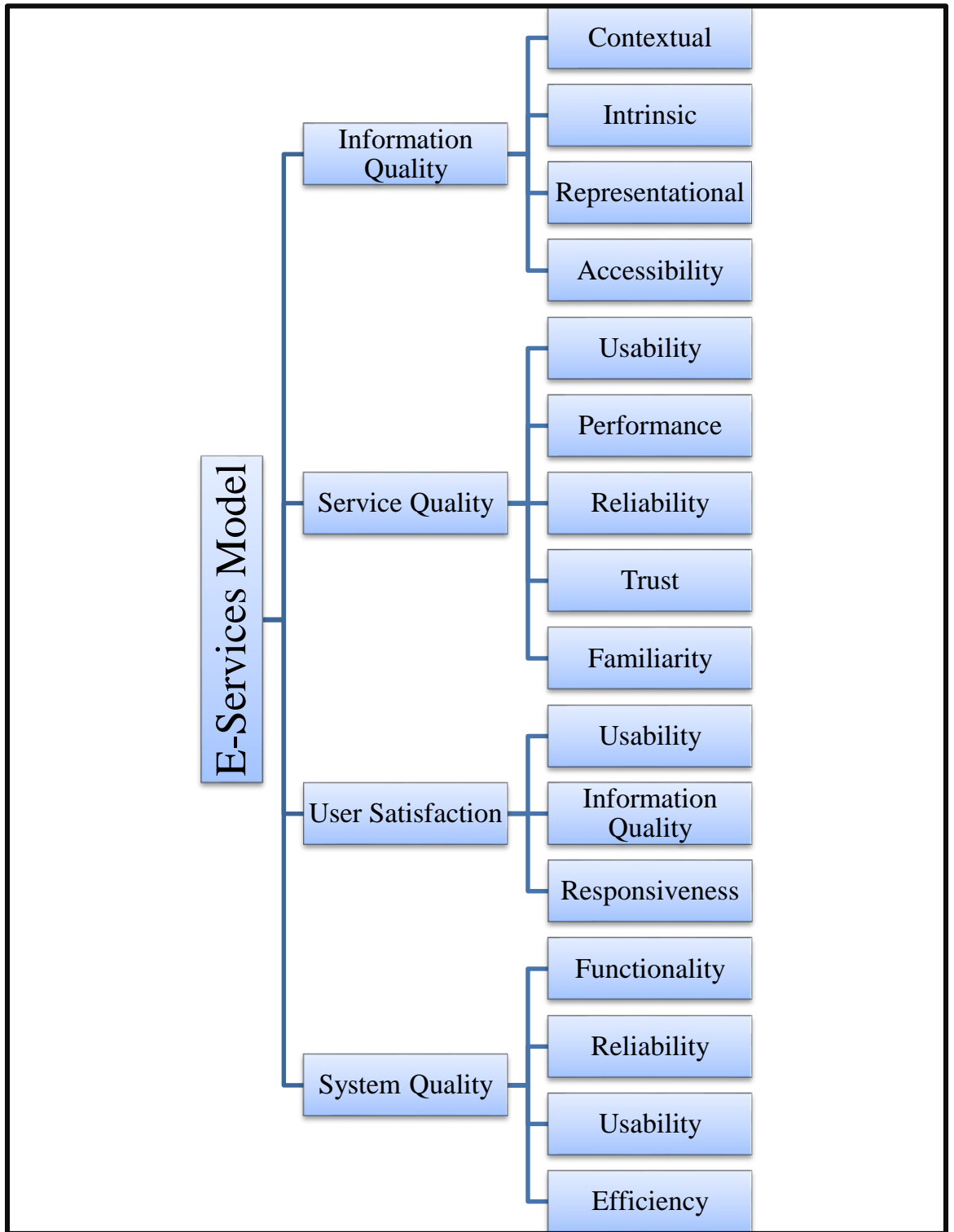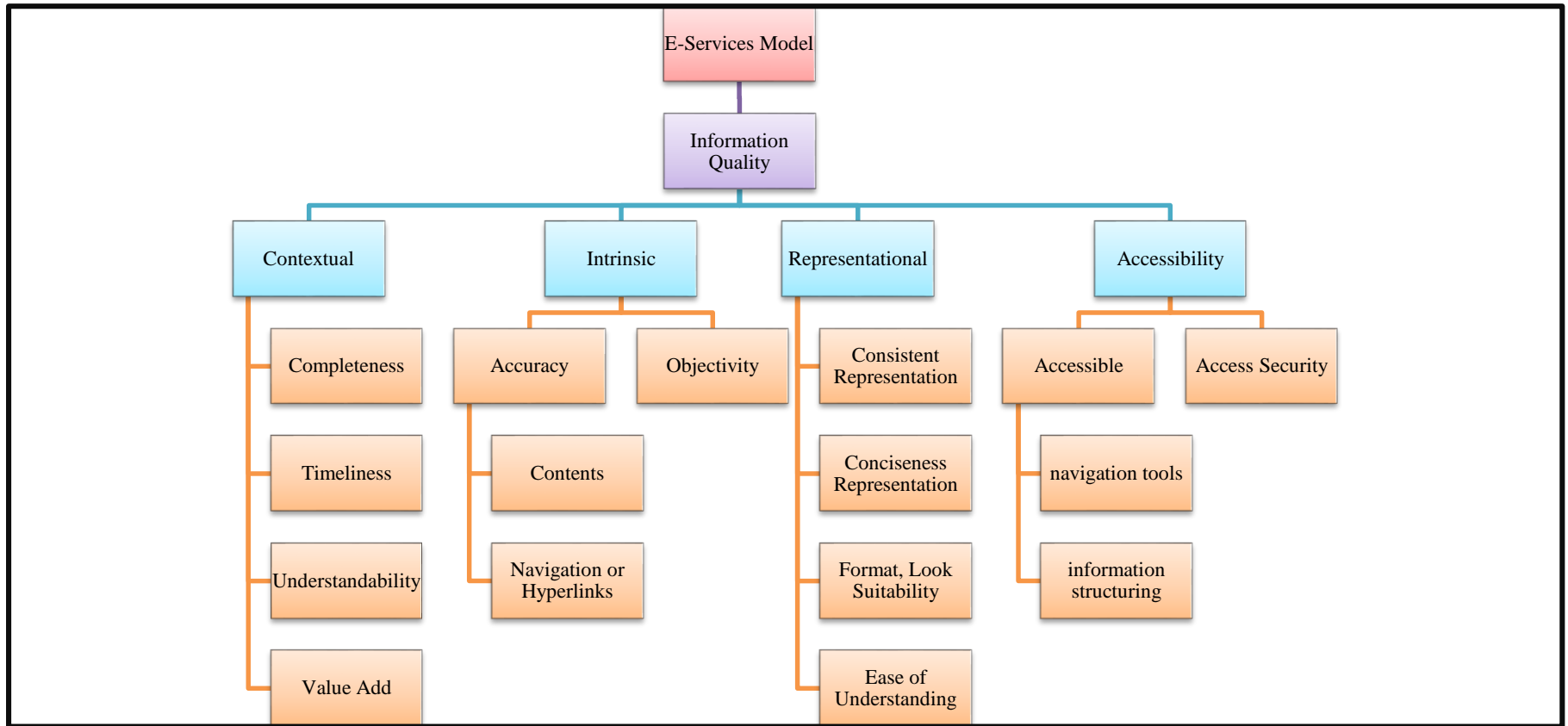
Figure (3.2): E-Service Evaluation Model

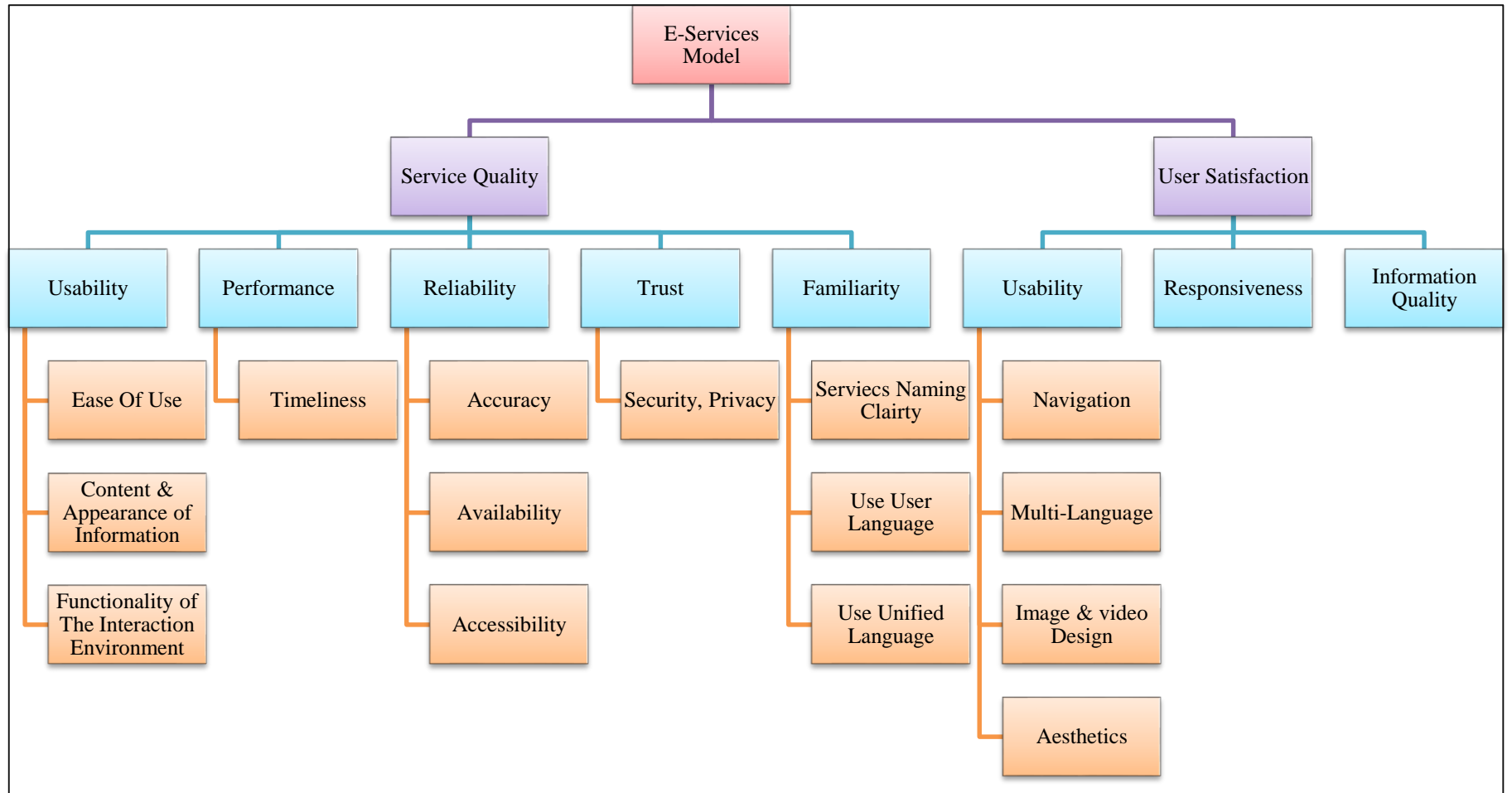Figure (3.3): User Based Governmental E-Service Evaluation Model Part1

Figure (3.4): User Based Governmental E-Service Evaluation Model Part2

3.3 Evaluation method: Questionnaire

To gather the data, the used methodology is questionnaire, which aims to capture the user's perception to assess the services of the Sudanese e-government.

3.3.1 Questionnaire design

The questionnaire of this research designed based on the proposed model, it contains three main categorize with 11 sub-sections and 43 questions. It been written by using Microsoft Excel Sheet and distributed to the candidates personally and via e-mail.

Five steps Likert scale method used to survey and collect user response in order to measure the extent of their agreement or disagreement on certain criteria.

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
0	1	2	3	4

Figure (4.1): Questionnaire Likert scale Range

3.3.2 Questionnaire objectives

The questionnaire aims to check the validity of the evaluation model. By using it on three working governmental websites (traffic police, electricity and experimental version electronic portal)

3.3.3 Candidates/Participants Profile

The participants in the questionnaire had be in the field of computer science with a minimum three years' experience programming development and design and for their master's degree which is preferable, their experience make them experts in the basics of creating good designs for the users.

3.3.4 Candidates Filling Principles

The excel sheet contained both the questionnaire questions and URL to the governmental website, the participants listed to explore the websites first, then answers the questionnaire questions and no specific time window during the day set for them to fill the questionnaire.

CHAPTER 4

4. Evaluation and Result Discussion

 4.1   Results and Analysis

   4.1.1   Data Collection Method Validity and Reliability:

It means that the questionnaire has accomplished the goal that it designed for, and hence achieve the objectives of the research, and it hypotheses, the reliability of the questionnaire has been measured by two ways:

1. **Content validity**

The researcher has issued the questionnaire to a number of specialists who evaluated it and eventually agreed on a 45 question, partitioned as following:

- General questions: about the age and gender.
- Specific questions format for 43 questions.

2. **Cronbach's Alpha**

Cronbach's alpha is the most common measure of internal consistency ("reliability"). It is most commonly used, when you have multiple Likert questions in a survey/questionnaire that form a scale and you wish to determine if the scale is reliable by keeping the questions that have high Cronbach's Alpha and eliminate the questions with low or negative Cronbach's Alpha, this analysis is done by using SPSS program.

Therefore, when applying the measure to the questionnaires of traffic police and electronic gate the result was .78 and .74 which is considered acceptable in most social science research situations, because its above .70, but it gave .56 for the Sudanese's Electricity Distribution Company e-services, because they don't comply to any design approaches and their services are not working from the users point of view.

   4.1.2   Qualitative Data

The total number respondents is 16 (10 males, 6 females), three of them their age range form 32-36 years old and the rest of the respondents their age range from 23-27 years old. Nine of these respondents have a master degree in computer science with

minimum of seven years working in program development, the other ten respondents have minimum of 4 years working as program development.

4.1.3   Quantitative Data

The respondents were from three governmental websites services (traffic police, Sudanese's Electricity Distribution Company and experimental version electronic portal) each one of them is listed and discussed separately below.

4.1.4   Result Discussion

The following tables illustrates the results analysis shows the final assessments results by the participants when they conformed the questionnaire against the governmental e-services websites. The assessment result expressed two views; from participant's perspective; an average produced for each website and its express the quality of services provided by the websites from user's perspective and from the proposed model dimensions.

1. Website 1 (Traffic Police)

In Traffic Police website, after analyzing the responds; in the information quality and user satisfaction dimensions there is lack of the presented information which led the website to be not understandable for its users, there presented information's are not related to E-service functionality, while moving back and forth between webpages; all respondent's reflected that there is no consistency for the representation and design structures with absence of feedback mechanisms. For the service quality, the users found that the service are usable, their results are accurate and produced in adequate time. However, the design if the naming of service is not clear and ambiguous and how its function compatible for people with disabilities.

Table (4.1): Results of Individual Assessment for Traffic Police website

Categories	% of Presented Information				% of Functionality of the E-service					% of User's personal opinion		% of website individual assessment
Sub-Categories	1	2	3	4	5	6	7	8	9	10	11	
Respondent1	68	73	77	45	56	60	52	12	72	25	50	58.1
Respondent2	60	53	49	55	52	60	52	16	56	30	40	50.2
Respondent3	56	47	51	50	52	60	52	8	60	50	40	50.7
Respondent4	32	47	37	50	40	60	48	16	60	65	40	46
Respondent5	36	53	37	50	44	60	44	16	52	55	40	45.1
Respondent6	40	53	63	60	56	40	40	16	44	55	60	51.2
Respondent7	76	87	83	65	76	80	76	32	76	60	70	75.3
Respondent8	68	53	46	70	60	100	68	20	80	25	60	59.5
Respondent9	68	67	71	75	76	80	80	24	80	75	80	74.0
Respondent10	72	73	74	85	64	100	64	20	80	40	60	68.8
Respondent11	76	73	77	80	72	60	76	32	80	75	80	75.8
Respondent12	40	53	63	60	56	40	40	16	44	55	60	51.2
Respondent13												
Respondent14	88	87	91	80	96	80	80	32	92	70	80	85.6
Respondent15	56	67	80	55	80	60	44	16	100	50	60	66.0
Respondent16												
Average	52	55	56	55	55	59	51	17	61	46	51	53.6

Table (4.2): Results of Categorical Assessment for Traffic Police website

Categories	% of Presented Information	% of Functionality of the E-service	% of User's personal opinion
Respondent1	67	57	33
Respondent2	54	52	33
Respondent3	52	51	47
Respondent4	40	49	57
Respondent5	42	47	50
Respondent6	55	46	57
Respondent7	78	77	63
Respondent8	58	69	37
Respondent9	71	77	77
Respondent10	76	69	47
Respondent11	77	76	73
Respondent12	55	46	57
Respondent13			
Respondent14	87	88	73
Respondent15	66	70	53
Respondent16			

2. Website 2 (Sudanese's Electricity Distribution Company)

In Sudanese's Electricity Distribution Company, after analyzing the responds; in the information quality and user satisfaction dimensions, the quality of the presented information is good and accurate, clear and easy to be understood by the users but it's not updated or up to date, expert respondent's reflected that there is no consistency for the representation and design structures nor standards, all hyperlinks are working with existence related information's to the hovered hyperlinks; but the Intellectual state don't change in some hyperlinks while moving between website pages, the navigations are not that easy to observe and the sensitive information are visible after the users session ends. Also, there is not a clear language consistency in website because in the same presented information there are some lines in Arabic and others in English however, all respondents reflected that the services are not usable nor understandable.

Table (4.3): Results of Individual Assessment for Electricity Website

Categories	% of Presented Information				% of Functionality of the E-service					% of User's personal opinion		% of website individual assessment
Sub-Categories	1	2	3	4	5	6	7	8	9	10	11	
Respondent1	48	47	57	30	48	40	32	16	60	30	40	44.7
Respondent2	60	60	51	55	52	40	52	16	48	45	40	51.2
Respondent3	52	60	37	55	40	60	48	24	56	40	40	47.9
Respondent4	64	73	60	45	56	60	40	16	64	35	30	53
Respondent5	60	67	57	40	56	60	40	16	56	35	30	50.2
Respondent6	76	67	60	85	80	80	48	12	64	80	50	66.5
Respondent7	76	80	63	70	76	80	80	32	84	65	70	74
Respondent8	84	87	69	80	84	100	72	40	80	75	60	78.6
Respondent9	64	47	51	70	76	80	76	32	92	60	60	67.9
Respondent10	96	80	83	70	76	80	76	12	80	80	60	77.2
Respondent11	96	80	71	80	80	80	80	24	64	80	60	76.7
Respondent12	76	67	60	85	80	80	48	12	64	80	50	66.5
Respondent13	68	73	74	60	56	40	64	8	76	85	50	65.6
Respondent14	88	87	91	80	96	80	80	32	92	70	70	85.1
Respondent15	96	93	86	95	96	100	76	24	100	85	90	89.3
Respondent16	76	73	66	85	60	60	60	16	92	60	60	68.8
Average	74	71	65	68	70	70	61	21	73	63	54	66.5

Table (4.4): Results of Categorical Assessment for Electricity Website

Categories	% of Presented Information	% of Functionality of the E-service	% of User's personal opinion
Respondent1	47	46	33
Respondent2	56	49	43
Respondent3	48	50	40
Respondent4	60	52	33
Respondent5	56	50	33
Respondent6	71	61	70
Respondent7	71	80	67
Respondent8	78	82	70
Respondent9	58	81	60
Respondent10	83	72	73
Respondent11	81	73	73
Respondent12	71	61	70
Respondent13	69	59	73
Respondent14	87	88	70
Respondent15	92	88	87
Respondent16	64	67	60

3. Website 3 (Experimental Version of Electronic Portal website)

In Experiment version of the Sudanese Electronic Portal, after analyzing the responds; according to the users there is a lack of the presented information, at the time the E-services are not functioning and there is no consistency for the representation and design structures nor standards, the navigations are not that easy to observe and the sensitive information are visible after the user's session ends.

Table (4.5): Results of Individual Assessment for Experimental Version Electronic Portal website

Categories	% of Presented Information				% of Functionality of the E-service					% of User's personal opinion		% of website individual assessment
Sub-Categories	1	2	3	4	5	6	7	8	9	10	11	
Respondent1	48	53	57	55	72	40	40	20	52	65	40	54
Respondent2	80	60	57	45	60	40	44	24	76	50	40	58.1
Respondent3	52	33	54	40	44	60	52	24	52	50	40	48.8
Respondent4	52	60	49	50	40	60	60	16	76	45	40	52.6
Respondent5	48	47	49	45	40	40	48	16	64	30	40	46
Respondent6	40	53	29	70	44	60	68	8	52	55	60	48.8

Respondent7	76	73	80	70	76	80	80	32	68	80	70	75.8
Respondent8	68	87	77	75	76	40	52	20	76	55	70	68.8
Respondent9	80	67	86	80	80	80	80	32	88	90	80	81.9
Respondent10	68	60	69	55	80	40	32	16	84	80	30	62.8
Respondent11	96	73	94	100	92	100	80	40	92	85	80	90.2
Respondent12	40	53	29	70	44	60	68	8	52	55	60	48.8
Respondent13	76	73	86	70	64	40	72	8	68	80	60	70.2
Respondent14	88	87	91	80	96	80	80	32	92	70	70	85.1
Respondent15												
Respondent16												
Average	57	55	57	57	57	51	54	19	62	56	49	55.8

Table (4.6): Results of Categorical Assessment for Experimental Version of Electronic Portal website

Categories	% of Presented Information	% of Functionality of the E-service	% of User's personal opinion
Respondent1	45	53	57
Respondent2	61	59	47
Respondent3	47	51	47
Respondent4	52	57	43
Respondent5	47	49	33
Respondent6	44	51	57
Respondent7	76	76	77
Respondent8	76	64	60
Respondent9	80	82	87
Respondent10	64	61	63
Respondent11	93	90	83
Respondent12	44	51	57
Respondent13	78	61	73
Respondent14	87	88	70
Respondent15			
Respondent16			

The following table illustrates and give general evaluation of the assessment result. After getting the average of the responders results, the Traffic Police website rated 53.6%, 66.5% for Sudanese's Electricity Distribution Company and 55.8% for the Experimental version of the Sudanese Electronic Portal. According to the international standers it's not a sufficient. Two expert respondents refused to fill the questionnaire for Traffic Police & the Experimental version of the Sudanese Electronic Portal; because in their opinion these websites follow no design structure.

The following table simplify the individuals and categorical result by showing the number of participants in each different percentage scale. The majority of the participants in Traffic Police ranked the website between 50%-60%, Sudanese's Electricity Distribution Company ranked 70%-80% and 40%-50% for Experimental version of the Sudanese Electronic Portal.

Table (4.6): summarization of individual participant's number in each percentage scale

	30-40	40-50	50-60	60-70	70-80	80-90	90-100
Individual Assessment							
Website1		2	6	2	3	1	
Website2		2	3	5	4	2	
Website3		4	3	2	2	2	

The second table shows the assessment of the participants based on their categorical assessments, and for the presented information in Traffic Police and Sudanese's Electricity Distribution Company was sufficient to some extent, but for Experimental version of the Sudanese Electronic Portal there was a lack of information.

The functionality of e-service was an issue in all three websites, because some services were hard to understand, incomplete and not functioning well with some errors in the final results, but this issues were at their minimum rate in Sudanese's Electricity Distribution Company.

Finally, as listed in the model the user's personal opinion have a relation to the responsiveness of governmental website and the presented information that's why most of the people were not happy about their experience in all three websites.

Table (4.6): summarization categorical participant's number in each percentage scale

Categorical Assessment

	30-40	40-50	50-60	60-70	70-80	80-90	90-100
Website1 (Traffic Police)							
Presented Information		2	5	2	4	1	
Functionality of the E-service		4	3	2	4	1	
User's personal opinion	3	2	5	1	3		
Website2 (Sudanese's Electricity Distribution Company)							
Presented Information		2	3	3	4	3	1
Functionality of the E-service		2	4	3	2	5	
User's personal opinion	3	2		3	7	1	
Website3 (Experimental Version of Electronic Portal website)							
Presented Information		5	1	2	3	2	1
Functionality of the E-service		1	6	3	1	2	1
User's personal opinion	1	3	3	2	3	2	

CHAPTER 5

5. Conclusions and Recommendations

5.1 Conclusion

The final results from this research shows that, the governmental e-service designed without any consideration to their intended users and using approaches are not suitable needs. The major problems faced the participant's while interacting with Traffic Police website are lack of the presented information, the presented information's are not related to E-service functionality, while moving back and forth between webpages; all respondent's reflected that there is no consistency for the representation and design structures with absence of feedback mechanisms. For the service quality, the users found that the service are usable, their results are accurate and produced in adequate time. However, the design if the naming of service is not clear and ambiguous and how its function compatible for people with disabilities. in Sudanese's Electricity Distribution Company, the results showed that the quality of the presented information is good and accurate, clear and easy to be understood by the users but it's not updated or up to date, expert respondent's reflected that there is no consistency for the representation and design structures nor standards, all hyperlinks are working with existence related information's to the hovered hyperlinks; but the Intellectual state don't change in some hyperlinks while moving between website pages, the navigations are not that easy to observe and the sensitive information are visible after the users session ends. Also, there is not a clear language consistency in website because in the same presented information there are some lines in Arabic and others in English however, all respondents reflected that the services are not usable nor understandable. And, in Experiment version of the Sudanese Electronic Portal, the results showed that the presented information, at the time the E-services are not functioning and there is no consistency for the representation and design structures nor standards, the navigations are not that easy to observe and the sensitive information are visible after the user's session ends. After analyzing the results, the websites were ranked according to the international standards, the Traffic Police website rated 53.6%, 66.5% for Sudanese's Electricity Distribution Company and 55.8% for the Experimental version of the Sudanese Electronic Portal. Hopefully, this research might help the designers in designing e-service and websites, better for the users and helping them to understand the importance of involving end user during design phase.

5.2 Recommendation

This is extremely serious research on the government electronic services. I wish the government in my beloved country and people to read and assimilate this research project. In addition, to improve the quality of the governmental e-service:

- Assessing the quality of the e-service from the organization side as listed in the model.
- To use this model in developing future e-service to assure quality before and while development process, furthermore, assure its compatibility with its intended users.

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Appendix (A): The Proposed Evaluation Model Questionnaire

Basic Information		Answer Below
Gender		
Age		

1. Regarding the presented information:

1	The Context of the Information

	Strongly Agree	Disagree	Disagree	Neutral	Agree	Strongly
	0		1	2	3	4

1.1.1	The provided information in the website is complete
1.1.2	Enough contact information is provided
1.2	The provided information is up to date
1.3	Provided information clear and easy to understand
1.4	Intellectual state of the user is changed positively after reading the information's

2	The Intrinsic of the Information

	Strongly Agree	Disagree	Disagree	Neutral	Agree	Strongly
	0		1	2	3	4

2.1.1	There is no inaccurate information and grammatical or spelling errors	
2.1.2	Contain no broken hyperlinks	
2.2	Presented information are relevant to e-services function and hyperlinks	

3	**The Representational of the Information**	Strongly Agree	Disagree	Disagree	Neutral	Agree	Strongly
		0		1	2	3	4
3.1	Design of every web page is consistent						
3.2	Web site is not too large and not crowded						
3.3.1	Use of fonts, colors or graphics is proper						
3.3.2	Proper use of language/style						
3.3.3	Style consistency						
3.3.4	Color consistency						
3.4	the individual website and its content easy to read and easy to understand						

4	**The Accessibility of the Information**	Strongly Agree	Disagree	Disagree	Neutral	Agree	Strongly
		0		1	2	3	4
4.1.1.1	Exists an enough navigation mechanisms such as (hyperlinks, buttons, any sign clarify the next step)						
4.1.1.2	navigation mechanisms Easy to observe						
4.1.2	website information structured in logical units						

4.2	Sensitive information not visible or accessible after the end of the session	

2. Regarding the use and functionality of the E-Service

5	**The Usability of the E-service**	Strongly Disagree Agree	Disagree	Neutral	Agree	Strongly Agree
		0	1	2	3	4
5.1.1	Services simple, easy and effortless to use					
5.1.2	Recover from mistakes quickly and easily.					
5.2.1	information displayed in plain, simple and concise text					
5.2.2	easy to read from normal viewing distances					
5.3	Exist an Interactive feedback between users and the organization (messages, e-mail or phones)					

6	**The Performance of the E-service**	Strongly Disagree Agree	Disagree	Neutral	Agree	Strongly Agree
		0	1	2	3	4
6.1	Service performed in a suitable time without no delay and no breaks.					

7	**The Reliability of the E-service**	Strongly Disagree Agree	Disagree	Neutral	Agree	Strongly Agree
		0	1	2	3	4

7.1	Service performed correctly from the first time.	
7.2	Webpages are available 24/7	
7.3.1	people with disabilities can perceive, understand, navigate, and interact with the site	
7.3.2	high speed of page loading	
7.3.3	Access to content is simple	

8	The User Trust in the E-services	Strongly Agree	Disagree	Disagree	Neutral	Agree	Strongly Agree
		0		1	2	3	4
8.1	can you provide your personal information with confidence						
8.2	can you provide your financial information and bank account information with confidence						

9	The Naming Familiarity of the E-service	Strongly Agree	Disagree	Disagree	Neutral	Agree	Strongly Agree
		0		1	2	3	4
9.1.1	Service name clear						
9.1.2	Service name reflects its function						
9.1.3	Services name doesn't contain Punctuation marks						
9.2	Services name understandable and readable to the user						
9.3	Content of the website page appeared in one unified language						

3. Regarding the personal opinion of the user:

10	**The Usability of the E-service**

		Strongly Agree	Disagree	Disagree	Neutral	Agree	Strongly
		0	1	2	3	4
10.1	the navigation from page to page is simple					
10.2	other languages are supported and easy to divert to					
10.3	presented media help in understanding of the e-service and its content					
10.4	the website design is attractive					

11	**The Responsiveness of the E-government site**

		Strongly Agree	Disagree	Disagree	Neutral	Agree	Strongly
		0	1	2	3	4
11.1	Exists a responses to user requests by any provided mean					
11.2	The encountered problems are quickly resolved					

Appendix (B): Traffic Police E-service Webpage

Appendix (C): The Traffic Police E-service Request Webpage

Appendix (D): The Traffic Police E-service Result Webpage

Appendix (E): Sudanese's Electricity Distribution Company E-service webpage

Appendix (F): Sudanese's Electricity Distribution Company E-service Request Webpage

Appendix (G): Sudanese's Electricity Distribution Company Home Page

Appendix (H): Sudanese's Electricity Distribution Company E-service's List Webpage