

# **Comparing Usability Standards for Arabic and English**

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## **Abstract**

Users from all over the globe are attracted and use the World Wide Web and the websites are a new perspective of a truly global medium of communication. All users regardless of their background and origin should be able to experience the web with equal results in terms of content impact. Although most websites are in English today, but there are non-English speaking people living and working around especially in the Middle East. Therefore, the web should be easily enough to be used, accessed and understood by all users. The purpose of this research was to compare usability standards for Arabic and English websites. Dubai Municipality website was considered as a study case. The research for this paper included an extensive review of current literature on usability definitions, characteristics and benefits associated with usability, in addition to the usability criteria and cultural differences. The literature review also included a detailed description about the Usability Evaluation Methods, both the Inspection and Testing methods.

Based on the review the usability criteria were determined and the Thinking Aloud testing method was selected as the usability technique for the research in addition to questionnaire. A total number of thirty participants, with defined user profile, were selected to carry out the experiment. The experiment tasks were based on eight hypotheses which were defined and tested. The experiment included ten scenarios or “real-life” tasks. On the other hand, the questionnaire subjects were based on identifying user profile, supporting experiment questions, website navigation, presentation layer, text size and overall quality.

After analyzing the usability test and questionnaire, the major findings indicate that English is more practical than Arabic. Where users are more confident browsing the English version, which means that English website is more usable than Arabic. The recommendations on the factors which caused the Arabic website to be less usable than English such as content translation, text size, etc has been identified and steps on how to make the Arabic more usable has been recommended.

**Keywords:** usability, criteria, cultural markers, localization, Arabic

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# **Chapter One**

## **Introduction and Problem Statement**

The WWW has become an integral part in our daily life where most companies, organizations, schools and universities have their own websites. More information is made available on the Web every day and the number of users is so large and indeed expanding. The Web has become “ubiquitous” in much of our society.

In the early 1990s, the Web was first introduced to the public and the primary concern was to make sure that the technological infrastructure worked. Now, the infrastructure has been stabilised, the challenge is to design websites that meet the needs of the people who use them. These people, known as users, are company’s customers or employees, organization members, school students or faculty, or people simply seeking information. All websites therefore should ensure that all users with various technologies, ages, computer knowledge, and disabilities have an equally enjoyable experience (Lazar, 2005). A site, especially bilingual, that is easy to use, loads quickly and allows tasks to be completed without frustration is all what satisfies a user.

Most of the difficulties that users experience in websites can be attributed to poor information architecture; the grouping of information into categories and the addition of navigational elements over this information structure (Rosenfeld and Morville, 1998). Despite the abundance of design recommendations and guidelines for building a usable website, web site usability continues to be a pressing interaction issue (Ivory, 2000). Website usability is getting even more critical as the number of sites grows exponentially and the number of users increases dramatically.

The usability of a website is so important that it can influence the amount of sales, because users are unwilling to read web pages with low usability, such as having pages that are hard to operate or understand, or pages that react differently from expectations (Goto and Cotler, 2002). To create easy-to-use web pages, an evaluation of usability is required. Web usability evaluation is performed to mainly discover problems on a website and designers consider a re-design about discovered problems (Nakamichi, Shima., Sakai, and Matsumoto, 2006).

Moreover, in early 2001, approximately 80% of web content is in English, but only 45% of web surfers have English as their first language. Most of the content on the web today is English, but the majority of the Earth people speak languages other than English. To reach a wider audience, websites should be multilingual, by providing the right content and structure (Huang and Tilley, 2001).

## **1.1 Problem statement**

The problem statement of the research is to assess and compare usability standards for Arabic and English. The assessment will be done on a Government Department website, Dubai Municipality. Dubai Municipality website is a bilingual site and is visited by large number of visitors. As will be demonstrated through the literature review, usability has a big role in conquest of any website.

Overall, this research will use the usability evaluation methods, usability criteria and usability guidelines appropriate for bilingual sites to assess English and Arabic web pages. The reason for exploring Arabic is because it is the official language of the United Arab Emirates and is widely used where Arabic is one of the six official languages at the United Nations (Nations 2002). In addition, it has a different writing direction with totally different script.

## **1.2 Aims and objectives**

The aim of the research is to evaluate usability standards for Arabic and English, undertaking Dubai Municipality bilingual (Arabic and English) website as a case; to identify which website version is more usable and to verify the gaps and areas of improvements between Arabic and English and to make the website is suitable for different audiences and make them user-focused.

Due to the complexity and diversity of government functions and structure, and dozens of website evaluation criteria available with hundreds of website features and elements, Dubai Municipality website <http://www.dm.gov.ae> will be evaluated against a set of usability guidelines that will be defined in this research. The evaluation will be based on success measures which will be identified through the literature review. Therefore, the research objectives are as follows:

1. examine the universal accepted guidelines for usability
2. Analyze Dubai Municipality e-government website for usability
3. Identify usability factors that are being done well and those that are not
4. Study the effect of bilingual websites and usability through usability tests

Following the criteria development, and selection of the evaluation method and experiment design, usability testing with a total number of thirty bilingual users will be performed. The usability testing outcome will be validated using hypothesis testing. Finally the researcher will discuss the results and suggest recommendations on improving Dubai Municipality website.

### **1.3 Scope and outline**

Chapter one contains the Introduction, which describes the problem statement and highlights the research goals and rationale. Next is the literature review chapter. The research methodology is introduced next followed by the results and data analysis chapter and finally the conclusion.

Chapter two gives a general overview about the concept of usability. The importance of usability, usability definition, and the importance of usability and general characteristics are also discussed. It also discusses the usability criteria and cultural markers. The discussion of these guidelines focuses particularly on the web page aspects under scrutiny in the rest of the dissertation. In addition, the chapter sheds light on the Usability Evaluation Methods and presents several usability evaluation techniques.

Chapter three discussed the research methodology. It discussed the approach selected and data required to be collected from the usability test and how they will be analyzed. It also analyzes the questions used in the experiment and the testing environment. Moreover, it illustrates the interface criteria with a number of hypotheses.

Chapter four is related to the data analysis. It analyses the gathered data from the usability experiment and questionnaire.

Chapter five gives a comprehensive summary of the research, documents the final conclusion and the concluding remarks.

## **Chapter Two**

### **Literature Review**

The previous chapter contains the Introduction, which describes the problem statement and highlights the research goals and rationale. Chapter two gives a general overview about the concept of usability. The importance of usability, usability definition, and the importance of usability and general characteristics are also discussed. It also discusses the usability criteria and cultural markers. The discussion of these guidelines focuses particularly on the web page aspects under scrutiny in the rest of the dissertation. In addition, the chapter sheds light on the Usability Evaluation Methods and presents several usability evaluation techniques.

## **2 About Usability**

The electronic environment of the World Wide Web, as a medium for international communication, evolves daily (Barber and Badre, 1998) and consumers in different countries with different ethnic origins use the Internet for different purposes (Chau, Cole, Massey, Montoya-Weiss, and O'Keefe, 2002.). Nielsen (2006), expected that about hundred million sites on the Web in January 2002, where users have more choices than ever and all the competitors in the world are a mouse-click away. Certainly, many users had and are still having frustrating experiences using websites or software (Juristo and Windl, 2001). Therefore, any website or software designed for people to use should be easy to learn and remember, effective and pleasant to use (Molich and Nielsen, 1990).

“Usability is not an abstract idea” (Juristo and Windl, 2001), when usability concept is introduced to an organization, it is possible to cost-justify the investment, reduce development time, increase sales, improve user productivity, and reduce support and maintenance costs (Juristo and Windl, 2001). As IBM has stated, usability “makes business effective. It makes business efficient. It makes business sense” (IBM, 2001).

The very first usage of the word usability, according to Shackel (1984), was given in the Oxford English Dictionary is: “It is not the utility, but the usability of a thing which is in question”. According to Shackel (1986), “the definition of usability was

probably first attempted by Miller in 1971 in terms of measures for 'ease of use'. Miller identified several criteria to measure ease of use; length of learning time, number of errors, and exasperation responses. In the second half of the seventies, the term 'user-friendly' became a buzzword. It was generally disliked in the academic world (Stevens, 1983).

## **2.1 Usability definition**

One definition of usability is quality in use (Juristo and Windl, 2001). Usability is also defined as “a quality attributes relating to how easy something is to use. More specifically, it refers to how quickly people can learn to use something, how efficient they are while using it, how memorable is it, how error-prone is it, and how much users like using it” (Nielsen and Loranger, 2006). In addition, usability is most often defined as the ease of use and acceptability of a system for a particular class of users carrying out specific tasks in a specific environment. The ease of use affects the users' performance and their satisfaction, while acceptability affects whether the product is used (Bevan, 1991). In simple terms, usability reflects how easy the software is to learn and use, how productively users will be able to work and how much support users will need (Juristo and Windl, 2001).

Jakob Nielsen (2003), defined usability as a quality attribute that assesses how easy user interfaces are to use. The word “usability” also refers to methods for improving ease-of-use during the design process. Usability is defined by five quality components:

- Learnability: How easy is it for users to accomplish basic tasks the first time they encounter the design?
- Efficiency: Once users have learned the design, how quickly can they perform tasks?
- Memorability: When users return to the design after a period of not using it, how easily can they re-establish proficiency?
- Errors: How many errors do users make, how severe are these errors, and how easily can they recover from the errors?
- Satisfaction: How pleasant is it to use the design?



The International Standard Organization (ISO, 1991) 9241 Part 11 defines usability “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”. In brief, the definition means that usability requirements are based on measures of users performing tasks with the product to be developed.

A more recent variation has been put forward by Quesenbery (2003). Quesenbery describes five dimensions of usability, called as the 5Es:

- Effective: How completely and accurately the work or experience is completed or goals reached
- Efficient: How quickly this work can be completed
- Engaging: How well the interface draws the user into the interaction and how pleasant and satisfying it is to use
- Error tolerant: How well the product prevents errors and can help the user recover from mistakes that do occur
- Easy to learn: How well the product supports both the initial orientation and continued learning throughout the complete lifetime of use

## **2.2 Usability characteristics**

It is generally accepted that the following five essential usability characteristics should be part of any software project: learnability, so the user can rapidly begin working with the system; efficiency, enabling a user who has learned the system to attain a high level of productivity; memorability, allowing the casual user to return to the system after a period of non-use without having to relearn everything; low error rate, so users make fewer and easily rectifiable errors while using the system, and no catastrophic errors occur; and satisfaction, making the system pleasant to use. There are trade-offs among these criteria, and some are more important than others, although this ranking depends on the situation. For example, long-term efficiency may be sufficiently important for developers to be willing to sacrifice rapid learnability.

### **2.2.1 The importance of usability in government websites**

People from different backgrounds, age groups, and different technology experience level give a variety of reasons for contacting government, including conducting transactions, looking for answers to specific questions, seeking help with a specific problem, or expressing an opinion. Thus, Government websites are being used more frequently and by more citizens than ever before.

Therefore the fact that user is not being able to find the right information must be avoided and users struggling to find the information they need on the website needs to be resolved. This can lead to waste of time, reduce productivity, increase frustration, and loss of repeat visits and money (Donahue, 2001).

### **2.2.2 Benefits associated with usability**

There are many critical benefits associated with usability, such as:

- Increased revenues
- Increased return on investment
- Reduced support costs
- Reduced development costs

## **2.3 Usability Criteria**

“Without measurable usability specifications, there is no way to determine the usability needs of a product or to measure whether or not the finished product fulfils those needs. If we cannot measure usability, we cannot have usability engineering.” (Jokela, Koivumaa, Pirkola, Salminen, and Kantola, 2006). A system or user interface can have adequate functionality, but inadequate usability because it is too difficult to use. The purpose of the usability requirements is to guard against that (Lauesen and Younessi, 1988).

Therefore, the usability criteria is the criteria guaranteeing the highest possible level of usability (Jordan, 1998), one ergonomic requirement for control concepts is that they must meet usability criteria (Kurt, 2002). Surprisingly, the literature has very little to say about usability requirements and rarely provides real-life examples. The usability requirements must be tangible so that it would be able to verify and trace

them. The usability requirements must also be complete so that if they are fulfilled, it is sure that the usability intended has been achieved (Lauesen and Younessi, 1988).

Indeed, having a general measure of usability will help having a better picture of the type of users who will be advantaged or disadvantaged by the user interface, or how to modify it to make it more or less appropriate to those types of user. Therefore, in order to obtain measures of usability it is essential to identify the user profile of the system and define the usability factors through a suitable method.

### **2.3.1 Usability and cultural differences**

Web pages that serve international users must be produced in multiple languages (Russo and Boor, 1993). It is not enough to localize a web page by translating the content without localizing the interface design layout, localization aspects must be addressed when developing multilingual web pages. The first is the language translation, measurements, currency, addresses and so on, while the second is the layout of the interface design which reflects cultural criteria (Sun, 2001).

In order to create usable multilingual web pages that are effective, efficient and satisfy the users' needs, Sun (2001) conducted user testing on three international communities from China, Germany and Brazil. Sun (2001) focused his study on examining the four major cultural categories of language, visuals, colours and page layout. The first category addresses the surface level of the localization, while the other three categories are related to the secondary localization aspects. The main aim of his study was to learn how the four cultural categories might affect web usability. He interviewed the target users about their experiences using the localised version of both the Lotus and Adobe web pages. It appeared that different users tried to apply their own cultural preferences to evaluate the design of the web pages. For instance, the Brazilians like to see vibrant colours and lively pictures on their local web pages, while the Chinese prefer to see one of the common Chinese flowers on their web pages. The Germans like the links in the navigation bar to be alphabetically organized. The main implication from Sun's study is that consideration of the cultural categories can increase the web page's usability.

As the previous study show that culture plays an important role to determine the usability guidelines of any web page. Thus, culture is important in identifying information technology specifications and it has effects on both the use and the interface (Marcus and Gould, 2000). Therefore, this research will use the usability evaluation methods to establish usability guidelines appropriate for assessing Arabic web pages.

## **2.4 Cultural Markers**

The electronic environment of the World Wide Web evolves daily, increasing the likelihood of international participants and transactions (Barber and Badre, 1998). In addition, consumers in different countries with different ethnic groups use the Internet for different purposes; it is required to design usable web interfaces that can be easily accessed and understood by international audiences (Sun, 2001). As a result, no longer can issues of culture and usability remain separate in design for the World Wide Web (Barber and Badre, 1998). Therefore, it is important to understand the concept of localization.

In the field of technical communication, localization is “the act of modifying an information product to make it usable and accommodate the target markets” (Sun, 2001). As discussed by Sun (2001), the localization process is carried out on two sub-levels: first is adjusting the features of the product including translation, punctuation, dates, weights, measurements, addresses, currency, and so on to mirror the conventions and needs of the target audience on the surface level. Second is adjusting the aesthetic appeal, images, colours, logic, functionality and communication patterns to conform to the target audience on the culture level.

Localization is so much more than translating the verbal component in the website. it involves translating content and adapting it to local cultures, changing not only content, but also graphics, colours, symbols, time and date formats, and so on (Bacak, 2000). As Hall (1990) suggests that up to 90% of all communication is conveyed by means other than language, thus only translating language is never enough.

However, considering the complex interplay of user, business, marketing, and engineering requirements in the process of localization, it is never easy to launch a culturally-competent web user interface that meets the needs of the majority of users from diverse cultural backgrounds. The localization requires a strategy for designing usable web interfaces that can be easily accessed and understood by international audiences (Barber and Badre, 1998). Hence, the notion of cultural markers was introduced into multilingual web interfaces.

To identify localization elements and generalize them to cultural markers that are specific to a given culture, or influenced by gene, it is important to understand the concept of cultural markers. Cultural markers were coined by Barber and Badre (1998) as the “interface design elements and features that are prevalent, and possibly preferred, within a particular cultural group”. Such markers signify a cultural affiliation. A cultural marker, such as a national symbol, colour, or spatial organization, for example, denotes a conventionalized use of the feature in the website, not an anomalous feature that occurs. To achieve cultural sensitivity, many multilingual websites use cultural markers to close the distance between local users and corporations, and localize websites on the cultural level. Examples CNN uses cultural icons (such as national flags) and cues to attract a wider pool of visitors to its site.

Cultural markers affect web usability; Barber and Badre (1998) define this combination as “culturability”, a new dimension in the web usability matrix. Culturability, emphasizes the importance of the relationship between culture and usability in the World Wide Web. They also stated that cultural markers are a significant part of our environment and we expect our work to demonstrate that the presence and/or absence of cultural markers in international web sites can affect learning and performance in an electronic environment.

A usability inspection has been made on the use of cultural markers on several hundred websites. Barber and Badre (1998) have identified localization elements and generalized the cultural markers (Table 1) that are specific to a given culture, and/or, perhaps influenced by gene/knowledge domain which refers to the type of information being presented on the Web and describes large categories of sites as

such as news, media and business. They have hypothesized that the incorporation of cultural markers in Web design will improve the usability of the site for local users for which the website was designed. They were able to identify these cultural markers using a three stage process. The first stage involved categorizing hundreds of web sites by country, genre, and language. For the second stage, they performed a detailed inspection of the collected web sites and identified a list of prevalent design elements. Lastly, the cultural markers were checked for emergent patterns within countries, genres, and across regions (Sheppard and Scholtz, 1999).

<b>HTML Specific</b>	<b>Icons/Metaphors</b>	<b>Colours</b>	<b>Specific Colours</b>	<b>Grouping</b>
# of lines # of centres # of images # of links # of internal links # of external links link colour visited link colour horizontal bars tables bold italics underlines frames audio video background image background colour text colour	international local clocks newspapers books pages homes stamps envelopes musical notes paperclips thumbtacks other	red blue green purple pink black yellow gold teal white multiple	flag graphics pictures borders background	symmetrical asymmetrical proximity alignment boundary enclosure connection
<b>Flag</b>	<b>Language</b>	<b>Geography</b>	<b>Orientation</b>	<b>Sound</b>
native foreign multiple	native foreign multiple	maps outline globe	centred left-right right-left	music voice
<b>Font</b>	<b>Links</b>	<b>Regional</b>	<b>Shapes</b>	<b>Architecture</b>
cursive italics bold size shading	colour embedded stand alone internal external	foliage animals landscape water desert	squares circles triangles rectangles lines arrows	state building house church office cityscape

**Table 2-1: Different Categories of Cultural Markers (Barber and Badre, 1998)**

To realize the importance of cultural markers when applied to Web design, colour may impact the user's expectations about navigation, links, and content as well as overall satisfaction. For example, an American bank using a Web site to promote services for French investors may want to avoid the use of the colour green, which is associated with criminality. On the other hand, the American bank may want to use green to attract Egyptian and Middle Eastern investor, as green has a positive connotation for them. The colour-culture chart below illustrates some of the different meanings (Boor and Russo, 1993).

<b>Colour</b>	<b>China</b>	<b>Japan</b>	<b>Egypt</b>	<b>France</b>	<b>United States</b>
<b>Red</b>	Happiness	Anger Danger	Death	Aristocracy	Danger Stop
<b>Blue</b>	Heavens Clouds	Villainy	Virtue Faith Truth	Freedom Peace	Masculine
<b>Green</b>	Ming Dynasty Heavens	Future Youth Energy	Fertility Strength	Criminality	Safety Go
<b>Yellow</b>	Birth Wealth Power	Grace Nobility	Happiness Prosperity	Temporary	Cowardice Temporary
<b>White</b>	Death Purity	Death	Joy	Neutrality	Purity

**Table 2-2: Colour-Culture Chart (Boor and Russo, 1993)**

Barber and Badre (1998) results from inspecting several hundred Web sites to identify culture and genre design elements is as follows:

- A commonly used cultural icon, the flag, is exploited in government sites. The flag serves as a symbol of immediate national, helping the user to quickly identify the locale and origin of the site. The flag is also used to denote alternative language choices, which impacts usability in that the user may identify and choose

an alternate language much more quickly and efficiently, as opposed to when the choices are textual.

- Some cultural markers may be particular to a given region, especially when the regions shares similarities in language. Middle Eastern sites in Arabic and Hebrew have a high frequency of orienting text, links, and graphics from right-to-left, as opposed to centring or left-to-right. The spatial orientation of presented information has immediate implications for usability. While the left side of a web site might be the first focus of attention for an American, the right side would be the initial focus for a Middle Easterner; thus important information should be displayed accordingly.
- Cultural markers may be particular to a given country and employed across genres. Brazil has many sites that are particularly colourful with one colour being overly dominant. This is an inactive of a cultural preference for many colours.
- Cultural markers can be cultural and/or genre specific and can then be used to implement culturability guidelines. It is also important to note the interplay between culture and genre. Lebanon, for example, has the culture markers light graphics and more text based. The travel genre has a high frequency of heavy graphics, but a travel site in Lebanon is dominated by the culture marker; thus Lebanon travel sites are still more oriented rather than graphically oriented.

#### **2.4.1 A study: Cultural markers for the Middle Eastern Web sites**

An interesting study on cultural markers has been done by Sheppard and Scholtz (1999). They were interested in devising experiments that whether a web site is more preferred by subjects when its design is reflective of their culture, which is a site design that contains their cultural markers.

The experimental process was to determine whether cultural markers can directly impact user performance. The approach that they used was a six-step process and selected a community web site that contained cultural markers that could easily be constructed between the North American culture and the Middle Eastern culture.



The cultural markers used in the Middle Eastern site were: fancy text fonts, green colour backgrounds and such spatial orientations as the placement of menu columns on the right.

The cultural markers that were used in this case include:

- Green background
- Green borders
- Green text for links
- High volumes of text
- Low volume of graphics
- Text lines of 70 characters
- Text oriented right to left
- Bullets positioned on the right
- Links without underlying, and;
- Colours used for highlighting instead of bolding

#### **2.4.2 Determining usability attributes**

Recent developments require that the user interface is easy to use, intuitive, easy to learn, adaptable, etc. the International Standards Organization proposes that (1993): “The usability of a product is the degree to which specific users can achieve specific goals within a particular environment effectively, efficiently, comfortably, and in an acceptable manner” (Hill, Crum and Stockman, 2000).

In addition, the main reference of usability is probably the definition of usability in ISO 9241-11 (1998): “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”. In brief, the definition means that usability requirements are based on measures of users performing tasks with the product to be developed.

#### **2.4.3 Sources of usability criteria**

There are several sources of usability criteria. The main criterion is developed from the organizational goals. Next are pre-existing set of guidelines and heuristics,

guidelines that could be congregated from research, convention and consensus of experts. In addition to the legal requirements which has been defined as the accessibility guidelines. Empirical usability is a source for usability criteria which evaluates for each major kind of use, user and task analysis (Becker, 2002).

The strategic goal of the organization is one of the ways which help in understanding whether the proposed usability is good or bad. The strategic goals include medical tracking, information dissemination, entertainment, gaming, education, financial, and sales of goods and services. Each of these strategic goals is targeting a particular user group, which can be profiled in terms of individual and collective characteristics. In addition, the strategic goals drive the computer technology requirements in terms of network access speed, screen size, browser type and version, and operating system (Becker, 2002).

Dubai Municipality organizational goals will be defined and derived from the mission and corporate strategy of the department. An interview with Dubai Municipality representative will be conducted in later stages of the research to define these goals.

The computing environment for a local user needs to be understood in terms of potential barriers to Web use. The computing environment includes screen size limitations, not only in terms of older, smaller monitors, but also in terms of newer, tiny screen sizes associated with mobile devices. Those Web sites that are highly animated may be virtually unusable for global regions where computer technology is not state of the art (Becker, 2002).

The computing environment at Dubai Municipality will be studied in order to understand the requirements to view the website and submit an online service.

The first activity is to identify user. Mayhew (1999) discussed that “there is no single best user interface style or approach for any and all types of users”. As described by Mayhew (1999) for the user profile task, it is essential to determine who will use the planned product. After determining who the users are a description of the whole user population in terms of characteristics relevant to user interface design. These characteristics include:

- Psychological characteristics. Example attitude, motivation
- Knowledge and experience. Example typing skills, task experience
- Job and task characteristics. Example frequency of use, task structure
- Physical characteristics. Example colour blindness

Identifying the primary users, primary tasks and context of use as stated by (Theofanos, 2006) can be defined by knowing the users' background: what are their goals, job responsibilities, daily activities/tasks, workflow, time constraints, and schedule. Understanding their computing environment and other applications they use routinely. In addition, knowing what they like and dislike about the current user interface.

User information is the basis for usability requirements, and the data could be gathered through interviews and/or a user profile questionnaire; known as the identify measures. From summarizing the data, a high level conclusion for each significant category of users is drawn regarding the desired subject which maybe a user interface, and document these in a proper documentation format (Mayhew, 1999).

#### **2.4.4 Determining usability criteria**

It has been discussed earlier, in the determining usability attributes section, that determining usability requirements should be a collaborative effort. However, there is no right or wrong guideline as to how this effort should be organized and managed. The existing literature review mainly focuses on describing and exploring the concepts and formats related to the process of gathering usability criteria (Jokela, 2005).

Determining usability requirements can first be based on the definition of usability of which is proposed by ISO 9241-11, which has been referred too earlier in the research.

“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”

Based on the definition of usability from ISO 9241-11, we consider usability requirements as of effectiveness, efficiency and satisfaction of users achieving their goals in the defined contexts of use.

Possibly one of the most detailed guidelines for determining usability requirements is a six-step process by Wixon and Wilson (1997). In their process, relevant usability attributes are determined based on user profile and task analysis. Then the measuring instruments and measures are decided upon and a performance level is set for each attribute. Wixon and Wilson (1997) presented a list of what they term “usability attributes” which are characteristics of an interface. These attributes can be used to categorize and quantify the various facets of an interface’s performance. The attributes proposed by Wixon and Wilson (1997) include:

- Usefulness
- Efficiency
- Memorability
- Advanced feature usage
- Flexibility
- Learn-ability
- Error rates
- First impressions
- Satisfaction or likeability
- Evolvability

On the basis of these categories it is possible to compile a list of measurement criteria for use in usability evaluations. These criteria make it possible to count or measure individual behaviours on the part of the user. Wixon and Wilson (1997) provide the following list of measurement criteria:

- time to complete a task
- number of tasks completed
- number of subtasks completed
- number of errors per unit of time
- time needed to complete a task after a specified period of time away from the system

- time spent recovering from errors versus time spent working productively
- number of steps required to complete a task
- number of negative reactions to interface
- number of times users access documentation or technical support
- number of commands or icons remembered after task completion

Gould and Lewis (1985) state that developing behavioural goals must cover at least three points. Firstly, a description of the intended users must be given and the experimental participants should be agreed upon. Secondly, the tasks to be performed and the circumstances in which they should be performed must be given. The third point of the process is giving the measurement of interest, such as learning time and the criterion values to be achieved for each.

According to Nielsen (1993) usability is associated with five attributes: learnability, efficiency, memorability, error and satisfaction. In usability goal setting, these attributes must be prioritized based on user and task analysis, and then operationalised and expressed in measurable ways. Learnability focuses on the ease of learning. Learnability is measured by selecting individuals who have had no previous experience with the system and measure the time it takes them to reach a specified level of proficiency in using the system. Efficiency focuses on the high level of productivity or effectiveness of an experienced user. Memorability focuses on how easy it is to remember how to use the system. Errors focus on the amount of inaccuracy displayed by users while they are using the system, it also looks at the ease with which the users recover from any errors they make. Satisfaction focuses on how pleasant the system is to use, so that users are subjectively satisfied when using it. Subjective satisfaction is measured by asking the users for their opinions.

Lauesen and Younessi (1988), on the other hand, introduced six styles for usability requirements based on five usability factors; ease of learning, task efficiency, ease of remembering, understandability and subjective satisfaction. The different styles specify and measure these factors more or less directly. The purpose of the usability requirements is to specify the necessary level for each factor.

The heuristics, ten general principles for user interface design, are considered to be web usability factors that are associated with usability testing.

- Visibility of system status
- Match between system and the real world
- User control and freedom
- Consistency and standards
- Error prevention
- Recognition rather than recall
- Flexibility and efficiency of use
- Aesthetic and minimalist design
- Help users recognize, diagnose, and recover from errors
- Help and documentation

Mayhew (1999) introduces a nine-step procedure for setting usability goals. In her procedure qualitative usability goals are first identified and prioritized. Then those qualitative usability goals that are relatively high priority and seem easily quantifiable should be formulated to quantified goals.

Qualitative goals are extremely useful in guiding initial design efforts. The qualitative usability goals might be (Mayhew, 1999):

- The design must support users working in a high-interrupt environment with lots of context information on screen to remind users where they are when they get distracted.
- The design must support very infrequent users of a very complex task. Thus, it must be self-explanatory and easy to learn and remember, incorporating as many business rules as possible and leading users by the hand through the task so they need not remember details of proper procedure between users.

By contrast, quantitative usability goals are objective and measurable and useful as qualitative goals are. Thus, they cannot be used directly as acceptance criteria during usability testing. However, they can serve as acceptance criteria during usability evaluation. The quantitative goals might be (Mayhew, 1999):

- Experienced users (defined as users who have performed the transaction five times in a training session) should take no longer than two minutes on average to transcribe data from a certain paper form to a certain online data entry form.
- Novice user (defined as the first time users) should take no longer than three minutes to fill in a certain online subscription form.

It is noticeable that in the first point, experienced users, an ease-of-use goal has been quantified. In the second, an ease-of-learning goal has been quantified. Ease-of-use goals focus on the use of the product by experienced users who have been trained on how to use the product and use it frequently enough to maintain expert performance. Ease of use is generally defined as the potential speed, efficiency, and flexibility an interface offers to an experienced user.

By contrast, ease of learning goals focus on the use of the product by first time users, users still in the learning process, or users who have been trained but use the product so infrequently that they may forget how to use in between users. Ease of learning is roughly defined as the length and slope of the learning curve for users who have not yet reached expert levels of usage.

Quantitative usability goals, ease-of-use and ease-of-learning, can be formulated as either performance/preference goals or satisfaction goals. Although these types of goals measure subjective reactions rather than objective performance, they are nevertheless quantifiable. Preference is clearly quantifiable as the user makes a choice. Satisfaction can be measured along a scale, for example, a five point scale ranging from not at all satisfied to extremely satisfied.

#### **2.4.5 Web usability for localised websites**

“The experiential and heuristic approaches to web usability studies reflect the technological explosion associated with Web use in such a short time period. Numerous online articles were published based on developer experiences, customer feedback, and economic and marketing data regarding Web use. Most of these articles

focused on web usability guidelines from a US perspective in terms of technological, economic, and cultural considerations. When internationalization was addressed, it typically was in terms of language translation, date, time, currency, and number formats, units of measure, and phone number and addresses formats” (Becker, 2002).

Most content on the web today is in English, but the majority of the earth’s people speak languages other than English, as highlighted by Huanf and Tilley (2001). Dunlap (2000) pointed that 92% of the world’s population live in countries where English is not the native language. Therefore, it is essential for organizations to consider religion, culture and language as well as technological constraints in the development of their websites, especially in a multinational city as Dubai.

Total number of UAE population stood at 4,104,695, Minister of Economy Sheikha Lubna Al Qasimi announced. The figure revealed by the minister sums up the preliminary results of the General Census conducted on 6 December 2005. The Census included all the people (nationals and non-nationals) who are residing in the UAE, at the night of December 6th 2005. Total number of non-nationals is 2,944,159, which is 78.1 % of the total population that were counted in the reference period, and it is 79.9% (3,279,774) of the total UAE population (Emirates News Agency, WAM, 2006). These and a lot of significant statistics were announced by Dubai Municipality's Statistics Centre in a half-yearly bulletin titled "Dubai in Figures" (2006). The figures show that there is a diversity of religion, culture and language and truly illustrates the importance of supporting multiple languages and data content formats of their websites and services, for much of this population English is a second language or unknown.

#### **2.4.6 Usability criteria for localised website**

A web usability assessment model has been developed by Becker (2002) which was a merge between the available heuristics that were too general, the strategic goals, the target market and the computing technology which are the key components of the model. The eleven usability factors in the model, navigation, design standards, personalization, design layout, performance, customer satisfaction, design consistency, reliability, security, information content, and accessibility were extracted



from a compilation of usability guidelines written by practitioners in the field, the National Institute of Standards and Technology (2001), and the IEEE Standard 2001-1999 (1999). Each of the usability factors is briefly described below from an internationalization perspective (Becker & Mottay, 2001) (Becker, 2002).

- **Design Standard:** standardized “look and feel” from any user’s perspective, standard font size, style, and colour. Localised design standards are used to ensure the correct and complete bi-directional layout of information content and Web objects to support international Hebrew and Arabic translated Web sites.
- **Personalization:** personal data such as name, address, phone, and credit card data, and buying preferences. From a localization perspective, it is important to take into account cultural considerations when personalizing a web site. For example, the “first name, middle initial and last name” is one of the formats, but is not necessarily the correct data format for other regions and countries.
- **Design Layout:** the visual presentation of web page content in terms of the positioning of web objects as well as, colours, icons, symbols, font sizes and styles. From a localization perspective, a website design is sensitive to the local culture. The design must take into account text flow and web object layout when native language is bidirectional such as Hebrew or Arabic, and text length increases when converting buttons, labels, and messages from one language to another.
- **Navigation:** the navigational schema in terms of breadth and depth of search paths and traversal mechanisms. If the navigational component of a website does not provide native language support, then global maps, national symbols such as flags, or other visual markers need to be used. For example, a country flag symbol next to the English text associated with each international website.
- **Design Consistency:** the consistent location of web objects within and across pages to provide a common look and feel in terms of the position of the

navigation bar, links, textual information, help, and search mechanisms even when the web page is inverted to support bi-directional languages.

- Customer Service: provides additional mechanisms to enhance the online experience. Online customer service typically offers online chat or email capabilities in order to get timely feedback. Barriers need to be overcome in terms of differences in language, text and data formats, currency, and culture.
- Reliability: is defined in terms of site crashes, downtime, error messages, and consistent response times. In terms of localised websites, the local computing technology and network access capabilities play a critical role in maintaining an acceptable level of reliability.
- Security: is concerned with privacy and limited access to personal information. The same security issues are facing all users in the international online market regarding the misuse and unauthorized distribution of credit card numbers, addresses, phone number, income, and other personal data.
- Performance: is measured in terms of consumer wait time and system response time. There is significant global disparity in terms of network access speed thus impacting the performance of localised websites.
- Information Content: is the correct and complete translation of text into a native language. Complete translation of a website includes all messages, prompts, buttons, and links, help support, and search results. It also includes semantic correctness by ensuring text is not culturally offensive, archaic, or nonsensical when translated from one language to another.
- Accessibility: is in terms of effective web use regardless of visual, physical, and cognitive impairments. From an internationalization perspective, web accessibility is impacted by reading and language comprehension skills of the targeted user.

### **2.4.7 Measurable usability goals**

A number of measurable usability goals needs to be set for every usability test performed. This means measuring how well the usability testing operates in specific defined areas. A measurable usability goal is "the definition of successful usability on the site for a specific set of users doing a specific task" (Usabilit.gov).

There are a set of defined measurable usability goals, the typical usability goals can include (Usabilit.gov and Wikipedia):

a. Time on task

A usability goal can be set for the overall time the user will take to carry out a task on the site. For example, how long it takes people to complete a specific task for example order an item, submit an application form.

b. Accuracy

A usability goal for the accuracy with which the user carries out the task can be set. For example, how many mistakes did people make, number of misunderstanding of information, number of unproductive navigation choices, number of unproductive searches, etc.

c. Overall success

The usability goal must be that users will be successful. If users cannot do their tasks or cannot get answers to their questions on the website, the website is failing those specific users for those specific tasks and questions.

d. Satisfaction

The measurable usability goal must be that users are happy. It is possible to measure the overall satisfaction by measuring the emotional response, for example how does the person feel about the tasks completed, whether the user would recommend the website to a friend.

e. Recall

A usability goal is how much does the person remember after doing the test or after periods on non-use.

On the other hand Van Duyne, Landy and Hong (2002) have further expanded on setting measurable usability design goals and developed a set of goals. Van Duyne, Landy and Hong (2002) pointed out that the goals should come directly from analyzing the business and customer needs. In addition, design principles come from research in human-computer as well as graphic design. This will help reach the goals. Most of the goals and principles which will be listed below will apply whether it is working on the site information architecture, navigation design or graphic design. Some possible design goals include the following:

- Faster task completion
- Successful completion of more tasks
- Greater ease of learning
- Commission of fewer errors
- Greater pleasure or satisfaction
- More fun
- Increased visitor-to-customer conversion rate
- Increased customer repeat visit
- Increased revenue

Studies carried out show that achieving many of the usability and customer experience goals, such as giving a more satisfying experience, have a direct impact on achieving business-related goals such as increased customer visits (Van Duyne, et al. 2002). The key to achieving all of these goals is by testing and measuring.

#### **2.4.8 Selected usability criteria**

The usability criteria for Dubai Municipality website will be divided into two parts. The first measurement is about general usability criteria and the second is the interface criteria.

The general usability criteria are:

1. Time to complete a task
2. Number of tasks completed
3. Number of negative reactions to interface

The Interface criteria which will be used to compare Arabic and English are:

1. Language translation button to the other bilingual site
2. Correct translation of text and all messages into the native language
3. Ease of use
4. Information content
5. Cultural markers
6. Design consistency
7. Navigation

## **2.5 Usability Evaluation Methods**

As discussed in the pervious chapter, there is an increasing interest in computer software and hardware to be easy to learn, easy to use, and more generally, serve as an appropriate tool for the tasks they are applied to. In other words usability is expected. This is the domain of human-computer interaction (HCI). HCI studies the interaction between people (users) and computers where the interaction between users and computers occurs at the user interface which includes both software and hardware (Wikipedia). One of the basic lessons learnt in human-computer interaction is that usability must be considered before prototyping takes place (Holzinger, 2005). Naslund and Lowgren (1998) revealed that more effort has been directed at bringing this knowledge, understanding the interaction between human and computer, to bear in developing systems that would be better for the user. Usability oriented systems development is now one of the main directions of HCI to facilitate and ensure the development of more usable systems. In order to achieve a good usability standard, computers professionals need robust, easy to use usability evaluation methods.

This chapter provides an overview of the main usability evaluation methods. The goals of the chapter are to provide detailed description of the methods which are Heuristic Evaluation, Cognitive Walkthrough and Thinking Aloud.

### **2.5.1 Usability Evaluation Techniques**

Computer professionals need robust, easy-to-use usability evaluation methods (UEM) to help them systematically improve the usability of computer artifacts. The term usability evaluation method refers to “any method or technique used to perform formative usability evaluation (i.e. usability evaluation or testing to improve usability)

of an interaction design at any stage of its development” (Hartson, Andre and Williges, 2003).

The essential common characteristic of UEM is that every UEM, when applied to an interaction design, produces a list of potential usability problems as its output. Some UEM have additional functionality, such as the ability to help write usability problem reports, to classify usability problems by type, to map problems to causative features in the design, or to offer redesign suggestions (Hartson, Andre and Williges, 2003).

A person using a UEM to evaluate usability of an interaction design is called an evaluator; a person using a usability inspection method is often called an inspector (Hartson, Andre and Williges, 2003).

To ensure the project has the essential usability characteristics, the usability inspection methods are divided into inspection methods (without end users) and test methods (with end users) (Holzinger, 2005).

### **2.5.1.1 Usability Inspection Methods**

Usability inspection “is the generic name for a set of methods based on having evaluators inspect or examine usability-related aspects of a user interface. Usability inspectors can be usability specialists, but they can also be software development consultants with special expertise, end users with content or task knowledge, or other types of professionals. The different inspection methods have slightly different goals, but normally, usability inspection is intended as a way of evaluating user interface designs. In usability inspection, the evaluation of the user interface is based in the considered judgment of the inspectors. The individual inspection methods vary as to how this judgment is derived and on what evaluation criteria inspectors are expected to base their judgments” (Nielsen and Mack, 1994).

Usability inspection cannot be used as a substitute for user testing methods. Its purpose is to provide practical suggestions in usability issues for interfaces during the early design stage where time and conditions are not adequate for end-user testing. There are many usability inspection methods available such as Heuristic Evaluation, Cognitive Walkthrough and Thinking Aloud (Liu, Osvalder and Dahlman, 2005).

Each method has its own advantages and disadvantages. Hence, finding a suitable usability inspection method when a user interface design has been generated and its usability for users needs to be evaluated is an important task.

Usability evaluation methods can be divided into two broad classes: empirical, in which the design is tested with representative users, and analytical, where the usability of the design is assessed without users, as found in Dumas and Redish (1993). The analytical methods are frequently called usability inspection. It is generally held that two classes of methods are complementary; they have different strengths and weaknesses, and typical development methodologies recommend the use of both (Naslund and Lowgren, 1999).

The basic idea of usability inspection methods is to predict the usability of an existing user interface design, using well-known methods that will be discussed later in this chapter. The existing knowledge about the usability inspection methods shares a set of assumptions in usability development. The assumptions are as follows (Naslund and Lowgren, 1999):

Assumption 1: Identifying possible problems is what counts. The more usability problems that can be identified with the help of the method, the better is the method. In addition, the judged severity of the problem, the possibilities of early identification, and the cost of identification are taken into account. Once the usability problems are found, they are communicated to the design team to make the necessary changes.

Assumption 2: Exploration and experimentation are important. Usability inspection can be used also in early design stages. The iterative shift between design and evaluation is initially to be used for exploration of general alternatives. Such a process leads to a better understanding of the design as well as the consequences of the alternatives.

Assumption 3: The process is convergent, resulting in a usable system. The predicted usability problems reported to the designers are supposed to lead to design revisions. Gradually, the design is to converge towards a system with adequate usability.

### **2.5.1.2 Types of Inspection Methods**

Usability inspection is the generic term for several methods, including at least the following eight (Nielsen and Mack, 1994):

- **Heuristic Evaluation.** The most informal method and involves having usability specialists judge whether each dialogue element conforms to established usability principles. These principles are normally referred to as the heuristics and give the method its name.
- **Guideline Reviews** are inspections where an interface is checked for conformance with a comprehensive list of usability guidelines. Guideline reviews contain on the order of 1,000 guidelines that require a high degree of expertise.
- **Pluralistic Walkthroughs** are meetings where users, developers, and human factors people step through a scenario, discussing usability issues associated with dialogue elements involved in the scenario steps.
- **Consistency Inspections** have designers representing multiple projects inspect an interface to see whether it does things in a way that is consistent with their own designs. Thus, consistency inspections are aimed at evaluating consistency across the family of products that has been evaluated by an inspection team.
- **Standards Inspection** has an expert on some interface standard inspect the interface for compliance. Thus, standards are aimed at increasing the degree to which a given interface is in the range of other systems on the market that follow the same standards.
- **Cognitive Walkthrough** use a more explicitly detailed procedure to simulate a user's problem-solving process at each step in the HCI, checking to see if the simulated user's goals and means for actions can be assumed to lead to the next correct section.
- **Formal Usability Inspections** are intended to be very similar to the code inspection methods with which many software developers are already familiar. In this



method, the various participants have well-defined responsibilities. A moderator is appointed to manage both individual and focused inspections, and the full team inspections meeting; a design owner is responsible for design and redesign; the inspectors have the job of finding problems; and a scribe records all defects and issues identified during the meeting. Inspections are performed through a six-step process: planning, a kick-off meeting, a preparation phase where inspectors review the interface individually, the main inspection review when the inspectors' lists the usability problems are merged, and a follow-up phase where the effectiveness of the inspection process itself is assessed.

- Feature Inspections focus on the function delivered in a software system. Feature Inspections can involve not only evaluation of the function, but can also involve the design of that function.

Two of the inspection methods will be measured, evaluated and discussed, the description of Heuristic Evaluation and Cognitive Walkthrough.

Heuristic evaluation is a “usability engineering method for finding the usability problems in a user interface design so that they can be attended to as part of an iterative design process” (Nielsen and Mack, 1994). Heuristic evaluation involves having a small set of evaluators examine the interface and judge its compliance with recognized usability principles the heuristics.

Another definition by Hertzum and Jacobsen (2003), HE is an informal UEM that enables evaluators to detect usability problems in an interface based on screen mock-ups or a running system.

Nielsen (1994) has described ten general principles for user interface design. They are called "heuristics" because they are more in the nature of rules of thumb than specific usability guidelines (Nielsen, 1994).

- Visibility of system status: The system should always keep users informed about what is going on, through appropriate feedback within reasonable time.

- Match between system and the real world: The system should speak the users' language, with words, phrases and concepts familiar to the user, rather than system-oriented terms. Follow real-world conventions, making information appear in a natural and logical order.
- User control and freedom: Users often choose system functions by mistake and will need a clearly marked "emergency exit" to leave the unwanted state without having to go through an extended dialogue. Support undo and redo.
- Consistency and standards: Users should not have to wonder whether different words, situations, or actions mean the same thing. Follow platform conventions.
- Error prevention: Even better than good error messages is a careful design which prevents a problem from occurring in the first place. Either eliminate error-prone conditions or check for them and present users with a confirmation option before they commit to the action.
- Recognition rather than recall: Minimize the user's memory load by making objects, actions, and options visible. The user should not have to remember information from one part of the dialogue to another. Instructions for use of the system should be visible or easily retrievable whenever appropriate.
- Flexibility and efficiency of use: Accelerators -- unseen by the novice user -- may often speed up the interaction for the expert user such that the system can cater to both inexperienced and experienced users. Allow users to tailor frequent actions.
- Aesthetic and minimalist design: Dialogues should not contain information which is irrelevant or rarely needed. Every extra unit of information in a dialogue competes with the relevant units of information and diminishes their relative visibility.

- Help users recognize, diagnose, and recover from errors: Error messages should be expressed in plain language (no codes), precisely indicate the problem, and constructively suggest a solution.
- Help and documentation: Even though it is better if the system can be used without documentation, it may be necessary to provide help and documentation. Any such information should be easy to search, focused on the user's task, list concrete steps to be carried out, and not be too large.

Heuristics Evaluation is performed as described by Nielsen and Mack (2004) by having each individual evaluator inspect the interface alone. Only after all evaluations have been completed are the evaluators allowed to communicate and have their findings aggregated. This procedure is important in order to ensure independent and unbiased evaluations from each evaluator. The results of the evaluation can be recorded either as written report from each evaluator or by having the evaluators verbalize their comments to an observer as they go through the interface. Written reports have the advantage of presenting a formal record of the evaluation, but require an additional effort by the evaluators and the need to be read and aggregated by an evaluation manager. Using an observer adds to the overhead of each evaluation session, but reduces the workload on the evaluators. Also, the results of the evaluation are available fairly soon after the last evaluation session since the observer only needs to understand and organize one set of personal notes, not a set of reports written by others. Furthermore, the observer can assist the evaluators in operating the interface in case of problems, such as an unstable prototype, and help if the evaluators have limited domain expertise and need to have certain aspects of the interface explained.

Typically, a heuristic evaluation session for an individual evaluator lasts one or two hours. Longer evaluation sessions might be necessary for larger or very complicated interfaces with a substantial number of dialogue elements, but it would be better to split up the evaluation into several smaller sessions, each concentrating on a part of the interface.

During the evaluation session, the evaluator goes through the interface several times and inspects the various dialogue elements and compares them with a list of

recognized usability principles (the heuristics). These heuristics are general rules that seem to describe common properties of usable interfaces. In addition to the checklist of general heuristics to be considered for all dialogue elements, the evaluator obviously is also allowed to consider any additional usability principles or results that come to mind that may be relevant for any specific dialogue element. Furthermore, it is possible to develop category-specific heuristics that apply to a specific class of products as a supplement to the general heuristics. One way of building a supplementary list of category-specific heuristics is to perform competitive analysis and user testing of existing products in the given category and try to abstract principles to explain the usability problems that are found.

In principle, the evaluators decide on their own how they want to proceed with evaluating the interface. A general recommendation would be that they go through the interface at least twice, however. The first pass would be intended to get a feel for the flow of the interaction and the general scope of the system. The second pass then allows the evaluator to focus on specific interface elements while knowing how they fit into the larger whole.

Since the evaluators are not using the system as such (to perform a real task), it is possible to perform heuristic evaluation of user interfaces that exist on paper only and have not yet been implemented (Nielsen, 1990). This makes heuristic evaluation suited for use early in the usability engineering lifecycle.

The output from using the heuristic evaluation method is a list of usability problems in the interface with references to those usability principles that were violated by the design in each case in the opinion of the evaluator. It is not sufficient for evaluators to simply say that they do not like something; they should explain why they do not like it with reference to the heuristics or to other usability results. The evaluators should try to be as specific as possible and should list each usability problem separately. For example, if there are three things wrong with a certain dialogue element, all three should be listed with reference to the various usability principles that explain why each particular aspect of the interface element is a usability problem. There are two main reasons to note each problem separately: First, there is a risk of repeating some problematic aspect of a dialogue element, even if it were to be completely replaced

with a new design, unless one is aware of all its problems. Second, it may not be possible to fix all usability problems in an interface element or to replace it with a new design, but it could still be possible to fix some of the problems if they are all known.

Heuristic evaluation does not provide a systematic way to generate fixes to the usability problems or a way to assess the probable quality of any redesigns. However, because heuristic evaluation aims at explaining each observed usability problem with reference to established usability principles, it will often be fairly easy to generate a revised design according to the guidelines provided by the violated principle for good interactive systems. Also, many usability problems have fairly obvious fixes as soon as they have been identified.

Heuristic evaluation is explicitly intended as a "discount usability engineering" method. Independent research (Nielsen, 1994) has indeed confirmed that heuristic evaluation is a very efficient usability engineering method. One of the case studies found a benefit-cost ratio for a heuristic evaluation project of 48: The cost of using the method was about \$10,500 and the expected benefits were about \$500,000 (Nielsen, 1994). As a discount usability engineering method, heuristic evaluation is not guaranteed to provide "perfect" results or to find every last usability problem in an interface. Therefore, the cost associated to this method should not be neglected. These costs seem primarily to be in the stage after usability issues are identified (Jeffries, and Desurvire, 1992).

Cognitive Walkthrough (CW) was devised to enable computer professionals to detect usability problems in a user interface based on a detailed specification document, screen mock-ups, or a running system (Hertzum and Jacobsen, 2003). The Cognitive Walkthrough method "is a type of usability inspection that focuses in evaluating a design for ease of learning by exploration" (Lewis, Polson, Wharton and Rieman, 1990). In the evaluation procedure, one or few usability specialists evaluate user interfaces by analyzing the mental processes required of an assumed novice user (Liu, Osvalder and Dahlman, 2005). CW is feasible and as a supplement to user testing in situations where users are difficult or expensive to recruit (Hertzum and Jacobsen, 2003).

The CW method traces the mental processes of users in detail and the user background. The reason is that CW focuses on tracing the user's mental process in each action is CW can simulate evaluators to find problems that would likely occur in actual use but would not be observed in laboratory studies (Thomas and Kellogg, 1989). On the other hand, different user background settings can affect the scope if design. Therefore, if the same factors in user background settings are considered by different analysts, then the evaluation results or conclusions will be the same (Liu, Osvalder and Dahlman, 2005).

The underlying theory of the CW is grounded in Lewis and Polson's theory of exploratory learning (Polson et al., 1992; Wharton et al., 1994), which is an information-processing model of human cognition that describes HCI in four steps: (1) The user sets a goal to be accomplished with the system. (2) The user searches the interface for currently available actions (menu items, buttons etc.). (3) The user selects the action that seems likely to make progress toward the goal. (4) The user performs the selected action and evaluates the system's feedback for evidence that progress is being made toward the current goal.

A brief description of the Walkthrough process as mentioned by Nielsen and Mack (1994), the reviews evaluate a proposed interface in the context of one or more specific user tasks. The input to a walkthrough session includes an interface's detailed design description, a task scenario, explicit assumptions about the user population and the context of use, and a sequence of actions that a user should successfully perform to complete the designed task.

During the walkthrough process the group considers each of the user actions needed to accomplish the task. For each action, the analysts try to tell a story about a typical user's interaction with the interface. They ask what the user would be trying to do at this point and what actions the interface makes available. If the interface design is a good one, the user's intentions should cause that person to select the appropriate action. Following the action, the interface should present clear feedback indicating that progress is being made toward completing the task.

The procedure for CW is divided into three stages; preparation, analysis and follow-up as discussed by Liu, Osvalder and Dahlman (2005). It has been indicated that four tasks should be finished at the preparation stage: (1) defining the assumed user background; (2) choosing sample tasks; (3) specifying correct action sequences for the tasks; (4) determining interface states along the sequences. On the other hand, Hertzum and Jacobsen (2003) discussed that the procedure for CW consists of a preparation phase and an execution phase. In the preparation phase, the evaluator describes a typical user, chooses the tasks to be evaluated, and constructs a correct action sequence for each task. When this is done the execution tasks can begin.

Both parties agreed that for each action in the action sequence the evaluator asks four questions: (1) Will the user try to achieve the right effect? (2) Will the user notice that the correct action is available? (3) Will the user associate the correct action with the desired effect? (4) If the correct action is performed, will the user see that progress is being made towards the solution of the task? With the description of the user in mind, the evaluator decides whether each question leads to success or failure. If there are positive answers to all four questions, this is termed as a “success story” for the specified action. If there is a negative answer to any of the four questions, this is termed a “failure story”. In case of failure, a usability problem has been detected. After all actions have been evaluated, the CW is completed by merging the detected problems into one non-duplicate list.

CW focuses on just one attribute of usability, ease of learning. Several studies showed that the method is narrowly focused (Nielsen and Mack, 1994). The method sacrifices obtaining valid information about other important usability attributes such as global consistency or the relative ease with which a user might be able to make catastrophic errors. On the other hand, Liu, Osvalder and Dahlman (2005), stated that the CW method has been proved to be a very useful evaluation and inspection method especially in the early design stage of interface development procedure.

## **2.5.2 Usability Testing Methods**

Testing with end users is the most fundamental usability method and is in some sense indispensable. It provides direct information about how people use the system and

their exact problems with a specific interface (Holzinger, 2005). User testing is based on bringing real users in and observing them as they interact with the system, in order to perform a given set of tasks. In simple, user testing provides insights into the mindset and working methods of real users (Nielsen and Landauer, 1993).

The most obvious benefit of usability testing is a usability test identifies problems that will plague the actual users of the application, where almost all the problems identified by the usability test were above median in severity, therefore there is no need to filter the problems. In addition, user's results from testing have an impact on the engineering developing the product. Finally, some problems found in usability test are highly unlikely to be discovered by other methods (Jeffries, R. and Desurvire, H. 1992).

There are several methods for testing usability, the most common being Thinking Aloud, Field Observation and Questionnaires.

Think-aloud (TA) testing is a widely used, valued and employed usability evaluation method (Nørgaard and Hornbæk, 2006). It may be the single most valuable usability engineering method for it involves having an end user continuously thinking out loud while using the system. By verbalizing their thoughts, the test user enables the evaluators to understand how they view the system, which makes it easier to identify the end users' major misconceptions (Holzinger, 2005). TA is used in various situations with various goals both early and late in development cycle (Nørgaard and Hornbæk, 2006).

Nørgaard and Hornbæk (2006) identified the common core of TA which involves a small number of users who think out loud while solving tasks with the system that is being tested, and an evaluator who detects usability problems by observing the users and listening in on their thoughts. It is generally held that at least four to five users are necessary to detect the majority of the problems in a system.

The general procedure for TA as summarized by Nørgaard and Hornbæk (2006), it consists of a preparation phase followed by a number of test sessions, normally one for each user. In the preparation phase, the people conducting the test familiarize



themselves with the work environment. The test sessions are administrated by a facilitator, who may at the same time be the person evaluating when the users experience problems. Each session consists of an introduction to familiarize the user with the test situation, the actual test, and debriefing of the user. In the introduction, the facilitator should teach the user to think out loud because this is an unnatural thing to do for users, and experience indicates that without teaching and some encouragement during the session only few users are capable of giving valuable verbal reports about their work. The actual test is initiated by reading the first task out loud and handing it over to the user who solves it while thinking out loud. After finishing the first task, the second is presented in a similar manner, and so forth. When the user has finished all tasks, or when time runs out, the user is debriefed to provide any additional insights into the system and to relax after the test session. After all test sessions have been run, the evaluator produces a complete, non-duplicate list of the detected problems.

Holzinger (2005) highlighted the advantages and disadvantages of the Think-Aloud method. The advantages of TA include revealing why users do something; providing a close approximation to how individuals use the system in practice; provision of a wealth of data, which can be collected from a fairly small number of users; user comments often contain vivid and explicit quotes; preference and performance information can be collected simultaneously; TA helps some users to focus and concentrate; and early clues can help to anticipate and trace the source of problems to avoid later misconceptions and confusion in the early stage of design. Disadvantages include a failure to lend itself well to most types of performance measurement; the different learning style is often perceived as unnatural, distracting, and strenuous by the users; non-analytical learners generally feel inhibited; and this method is time-consuming since briefing the end users is a necessary part of the preparation.

Causing users to focus and concentrate is both an advantage and a disadvantage since it results in less than- natural interactions at times and causes TA to be faster due to the users' focus.

Field Observation is the simplest of all methods. "It involves visiting one or more users in their workplaces. Notes must be taken as unobtrusively as possible to avoid

interfering with their work. Noise and disturbance can also lead to false results. Ideally, the observer should be virtually invisible to ensure normal working conditions. Sometimes video is used to make the observation process less obtrusive, but it is rarely necessary. Observation focuses on major usability catastrophes that tend to be so glaring they are obvious the first time they are observed and thus do not require repeated perusal of a recorded test session. Considering the time needed to analyze a videotape is approximately 10 times that of a user test, the time is better spent testing more subjects or testing more iterations of the design. Video is, however, appropriate in some situations. For example, a complete record of a series of user tests can be used to perform formal impact analysis of usability problems” (Holzinger, 2004).

Holzinger (2004) described another means of electronic observation which is data logging. It involves statistics about the detailed use of a system. Data logging can provide extensive timing data, which is generally important in HCI and usability. Normally, logging is used to collect information about the field use of a system after release, but it can also be used as a supplementary method of collecting more detailed data during user testing. Typically, an interface log will contain statistics about the frequency with which each user has used each feature in the program and the frequency with which various events of interest (such as error messages) have occurred.

Questionnaires are useful for studying how end users use the system and their preferred features. It is an indirect method, since this technique does not study the actual user interface: it only collects the opinions of the users about the interface. A simpler form of questionnaire is the interview. The form of the interview can be adjusted to respond to the user and encourage elaboration. Advantages include that subjective user preferences, satisfaction, and possible anxieties can be easily identified; and questionnaires can be used to compile statistics. Disadvantages include that indirect methods result in low validity; this method needs sufficient responses to be significant (30 users is the lower limit for a study) (Holzinger, 2005).

In conclusion, no usability evaluation method can detect 100% of the problems or errors of real users in real life (Liu, Osvalder and Dahlman, 2005). In addition, all

methods have their own strengths and weaknesses, and several methods will need to be used by the developers/evaluator to ensure good interface coverage.

### **2.5.3 Comparison of Usability Testing and Inspection Methods**

The two types of usability evaluation techniques may be compared in terms of how they meet a usability engineers and a software development team's concerns regarding a number of issues. The two methods can be compared on the following issues (Nielsen and Mack, 1994):

- Ability to address evaluation objectives. Objectives of the usability evaluation need to be clearly defined, and a clear view of what method or methods are best suited to capture the information based on specific requirements. At the present time, it appears that usability testing is able to address a wider range of evaluation issues than inspection methods.
- Number and type of usability problems identified: The majority of the published studies suggest that usability testing identifies more usability problems than inspection methods do.
- Human factors involvement: Human factors time included preparation of all materials, administration of sessions, and data analysis. In conducting the method, the human factors time spent per evaluation session was 4 hours per heuristic evaluation, 33.2 hours per user in the usability testing. On the other hand, the lower amount of human factors time spent in the methods had a negative impact on data interpretation and analysis work.
- Ability of a method to facilitate organizational acceptance of usability goals and activities. An organization's structure and culture and coordination of the groups involved in a product cycle can be employed to facilitate or hinder acceptance to usability data, regardless if whether it is based on inspection or testing methods. A key issue in terms of an organization accepting and using usability data to its advantage is the development team's perception of the value of the usability work on the interface. The perception of value may

result from a myriad of sources and can be achieved using either type of usability evaluation method.

- Effectiveness of a method in generating usability recommendations for change. In order to obtain more valuable data for identified problem it has been suggested that an improvement is needed to problem capturing and debriefing methods. Studies showed that more information about recommended changes to identified problems from users in usability testing sessions was more highly integrated into the process.
- Cost-effectiveness of methods: The relative cost-effectiveness of usability and inspection methods are based on return on investment in implemented changes, and it is not clearly established at this time, for no studies to date have systematically compared relative cost-effectiveness of inspections and usability testing.

The table below (Table 2-3) summarizes briefly the strengths and weaknesses of usability testing and inspection methods as related to the discussion above (Nielsen and Mack, 1994).

Issue		Usability Testing	Inspection Method
Ability to address evaluation objectives		+	-
Number and type of usability problems identified		+	-
Reliability of usability findings		+	+
Human factors involvement	In conducting method	-	+
	Data analysis	+	-
Ability to facilitate organizational acceptance of usability goals and activities		+	+
Appropriateness of method's use at different points in development cycle	For numerous lower-level design trade-offs	-	+
	For high-level design guidance, full coverage of interface	+	-
Effectiveness of method in generating recommendations for change		+	-
Cost-effectiveness of method		+	+

**Table 2-3: Strengths and weaknesses of usability testing and inspection methods.**  
Legend: + indicates a strength and – indicates a weakness

## 2.6 Determining the number of evaluators

Some people think that usability is very costly and complex and that user tests should be reserved for the rare web design project with a huge budget and a lavish time schedule. Not true. Elaborate usability tests are a waste of resources. The best results come from testing no more than 5 users and running as many small tests as you can afford (Nielsen, 2000).

Nielsen (2000) theory stated “you collect data from a single test user, your insights shoot up and you have already learned almost a third of all there is to know about the usability of the design. The difference between zero and even a little bit of data is astounding. When you test the second user, you will discover that this person does some of the same things as the first user, so there is some overlap in what you learn. People are definitely different, so there will also be something new that the second

user does that you did not observe with the first user. So the second user adds some amount of new insight, but not nearly as much as the first user did.

The third user will do many things that you already observed with the first user or with the second user and even some things that you have already seen twice. Plus, of course, the third user will generate a small amount of new data, even if not as much as the first and the second user did. As you add more and more users, you learn less and less because you will keep seeing the same things again and again. There is no real need to keep observing the same thing multiple times, and you will be very motivated to go back to the drawing board and redesign the site to eliminate the usability problems. After the fifth user, you are wasting your time by observing the same findings repeatedly but not learning much new”.

Why not test with a single user is an important question as Nielsen (2000) discussed “you might think that fifteen tests with a single user would be even better than three tests with five users. Learning becomes much less after the first user than from any subsequent users, so why keep going? Two reasons:

- There is always a risk of being misled by the spurious behaviour of a single person who may perform certain actions by accident or in an unrepresentative manner. Even three users are enough to get an idea of the diversity in user behaviour and insight into what's unique and what can be generalized.
- The cost-benefit analysis of user testing provides the optimal ratio around three or five users, depending on the style of testing. There is always a fixed initial cost associated with planning and running a test: it is better to depreciate this start-up cost across the findings from multiple users.

Although the above theory and discussion states that five users are respectable for the usability experiment, this research will be using thirty participants. This is because the research will use inexperienced users of the website and in order to maintain data integrity 30 of them should be used. In addition, understanding the user's task, culture, and capabilities will be taken into consideration.

## **2.7 Usability Technique for the research**

The usability evaluation technique that will be used for this research is a combination between usability inspection methods and the test methods. The Thinking Aloud will be supplemented with a task-independent method such as questionnaires which will be suitable.

Combining both methods has advantages that outweigh the disadvantages. Advantages include the subjective user preferences, satisfaction, and possible anxieties can be easily identified; and questionnaires can be used to compile statistics.

### **2.7.1 Thinking Aloud**

Over the last three decades, the thinking aloud method has been a widely used instrument to study cognitive processes (Krahmer and Ummelem, 2004). Moreover in digital environments, thinking aloud is frequently and widely used method for usability testing. (Waes, 2000), for the above mentioned statements, therefore I have selected the thinking aloud as a method for the usability test which will be conducted on Dubai Municipality website. Thinking aloud is a popular and effective method for usability testing. It provides useful information about the users who are interacting with a certain application.

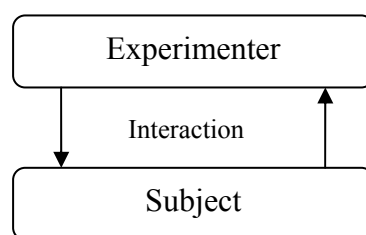
The thinking aloud framework has been used for three types of goals as described by Krahmer and Ummelem (2004) where data can be analyzed in either a qualitative or a quantitative way.

1. To find evidence for models and theories of cognitive processes, develop a theory of human problem solving, and thinking aloud was an important instrument for collecting relevant data to support it.
2. To discover and understand general patterns of behaviour in the interaction with documents or applications, in order to create a scientific basis for designing them.
3. To test specific new documents or applications in order to troubleshoot and revise (usability testing, or pre-testing, or formative testing). The primary goal is to gather user information to support the design of a specific product.

Ericsson and Simon (1993), whose research matches the first category, developed a theoretical framework and accordingly, a procedure for collecting valid and reliable thinking aloud data. The procedure they proposed should prevent researches from interfering with the subjects' (participator) cognitive processes and thus prevent them from affecting the research outcome. This approach has been the background for many thinking aloud studies since the early 1980s. However, despite this framework and despite the large number of thinking aloud studies, the method has been criticized more than once (Krahmer and Ummelem, 2004).

Boren and Ramey (2000), on the other hand, focus on the usage of thinking aloud for the third goal: usability testing. . In addition, Schriver (1984) and Nielsen (1993), among many others, promoted this method as an instrument for testing and revising functional documents such as manuals and websites. Usability testers who work with the thinking aloud method tend to refer to the Ericsson and Simon framework (E&S framework) to account for their methodological choices (Krahmer and Ummelem, 2004).

Thinking aloud has been defined as a "method for scientific research rests on a solid scientific foundation in cognitive psychology" (Ericsson and Simon, 1993). The below figure provides the schematic setting of thinking aloud experiments introduced by Ericsson and Simon.



**Figure 2-1: Schematic experimental set-up for a thinking aloud study**

The process of the thinking aloud focuses the attention on the subject. The subject is instructed to continuously verbalize their thoughts, which means that there is a form of a single directional communication between the subject and the experimenter; the subject continuously verbalizes his thoughts and the experimenter only listens.



It is important that the experimenter just listens and do not interfere so the subject is not influenced in any way. However, if the subject keeps silent for a long period of time and to avoid this, the experimenter is allowed to remind the subject to think aloud. This reminder should be short and non-intrusive. Ericsson and Simon propose to only use the phrase Keep talking.

Ericsson and Simon (1993), recommends an initial practice session in which the subjects are taught to verbalize their thoughts for thinking aloud is unnatural. "During warm up, the experimenter feels free to interfere with and disrupt the subject, while during the experiment, he should be very concerned not to interfere".

According to the E&S method, performing thinking aloud experiment implies the following rules:

1. When the subject keeps silent for a longer period of time, the experimenter should provide a reminder (keep talking).
2. Other than that, the experimenter should not interfere during the thinking aloud process.
3. To familiarize subjects with the thinking aloud method, researchers should train them in advance.

In most website usability research, tests are set where a user is given a set of realistic tasks and asked to perform them while thinking aloud. Statistics such as task completion rates and times are tracked along with usability issues

Participants in the think aloud group read their assigned texts alone. Participants are instructed to say aloud whatever they were thinking as they read. After they had read the warm-up, background text, participants are then questioned about any difficulties they were having with the technique (Earle, 2004). Users are encouraged to verbalize their thoughts as they attempt to complete their tasks. Users may point out parts that are satisfying, confusing, or they may express their thoughts on how to improve certain areas. These comments should be recorded either by on video, audio or note taking (Lazer, 2006).

The experimental procedure starts where each participant works on the task by reading it alone with no distractions from other participants or experimenters. Each of the think aloud group proceeds as described above except for being asked to think aloud while reading. Following the experimental procedure participants are debriefed, paid and dismissed.

### **2.7.2 Questionnaire**

Often think aloud method is used in combination with other evaluation techniques (Waes, 2000) when considering qualitative data in a research. Indeed, an objective of qualitative method is to access the world in terms of those people being reached (Burton, 2000). A questionnaire is the most widely used survey instrument across the social sciences. For this reason a questionnaire will be used to elicit both personal details and specific details about the usability test.

Fowler (1993) argues that "determining a question for a survey instrument is designing a measure not a conversational inquiry. Good questionnaires maximize the relationship between the answers recorded and what the researcher is trying to measure". If questionnaires are carefully designed, it provides important insights into human behaviour (Burton, 2000).

## **Chapter Three**

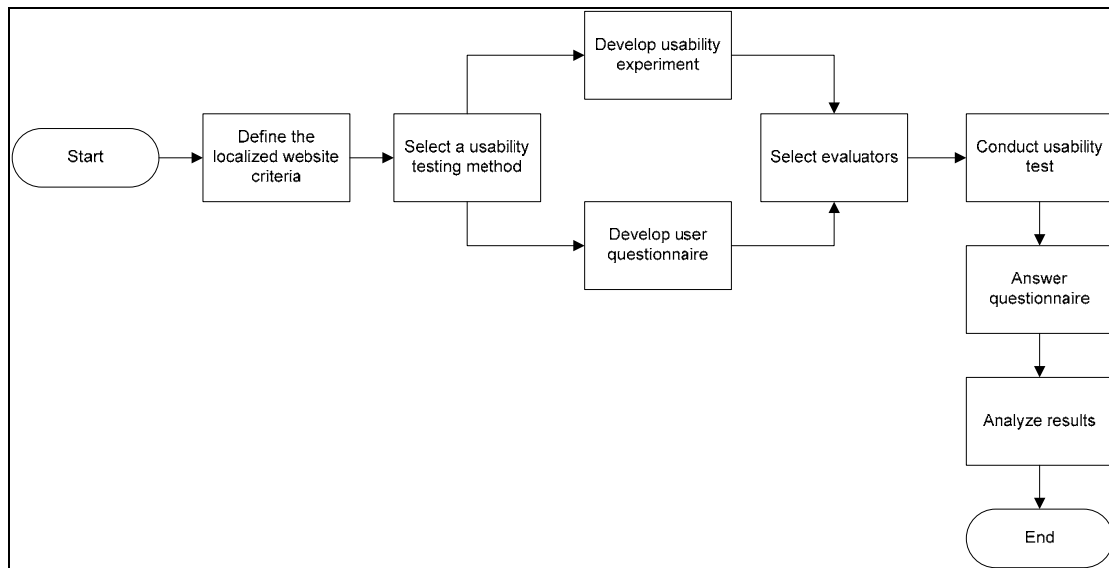
### **Research Methodology**

The preceding chapters of the dissertation identified the problem statement, which applies superlative usability criteria to Dubai Municipality portal and study the effect of bilingual websites and usability through usability tests.

The literature review encircled around the general overview of usability which included the usability importance, definition, general characteristics. The literature review chapter also included a discussion about the different usability criteria and criteria for localised website by identifying the cultural markers that are reflected in websites around the world and the different cultural backgrounds and international users. The literature review entailed different Usability Evaluation Methods which consists of the Usability Inspection Methods and Usability Testing and determining the number of evaluators have all set the path to develop a model to assess the usability of Dubai Municipality website.

### **3 Approach overview**

The high level flow of the usability process will start by defining the localised website which is the basic element that will be used for the experiment. The next measure is to select the best Usability Testing method or a combination of methods. Once the testing fundamentals are clear, a set of usability experiments and user feedback forms such as questionnaire will be developed. Subsequently the users will be selected and notified of their involvement in the usability test. Once the usability test is executed and the questionnaire is answered, data analysis will be conducted to verify the usability of Dubai Municipality website. The following figure illustrates the process described above.



**Figure 3-1: Methodology process**

### 3.1 Approach

In order to collect data, to understand whether the Dubai Municipality Arabic or English website is more usable, a usability test will be developed which will be divided into two parts; usability experiment and an online questionnaire. The test will start with a usability experiment which will be conducted on thirty different users; fifteen will start with the English test and the other fifteen with the Arabic test. The usability experiment will provide and insight the usability errors when navigating both website versions.

The second approach is to conduct an online questionnaire, where the user will answers a set of questions after finishing the usability experiment. The online questionnaire will focus on identifying the user profile and evaluating some usability topics. This will provide additional information and will support the data collected from the experiment.

### 3.2 Data required

There are two kinds of required data that will be collected from the usability test: process data and bottom-line data (Van Duyne, et al. 2002). The process data consists of informal, qualitative observations of what people are thinking and doing, an overall feeling of what works and what does not work on the website. The key things to look

for are critical incidents, places on the website where participants are confused, frustrated, or even swear. It also includes cases in which people are pleasantly surprised or say something positive about the website.

In contrast, bottom-line data consists of formal quantitative measurements such as time it takes to complete a task, the number of errors that occur, or the time it takes to learn a task (Van Duyne, et al. 2002).

Supporting data will be collected through an online questionnaire to help identify and focus on the website problems and errors.

### **3.3 The experiment**

This section will analyze the usability testing experiment and the user questionnaire and define the users' criteria and the testing environment.

The usability test will be carried out on a total of thirty people (evaluators) whom are mainly the site target audience. Having 30 evaluators is a reasonable sample which will allow the normal distribution of data to be used. There are two specific criteria while selecting the evaluator, the person selected should have used the web enough to know the basics and understands both website languages (Arabic and English).

The testing premises will be Dubai eGovernment training room, located at the Emirates Towers. The room capacity is for nine users per testing session. The computer specification which will be used for testing is as following:

- Microsoft Windows XP professional (Service Pack 2)
- Processor 1500MHz
- 1.50 GB of RAM
- Graphic Card
- Browser: Internet Explorer version 6.0
- 15 Inch Monitor
- Internet speed: 2 MB

The testing process will be divided into two phases which will include several steps.

1. All participants will fill out a confidentiality form, agreeing to take part in the usability test.
2. Fifteen of the participants will receive an introduction about the purpose and process of the test in English. The other fifteen participants will receive the same information in Arabic.
3. Fifteen of the participants will be asked to perform a number of tasks in English, while the other fifteen will perform the same number of tasks in Arabic.
4. The first fifteen participants whom performed the tasks in English will perform the same tasks in Arabic and vice versa.
5. All participants will fill out an online usability questionnaire
6. Participants to receive a Thank you letter

### **3.3.1 The Usability testing experiment**

The usability testing method selected is the Thinking Aloud; where a user is given a set of realistic tasks and asked to perform them while thinking aloud. Participants are instructed to say aloud whatever they were thinking as they read and perform the test.

The usability testing experiment (Appendix 1) is broken into three major phases: preliminary instructions and paperwork, performing the tasks and a debriefing. The experiment consists of twenty different tasks, ten for each language. The first page is an introduction and a summary about the reason this test is conducted, brief description on how the experiment will be operated and managed, and a list of all the tasks that the user will undertake. The second page explains the confidentiality of the participant's information and that all information will not to be disclosed. The participant's signature is required at this stage.

- The first task is about the common look and feel of the website. It explores and assesses if there is a design consistency on both languages of the website. This task measures the participant's satisfaction on design. The purpose of this question is to asses the one of the hypotheses which will measure the design consistency on both Arabic and English.

- The second task requires the user to search for an online service and then evaluates the process and records the time required to complete the task. The task assesses a hypothesis, to define which language is easier than the other. The search is performed on a service any citizen or resident would like to use. The participants were asked to search for the service and evaluate the process of searching on a 5-point scale, where 1 is being easy and 5 is being difficult.
- The third task is concerned with downloading an application form and scanning through the document. The purpose is to note any problems the users experience while downloading the file. Task three, is considered as a supporting question to check if all forms are properly translated and clear instructions are provided.
- The fourth task has two goals, the first is to search for a feedback form available on the website and the second is to make sure that all alerts and messages are properly translated into the right language. This task measures the time required to complete the task and the number of wrong clicks. This task also assesses two hypotheses. The results will be used to check if alerts are properly handled in which language more than the other and to know whether finding a specific form is clearer on Arabic, English or both.
- Task number five is concerned whether the website navigation elements such as the menu and search box are placed where the user expects to see them. User satisfaction is measured at this stage on a 5-point scale with 5 being difficult and 1 being easy. Task six, considered as a supporting question to hypothesis seven. The purpose of this task is to make sure that search box is located at a convenient place and accessible by all users.
- Service registration is the sixth task, where the user is asked to fill a registration form. The process of filling in the registration form is measured on a 5-point scale with 5 being difficult and 1 being easy, along with the time required to complete the task. The task checks if the registration form is provided in both Arabic and English.

- Task seven evaluates the customer support provided on the website whether proper online help and documentation is available. Customer support question is an open-ended question and a supporting question to hypothesis six. It measures the overall customer support concept on the website, and not the differences between Arabic and English. The reason is to highlight the importance of the customer support which helps the website become trustier.
- Task number eight assesses the three different ways to search for a service in the Directory of Services. The user is then asked to rate each category of a 5-point scale with 5 being difficult and 1 being easy. The purpose of this question is to determine how well each of the search strategies and evaluating the overall concept of having multiple ways to search for a service, as a usability concept. The results of this supporting task will be analyzed per search strategy.
- Task nine is related to the home page, the user is directed to the homepage and asked to give their view and rate the homepage on a 1 to 5 scale, where 5 is being worst and 1 is being best. The task is a follow-up question, directs the participants attention to the home page which contributes to the design consistency hypothesis.
- Task ten measures on a 5-point scale with 5 being difficult and 1 being easy the ease or difficulty of switching from one language to the other of the website. This is hypothesis question which assesses which switching button between the two different versions of the website is more easy and usable.

### **3.3.2 User questionnaire**

The user questionnaire (Appendix 2) is another testing method, post-test, which will be used after the experiment is over to get the evaluators feedback and keep a record of some necessary facts that will facilitate in the analysis section. QuestionPro was the online questionnaire tool that has been used to gather data.

There are twenty questions in the online questionnaire. The questionnaire starts with a greeting message and briefly explains the importance of filling in the questionnaire after completing the experiment and the maximum time required to finish the



questionnaire. In addition it highlights the confidentiality of the participant's information.

- The first six questions focuses on understanding the user profile, in the sense of getting more details on the type of gender, age group, education level, employment status, user native language and reasons for using the internet. The purpose of this section is to gather information about the person participating in the usability test. In addition to make sure that the selected participants are within the user profile criteria.
- Questions seven to eleven are general supporting questions related to the usability experiment. It asks the users about their confidence level in using which language of the website. In addition, searching for information and filling an online form, in the future, would be using which language with specifying the reasons for their choice. Question seven is related to the fifth hypothesis, which states, users are equally confident while browsing the Arabic or English website.
- Question eight asks the participants “If you had the chance to fill an online form again, in which language will you perform this task?” This question is considered a follow-up question to deeply analyze which language is more usable than the other. Question eleven asked “If you had the chance to search for information, in which language you will perform this task?”. This question is directly related to hypothesis seven to find which is easier Arabic or English in terms of finding a specific service or content.
- Question twelve assessed the website navigation, whether the Arabic or English navigation site navigation made the site easy to navigate through. The questions asks each user to rate each item on a 1-to-5 Likert response scale, where 1 is being strongly disagree and 5 is being strongly agree. Navigation question comes next which is related to hypothesis eight. The results will be used to understand if the Arabic navigation design made the site easy to navigate or the English navigation design made the site easy to navigate.

- Questions thirteen to seventeen assessed the presentation layer of the website on both languages on a 1-to-5 Likert response scale, where 1 is being strongly disagree and 5 is being strongly agree. The questions focused on the use of graphics, design elements used in the site, amount of information displayed on each page and the colour combination used in the website. The assessment was on the graphics, design elements such as banners, amount of information displayed and colours used in the website. The questions are considered to be supportive and follow-up question to the main hypotheses.
- The website Arabic and English font type and size was assessed in question seventeen. The users were asked to assess the overall font size in the website and in the Directory of Services pages on a small/large scale. This is one of the important supporting questions to multiple hypotheses. As it plays an important role in the design, finding content or information content and the website navigation hypotheses.
- The overall quality of the website is assessed in questions eighteen to twenty, where on a Likert scale the users rate their overall understanding of the purpose of the site. In addition, question nineteen discuss if the user clearly understands the services on Dubai Municipality website by looking at the website. Finally, the quality of the website is rated based on the user web experience where 1 being very high quality and 5 being unacceptable.

### 3.3.3 Analysis of results

The results will be analyzed for each question and using Microsoft Excel will be used. The reliability of the answers received will be validated via hypothesis testing using the Paired t Test. “The paired t test provides a hypothesis test of the difference between population means for a pair of random samples whose differences are approximately normally distributed” (StatsDirect). The test statistics is calculated via

the following formula:  $t = \frac{\bar{d}}{\sqrt{s^2/n}}$  where d bar is the mean difference, s<sup>2</sup> is the

sample variance,  $n$  is the sample size and  $t$  is a Student  $t$  quantile with  $n-1$  degrees of freedom which is 2.045. The hypothesis for this test is as follows:

Null hypothesis =  $H_0$

Alternative hypothesis =  $H_1$

The null hypothesis states that there are no differences between the observed and the expected frequencies. The alternative hypothesis states that there are significant differences between the observed and expected frequencies (Levin and Rubin, 2004). The decision rule for rejecting the null hypothesis is to reject  $H_0$  if  $t \leq 2.045$ . Using Microsoft Excel, the frequency of the defined hypothesis will be calculated and the  $t$  test value will be calculated too.

### **3.4 Carrying out the usability test**

There are important steps that need to be taken in order to run a usability test to give better results with real user participation. The approach which will be followed in carrying out the usability test for Dubai Municipality is as follows:

- Greet the participants by introducing the experimenter and describing the purpose of the test.
- Fill out the paperwork (confidentiality sheet)
- Ask participants to think aloud
- Instruct the participants how to start by informing about the test rules and procedures and answering any question or queries the participant have in mind.
- Take good notes during each task about what each participant says and does during the test. A digital watch will be used to keep track of time.
- Watch the participants closely to find any interesting action.
- Follow-up with the online survey. After all the tasks are completed, the participants are instructed to fill out an online questionnaire.
- Debrief the participants after the test by discussing any interesting behaviour the participants had and share thoughts on how to fix the problems encountered.

### 3.5 Hypothesis

The table below illustrates the interface criteria selected for the usability experiment which will be conducted on Dubai Municipality website. Each criterion is associated with a number of hypotheses which describes the expected outcome of the experiment. The table also incorporates how each criterion will be measured.

Element/Criteria	Hypothesis	How to measure
Language translation button to the other bilingual site	Switching between the two different versions of the website (Arabic/English) is clear.	Experiment
Correct translation of text and all messages into the native language	There is a proper translation of the website date, time, messages and alerts.	Experiment
Ease of use	Users are more confident browsing the version of their native language.  Performing an online transaction on the English version is less complicated than Arabic	Questionnaire  Experiment and questionnaire
Information content	It is easier to find a specific service or content on the Arabic website.	Experiment
Cultural markers	Cultural markers are used in the website.	Questionnaire
Design consistency	There is a common look and feel across all pages, even when the website is inverted to the other language.	Experiment and questionnaire
Navigation	English version is easy to navigate.  Navigation elements on the English version, such as the menu and search box, are placed where users expect.	Questionnaire  Experiment and questionnaire

**Table 3-1: Hypothesis**

## **Chapter Four Data Analysis**

Chapter four will analyze the data gathered from both the usability experiment and the online questionnaire which has been described in the previous chapter. The first section will analyze the user profile to verify that it matches the defined criteria, followed by the analysis of the Usability Experiment and the analysis of the Online Questionnaire. The third section of this chapter will include analyzing the hypothesis which will include critical analysis about implications and reasons. The last section will include extended analysis, recommendation and summary of major findings. The analysis will include screenshots of the website and figures where possible to illustrate the idea.

The analysis will be conducted on Dubai Municipality (DM) website <http://www.dm.gov.ae>. Dubai Municipality has the vision "creating an excellent city that provides the essence of success and comfort of living." Dubai Municipality is one of the largest establishments in Dubai in terms of the number of people it employs, the volume of services it provides to the public and the projects it carries out.

Dubai Municipality is the major driving force behind the development process of Dubai City as a whole and has already delivered a year ahead of schedule on its promise to migrate 90% of its services into eServices. Dubai Municipality was the proud winner of the 2006 Public Services Award from the United Nations. It has also won many regional awards including Arab eContent 2005 Award.

### **4 User profile analysis**

Thirty participants were involved in the usability experiment and later answered the online questionnaire. A total of thirty responses were obtained. The online questionnaire focused on perceiving the participants profile to make sure that they are within the defined user criteria. Thirty participants, having the following profile characteristics, evaluated Arabic and English standards.

A total of 16 male participants and 14 female participants were in the test. The average age group is between the ages 26 to 30, as summarized in the table below.

Gender:		
Male	16	53.33%
Female	14	46.67%
Total	30	

**Table 4-1: Gender data summary**

Your age group:		
20 to 25	10	33.33%
26 to 30	17	56.67%
30 to 40	3	10.00%
40 to 50	0	0.00%
Other	0	0.00%
Total	30	

**Table 4-2: Age group data summary**

Out of the thirty participants, 27 of the participants (90%) are Bachelors degree holders, 2 (6.67%) are Master holders and one with a Higher Diploma education level, as illustrate in the table below.

What is your education level?		
Bachelor's degree	27	90.00%
Master	2	6.67%
Doctor	0	0.00%
Professor	0	0.00%
Other	1	3.33%
Total	30	

**Table 4-3: Education level data summary**

The employment status of the usability experiment participates gives an idea that 28 out of 30 (93.34%) are employed as illustrated in the table below.

Employment Status:		
Employed	26	86.67%
Self-Employed	2	6.67%
Unemployed	1	3.33%
Student	0	0.00%
Home Duties	1	3.33%
Retired	0	0.00%
Total	30	

**Table 4-4: Employment status data summary**

In addition, all 30 participants consider Arabic to be their native language, as shown in the table below.

What is your native language?		
Arabic	30	100.00%
English	0	0.00%
Other	0	0.00%
Total	30	

**Table 4-5: Language data summary**

All 30 participants use the internet for different reasons. The high response 36% was to performing web searches, next was managing emails 28%, reading newspaper online scored 20% and only 13.33% perform online transactions and 2.67% use the internet for networking with friends, online banking and visiting forums. The below table illustrates the data summary of the question.

What do you use the internet for?		
E-mails	21	28.00%
Web Searches	27	36.00%
Performing online transactions	10	13.33%
Reading Newspaper	15	20.00%
Other	2	2.67%
Total	75	

**Table 4-6: Internet uses data summary**

In summary, the participants selected for the usability test are within the defined criteria. All participants have good education level, employed and can read, write and speak both Arabic and English. The data also shows that all participants have a good knowledge on how to use the Internet.

## **4.1 Usability Experiment Analysis**

The usability experiment consists of ten tasks to be performed on Dubai Municipality website. The tasks are as following:

- Task 1: Getting started
- Task 2: Common look and feel
- Task 3: Search for an online service
- Task 4: Downloading application form
- Task 5: Proper Alerts Translation
- Task 6: Search box
- Task 7: Service registration
- Task 8: Customer support
- Task 9: directory of services
- Task 10: Home page

Analyzing the experiment results of the thirty participants will identify the root causes of usability problems if any and will determine whether Arabic or English are more usable to use on Dubai Municipality website.

### **4.1.1 Task 1 – Getting started**

The task starts by asking the participant to launch an Internet Explorer browser and to type the website URL. The Arabic version of the website is downloaded, as the default language of the website. The participant is then asked to explore the page and to find the language switch button and switch to the English version of the website.

Measuring the ease of finding and switching to English is measured in this task on a 5-point scale, where 1 is being easy and 5 is being difficult. The results are as following:



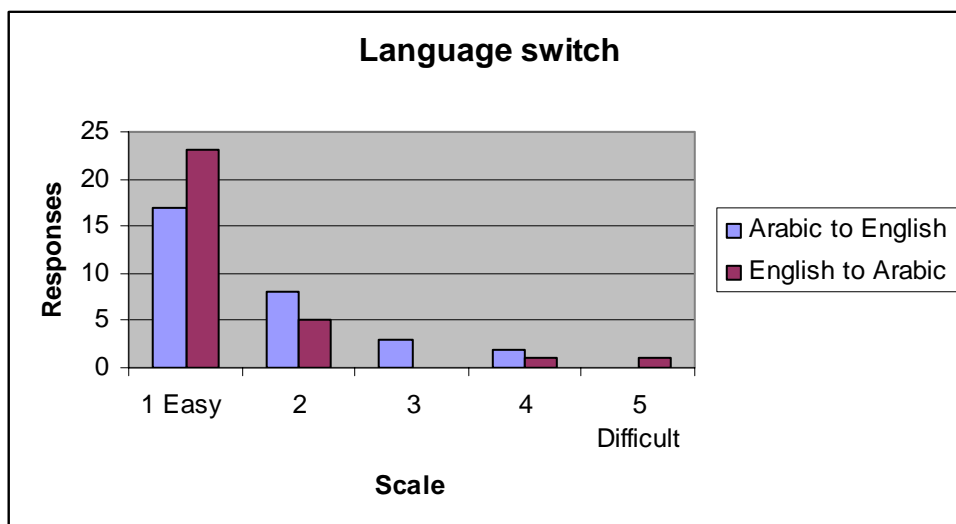


Figure 4-1: Language switch chart

Key	Arabic to English	English to Arabic
1 Easy	17	23
2	8	5
3	3	0
4	2	1
5 Difficult	0	1
Total	30	30

Table 4-7: Getting started data summary

Results show that 25 out of 30 respondents found it easy to switch from the Arabic version of the website to the English. On the other hand, 28 out of 30 respondents found it simple and easy to switch from the English version of the website to the Arabic. This gives an indication that the location of the switch buttons and the process of switching between Arabic and English versions of Dubai Municipality website are equally easy, comprehensible and straightforward.

The analysis of the data was done at 95% confidence. A t-test was performed and the t-value was found to be 3.500 which are greater than 2.045. A mean difference of 0.267 has been calculated. The 2.5% point of the t-distribution with 29 degrees of freedom is 2.045. The 95% confidence interval for the true mean difference is 1.67 and 1.4. The next step was to compare the means of the two data sets. The mean score for switching from Arabic to English was 1.67 and 1.4 for switching from English to Arabic. The difference between them is very minimal; therefore, it is true that the switch from Arabic to English and vice versa is equally easy. One of the possible

reasons for this could be the convenient location. Another reason could also be related to the icon it self, as it includes a text and an image of the switch language. The use of icons is strongly recommended to use as discussed in the localised cultural markers in the literature review.

#### **4.1.2 Task 2 – Common look and feel**

The concept of the common look and feel generally refers to the user interface. As defined by Dubai eGovernment standards “the branding elements of a website should convey a single, unified message to all stakeholders”. In this task the common look and feel covered areas such as accessibility, layout (header and footer) and colour schemes. The common look and feel of Dubai Municipality and design consistency has been tested.

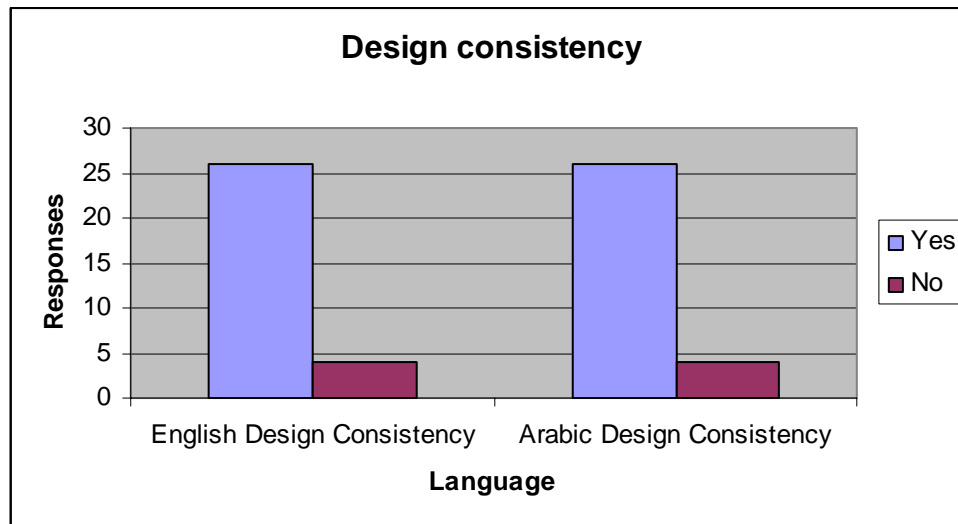
The analysis of the data was done at 95% confidence. A t-test was performed and the t-value was found to be 0.000 which is less than 2.045. A mean difference of 0.00 has been calculated. The 2.5% point of the t-distribution with 29 degrees of freedom is 2.045. The 95% confidence interval for the true mean difference is 0.867 for both. The next step was to compare the means of the two data sets. The mean score for both languages is the same. This means that Arabic and English are identical in terms of the header and footer, colour scheme; English is a mirror of the Arabic and vice verse in terms of design.

The results illustrated in table 9 and figure 2 show that there is equality between Arabic and English. Where 26 out of 30 (86.67%) respondents agreed that there is a design consistency and the common look and feel between Arabic and English, as shown in the table below (table 9). This again reflects that the header and footer, colour scheme are equal on both languages and the English is a mirror of the Arabic and vice verse in terms of design

The common look and feel could not only be measured through one usability task. Further questions will be analyzed later in the experiment and online questionnaire; in order to give clear indication whether the statement is true. This will be discussed further in the hypothesis section.

Key	English Design Consistency	Arabic Design Consistency
Yes	26	26
No	4	4

**Table 4-8: Design consistency data summary**



**Figure 4-2: Design consistency chart**

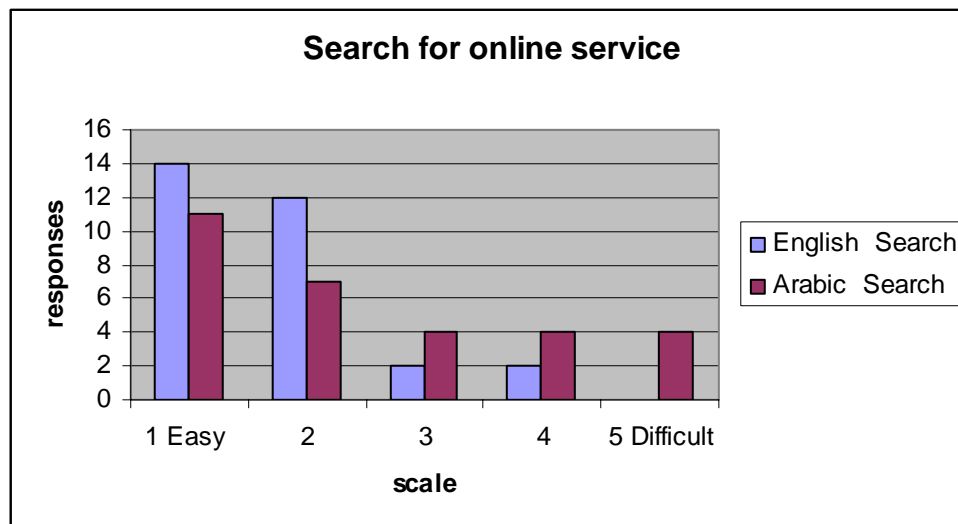
### 4.1.3 Task 3 - Search for an online service

Searching for an online service is one of the important tasks to be tested. The selected service to search for is booking Al Memzar Park Chalet, a service any citizen or resident would like to use. The participants were asked to search for the service and evaluate the process of searching on a 5-point scale, where 1 is being easy and 5 is being difficult. The time to complete the task has also been recorded.

The analysis based on the scale show that the English search results show that almost 26 out of 30 participants found the search for the online service easy; the other 4 responses indicated that the search was not easy but yet not difficult. The Arabic search results were different. Only 11 out of 30 found the search easy. 4 participants described the process as difficult and 8 participants described it as hard and tricky, as illustrated in the table 10 and figure 3 below.

Key	English Search	Arabic Search
1 Easy	14	11
2	12	7
3	2	4
4	2	4
5 Difficult	0	4

**Table 4-9: Search for online service data summary**



**Figure 4-3: search for online service**

During the observation the participants used different approaches to search for the online service. The majority used the default category in the Directory of Services page, others used the advanced search tab available in the same page, and fewer used the search box located above the main menu.

The time to complete the search task has been calculated. The minimum time scored to search for the service in the English website was 0:43:31 seconds and the maximum time was 2:52:34 minutes. On the Arabic version of the website, it took 0:17:54 seconds as the minimum and 6:33:56 minutes as the maximum. In real life search, users tend to give up fairly quickly but for the sake of the experiment the participants insisted to find the online service.

	English	Arabic
Minimum	0:43:31	0:17:54
Maximum	2:52:34	6:33:56
Median	1:09:18	1:04:57
Average	1:20:19	1:34:38

**Table 4-10: Time data summary**

In addition, the analysis data was also done at 95% confidence. A t-test was performed and the t-value was found to be -3.181 which is less than 2.045. A mean difference of -0.7 has been calculated. The 2.5% point of the t-distribution with 29 degrees of freedom is 2.045. The 95% confidence interval for the true mean difference is 1.7 and 2.4. The next step was to compare the means of the two data sets. The mean score for the English search was 1.7 and for the Arabic it was 2.4. So the English search is faster and easier than the Arabic. One of the possible reasons for this could be the users felt more comfortable using English search. The reason could be that users believe that search results are more accurate in English, and English keywords are easier to think of. Another reason could be the fact that English keys on the keyboard are much easier to memorize than the Arabic.

#### **4.1.4 Task 4 - Downloading application form**

Task four, considered a supporting question. It assesses the document downloading concept on both website languages. As seen from the results below (Table 4-11), most participants faced problems while performing this task. The problems could be summarized as browser problem which is the popup blocker, Adobe Acrobat software not installed, no clear directions on where to click to download the application form.

The browser problem was studied by referring back to Microsoft (2004) website to understand why most of the users faced this problem. Microsoft (2004) website stated “the Pop-up Blocker is a new feature in Internet Explorer. This feature blocks most unwanted pop-up windows from appearing which means it will block most automatic pop-ups. By default, the Pop-up Blocker is turned on”.

The second problem users faced was with Adobe Acrobat. The website, on both languages, did not point out that Adobe Acrobat software is a pre-requisite and ought to be installed on the machine for the user to be able to download the file. It is here suggested to open the application form within the same browser to overcome this problem.

Another major problem which faced the participants was the misleading text on the three buttons available at the bottom of the form page, as illustrated in the screenshot,

Appendix 3, figure 1 and 2. No button explicitly stated the word “download” for the user to click and download the form. The same issues were noticed on the Arabic version of the website. Couple of participants suggested adding icons beside the form’s name, where the user can open, download, save the form or even bookmark the page.

For those who successfully downloaded the application form on the English version of the website, they noticed that the form is only written in Arabic and there is no proper translation of the text. This issue will be analyzed in task 5.

Key	English	Arabic
Yes	19	19
No	11	11

**Table 4-11: Downloading form data summary**

#### **4.1.5 Task 5 – proper alerts translation**

Alerts were measured as one of the usability criteria on Dubai Municipality website. Task number 5 asked the participants to find the feedback form on the website. The task measured the number of wrong clicks through the tally sticks method and alerts translation. The feedback form is located under the Contact Us button which is one the top header of the page.

Wrong clicks	English	Arabic
Minimum	0.00	0.00
Maximum	7.00	9.00
Median	2.50	3.00
Average	2.67	3.33

**Table 4-12: Number of wrong clicks data summary**

Hypothesis seven was tested in this task. The analysis of the data was done at 95% confidence. A t-test was performed and the t-value was found to be -1.650 which is less than 2.045. A mean difference of 0.066 has been calculated. The 2.5% point of the t-distribution with 29 degrees of freedom is 2.045. The 95% confidence interval for the true mean difference is 2.67 and 3.33. The next step was to compare the means of the two data sets. The mean score for finding the feedback form on English was

2.67 and for the Arabic feedback form it was 3.33. One of the reasons for this could be the participants did not expect the feedback form to be located under the contact us category. The observation proved that the participants' wrong clicks were mostly on Have Your Say link, eComplain System banner and My View Counts box. Most participants commented that the feedback form that should be separated from the contact us content. The contact us is used for contact numbers, help desks, department location and other related information. Another possible reason could be that improper naming of the category "Contact us", where the user was not able to recognize that the feedback form would be related to this category. The solution could be by having a separate link for the feedback.

Proper alerts translation was also measured in task 5. The user was asked after finding the feedback form to click on the submit button and notice the alerts. The English feedback form displayed English alerts check screen shot (Appendix 3, figures 3). However, the Arabic feedback form displayed English alerts after clicking on the submit button (Appendix 3, figures 4). As a result, the alerts on the Arabic version of Dubai Municipality website are not handled properly.

Hypothesis four was tested through this task. The analysis of the data was done at 95% confidence. A t-test was performed and the t-value was found to be -7.142 which is less than 2.045. A mean difference of 0.7 has been calculated. The 2.5% point of the t-distribution with 29 degrees of freedom is 2.045. The 95% confidence interval for the true mean difference is 0.833 and 0.133. The next step was to compare the means of the two data sets. The mean score for having well translated English alerts was 0.833, and the mean for having Arabic translated alerts was 0.133. This means that the English alerts are very well handled than the Arabic alerts. One of the possible reasons for this could be the website developers are not familiar with Arabic, therefore they cannot write Arabic alerts. The other reason that could be thought of is the assumption which Dubai Municipality management has that most website users will use the English version of the website, or they are bilingual users and would understand the alerts. This problem needs to be fixed by testing all alerts again and providing the website developers with the correct translation.

In summary, Dubai Municipality website needs to focus more of customer service by providing online support, emergency numbers, highlighting the latest rules and procedures. In addition, the alerts need to be customized per language.

#### 4.1.6 Task 6 – search box

Search is one of the most important design elements on a website, where should be easily found and available from every single page on the website. Task six, considered as a supporting question to hypothesis 7, asked the participant to look for the search box and perform a simple search query. The purpose of this task is to make sure that search box is located at a convenient place and accessible by all users.

Usability experts discuss the search interface as a text box where users can enter their queries, combined with a single button labelled Search. It should usually be in the top right of the page, preferably, since that is where users look for it. The search box width, as recommended, should make the search boxes 27 characters wide, which is enough for 90 percent of users' queries. Cutting off a bit of the query for 10 percent of users is a usability trade-off that most websites should be willing to make in order to conserve space, since the search box should be on every page (Nielsen and Loranger, 2006).

The participants' results on this task show that 28 out of 30 respondents found the search location convenient and easy to find on both Arabic and English, as illustrated in the table below. The reason that can be attributed to the focus is the fact that the location of the search is above the eye-catching location of any website which is above the main navigation. However, some participants gave comments on the search box such as: they prefer the search box to be located at the top of the page; another comment is to have a bigger search field and a bigger button. It is suggested to locate the search box at the top of the page as advised by the usability experts.

Convenient and easy to find	English Location	Arabic Location
Yes	28	28
No	2	2

Table 4-13: Search location



#### 4.1.7 Task 7 – Service Registration

The Public User Registration form is the fundamental form on Dubai Municipality site, where all website users must fill in order to register to any service related to Dubai Municipality. Therefore, it is crucial to examine and assess the form and see how users respond to it.

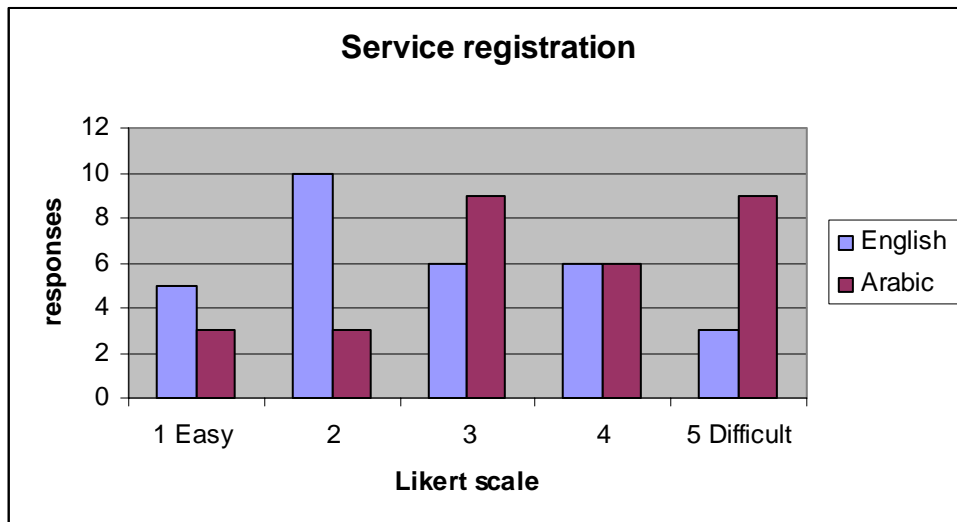
The form could be filled through two different scenarios. The first scenario starts when the user clicks on the register button located under the login box. A new browser is opened asking the user to select the category which best describes his group in addition to request for new password (See: Appendix 3, figure 5). The second scenario is by clicking on the Apply button on the service, a small window is launched requesting the user to enter the access information or register for the service (Appendix 3, figure 6). Clicking on the Register button would open the user management page ( Appendix 3, figure 5).

The results for the English experiment were analyzed and almost 50% of the participants believed that filling the form is easy, 20% found the process neutral and 30% of the participants found the process of filling in the user registration form difficult. The results show that the participants were comfortable with the overall filling process.

On the other hand, the Arabic results were also studied, the findings showed that 50% of the participants believed that filling the form is difficult, 30% found the process neutral and 20% of the participants found the process of filling in the user registration form easy, as show in the table and chart below. Lack of text translation and not having proper instructions were part of the main reasons the Arabic test scored low.

Service Registration	English	Arabic
1 Easy	5	3
2	10	3
3	6	9
4	6	6
5 Difficult	3	9

**Table 4-14: service registration data summary**



**Figure 4-4: Service registration chart**

Another essential part of the registration form, that was also part of the usability experiment, is assessing the process of selecting a service from the service box “Available Services and Roles” (Appendix 3, figure 7). This is where the user should select the services he wishes to enrol in. The results show that 66.6% on the English test and 63.3% on the Arabic test believed and experienced difficulties in understanding the process of selecting a service from the service list. In addition, 36.67% on both tests found the process neutral, as illustrated in Table 4-15 and Figure 4-5.

The process of selecting the service is complicated and no clear directions are given to the user. The user should discover by trial and error and reading alerts how to register for the service.

Service Selecting	English	Arabic
1 Easy	3	1
2	3	3
3	4	7
4	11	8
5 Difficult	9	11

**Table 4-15: Service selecting data summary**

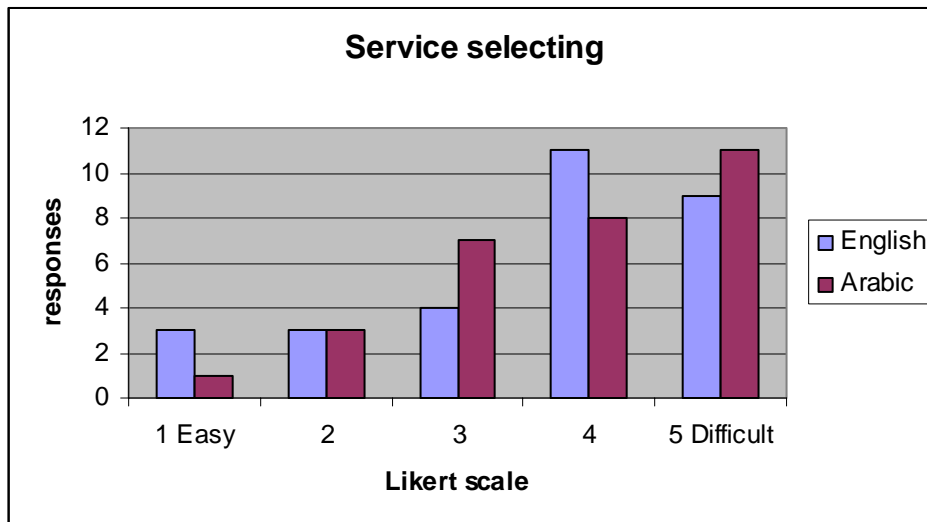


Figure 4-5: Service selecting chart

Having a quick glance at the form, the form should be fully bilingual and proper support and assistance should be available to make it easier and usable for all users.

#### 4.1.8 Task 8 – Customer support

Customer support question is an open-ended question and a supporting question to hypothesis six. It measures the overall customer support concept on the website, and not the differences between Arabic and English. The reason is to highlight the importance of the customer support which helps the website become trustier. The question asked the participant about the actions they would take in case they were searching for particular information and could not find it on the website. Summarizing the comments, it all evolved around the same ideas:

- Calling the department
- Sending an email
- Calling 700040000 – Dubai eGovernment Call Centre
- Looking for the FAQ section on the website

This is an indication that Dubai Municipality website should focus on making the department and helpdesk number clear for users to have quick and easy access too. It is also essential to provide an email and a help or frequently asked questions section on the website, in order to make the website a reliable source.

#### 4.1.9 Task 9 - Directory of services

The Directory of Services page provides lists of services either by category, department or by using the advanced search. The purpose of this question is to determine how well each of the search strategies and evaluating the overall concept of having multiple ways to search for a service, as a usability concept. The results of this supporting task will be analyzed per search strategy.

The Advanced Search Tab on the Directory of Services achieved the highest percent in terms of easiness on the English version of Dubai Municipality website, it scored 100%, and this means all participates found this option clear and easy to use. The second easy way to search was the Department Tab and it scored 56.67%. The Category Tab scored 53.33% of total participants' responses as shown in Table 4-16 and chart below (figure 4-6). Equally, both the Category and Department Tabs scored 33.33% percent of difficulty.

English	Category Tab		Department Tab		Advanced Search Tab	
1 Easy	9	53.33%	7	56.67%	28	100%
2	7		10		2	
3	4	13.33%	3	10.00%	0	0%
4	8	33.33%	6	33.33%	0	0%
5 Difficult	2		4		0	

Table 4-16: Directory of services - English data summary

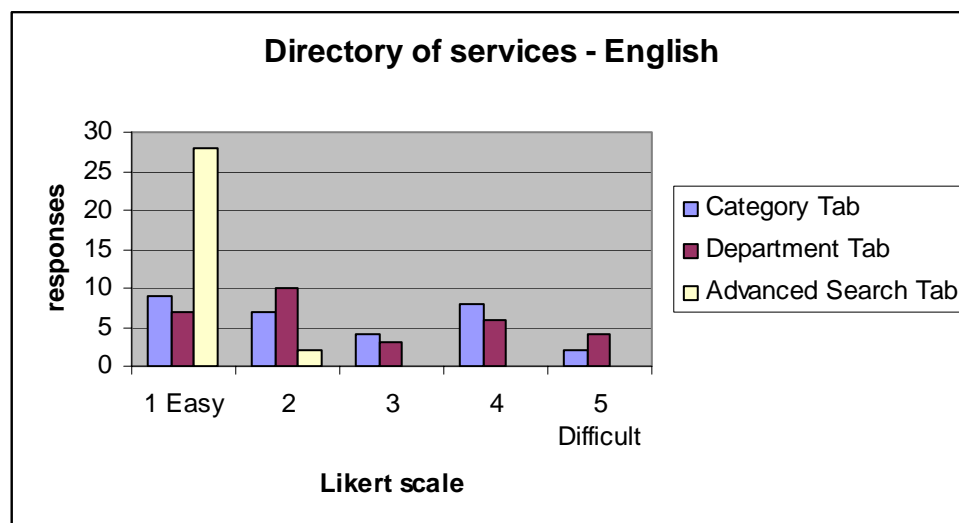
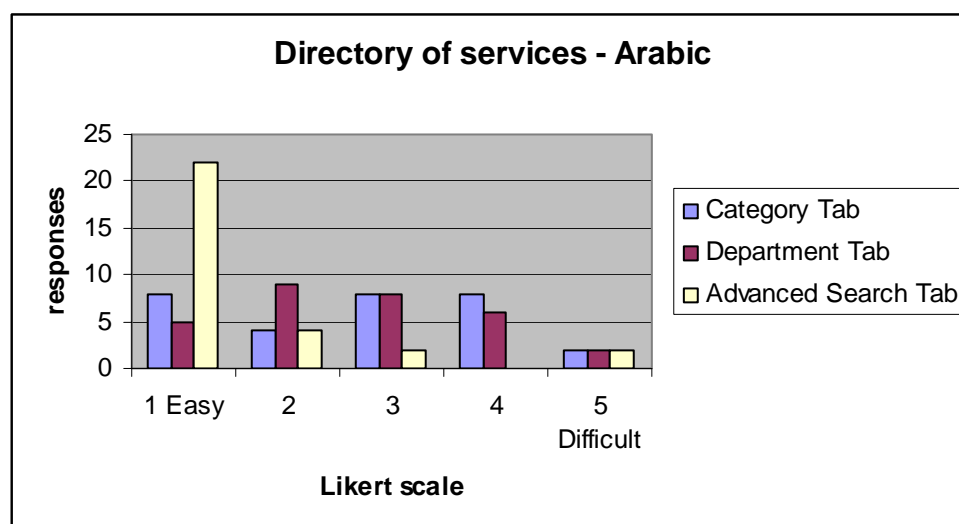


Figure 4-6: Directory of services - English chart

In parallel, on the Arabic version of Dubai Municipality, the Advanced Search Tab was ranked first with 86.67%. The Department Tab comes next in easiness and it scored 46.67%. The Category Tab comes last and scored 40% on easiness. In contrast, the Category Tab scored the highest score on difficulty, 33.33% and the Advanced Search Tab scored 6.67% as shown in table 18 and figure 14 below.

Arabic	Category Tab		Department Tab		Advanced Search Tab	
1 Easy	8	40.00%	5	46.67%	22	86.67%
2	4		9		4	
3	8	26.67%	8	26.67%	2	6.67%
4	8	33.33%	6	26.67%	0	6.67%
5 Difficult	2		2		2	

**Table 4-17: Directory of services - Arabic data summary**



**Figure 4-7: Directory of services - Arabic chart**

In conclusion, the usability experiment observer, believes that the participants did not evaluate this question accurately. The reason, from my point of view, the Advanced Search Tab was ranked the highest in the English version of the website is because the participant was given the name of service and therefore they could easily search for it where this would not be the case in a real time scenario.

The observer also believes that the use of tabs to alternate between views within the same context is very useful. Therefore, the observer supposes the Category Tab would

be the default tab and combined with the Advanced Search Tab. The tabs should be used in a clear and obvious way, in order to make a good use out the section.

#### 4.1.10 Task 10 – Home page

The last task in the experiment, which is a follow-up question which contributes to the design consistency hypothesis, directed the participants attention to the home page, the main purpose is get their comments and opinions on a 5-point scale 1 being wonderful and 5 is being terrible. The English website version results show that 33.3% of the participants thought the home page is wonderful, 23.3% considered the homepage neutral and 40% of the participants believed the homepage was poor. The Arabic website results were equivalent to the English. 30% of the participants thought the home page was wonderful, 36.67% considered the homepage neutral and 33.33% of the participants believed the homepage was poor.

Homepage	English		Arabic	
1 Wonderful	5	33.333%	4	30%
2	5		5	
3	7	23.330%	11	36.67%
4	8	40%	6	33.33%
5 Terrible	4		4	

**Table 4-18: Home page evaluation data summary**

One of the possible reasons for English home page being better than Arabic is the font size used. The Arabic font is small as will be discussed in the questionnaire analysis. The other reason could also be the number of banners used.

## 4.2 Questionnaire Analysis

The online questionnaire questions are divided into five main categories, experiment supporting questions, navigation, presentation layer, font and overall quality. This section will analyze and explain each question, and will include a summary.

### 4.2.1 Experiment supporting questions

There are five questions in the online questionnaire which are general supporting questions to the usability experiment. Question five was “You felt more confident using which language of the website”. This question is related to the fifth hypothesis, which states, users are equally confident while browsing the Arabic or English website.

The analysis of the data was done at 95% confidence. A t-test was performed and the t-value was found to be 22.692 which is greater than 2.045. A mean difference of -0.533 has been calculated. The 2.5% point of the t-distribution with 29 degrees of freedom is 2.045. The 95% confidence interval for the true mean difference is 0.233 and 0.767. The next step was to compare the means of the two data sets. The mean score for the Arabic respondents was 0.233 and for the English respondent it was 0.767. So the participants felt more confident browsing the English website rather than the Arabic. One of the possible reasons for this could be the confident level the users experiences while using the English website. Another reason could be related to the participants themselves, as they tend to use English more than Arabic in their daily life, therefore, they feel more confident. The other reason could be English phrases and words are more comprehensible. This could also be related to the Standard Arabic language used on the site, as users are used to communicate in a different dialect.

You felt more confident using which language of the website		
Arabic	7	23.33%
English	23	76.67%
Total	30	

Table 4-19: Question 5 data summary

Question six asks the participants “If you had the chance to fill an online form again, in which language will you perform this task?”. This question is considered a follow-up question to deeply analyze which language is more usable than the other. Out of the respondents, 25 (83.33%) will use English to fill online forms and 5 (16.67%) will perform this tasks in Arabic, as shown in the table below.

If you had the chance to fill an online form again, in which language will you perform this task?		
Arabic	5	16.67%
English	25	83.33%
Total	30	

**Table 4-20: Question 6 data summary**

The participants were asked for the reason to choose English to fill an online form:

- I am more familiar with the English websites
- It is easier and faster to read
- All online forms that I have used were in English, so I am used to them more than Arabic.
- More clear
- More comprehensible
- Arabic is difficult to me
- Forms were mostly in English

Question eleven asked “If you had the chance to search for information, in which language you will perform this task?”. This question is directly related to hypothesis seven. Out of the respondents, 23 (76.67%) will use English to fill online forms and 7 (23.33%) will perform this tasks in Arabic, as shown in the table below.

If you had the chance to search for information, in which language you will perform this task?		
Arabic	7	23.33%
English	23	76.67%
Total	30	

**Table 4-21: Question 11 data summary**

The participants were asked for the reasons they prefer searching for any information in English rather than Arabic:

- I am more familiar with the English websites
- Arabic use different words for the search while English is only the English Language.
- I have always performed my searches in English, especially for my university work which was mostly in English.
- I feel more comfortable
- Search results are more accurate in English.



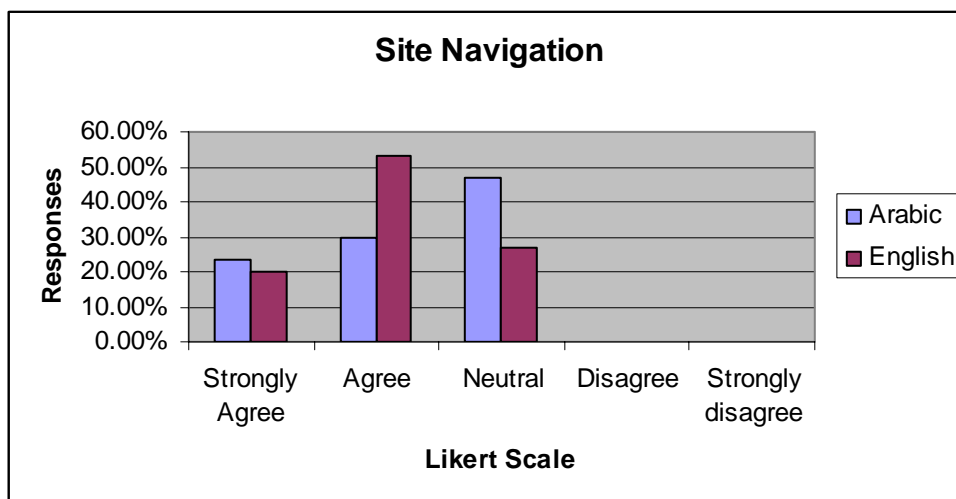
- Keywords are easier

The analysis of the data was done at 95% confidence. A t-test was performed and the t-value was found to be -1.650 which is less than 2.045. Mean difference of -0.533 has been calculated. The 2.5% point of the t-distribution with 29 degrees of freedom is 2.045. The 95% confidence interval for the true mean difference is 0.233 and 0.767. The next step was to compare the means of the two data sets. The mean score for the Arabic respondents was 0.233 and for the English respondent it was 0.767. So the participants found that finding a service or information content is easy in English. One of the possible reasons for this could be connected to how well the website navigation is structured or yet another reason is the related to the search tool used on the website. This question is related to multiple other factors which will be handled when discussing the hypothesis.

In summary and as a preliminary finding the English version of the website is more usable by users. The data collected supports this finding; the answers clearly show that the participants felt more confident using English side of the website, will perform any online transaction in English and will search for information in English.

#### **4.2.2 Navigation**

Navigation question comes next which is related to hypothesis eight. The participants were asked if the Arabic navigation design made the site easy to navigate or the English navigation design made the site easy to navigate. Out of the 30 respondents, 53.33% agreed that the English site navigation is easy. In addition, 46.67% agreed that the Arabic site navigation is easier too, as illustrated in the column chart below.



**Figure 4-8: Arabic/English Navigation**

The analysis of the data was done at 95% confidence. A t-test was performed and the t-value was found to be 16.560 which is greater than 2.045. A mean difference of 0.00 has been calculated. The 2.5% point of the t-distribution with 29 degrees of freedom is 2.045. The 95% confidence interval for the true mean difference is 6 and 6. The next step was to compare the means of the two data sets. The mean score that there is differences between the Arabic or English navigation, and they are equally easy to navigate. The reason could be related to the design consistency and the location of the navigation menus.

In summary, the figure above show that both the Arabic and English site navigation is clear and understandable to the participants and site users. However, through the experiment observation, some participants had a slight problem in dealing with the navigation menu. The error occurs when the user clicks on the menu icon as an example DM Services instead of mouse hovering over the icon.

Dubai Municipality website is using an indicator which shows the user is in the context of the website hierarchy which is called breadcrumbs. The breadcrumb (Appendix 3, figure 9 and 10) shows the path from the homepage to where the user is. Although this is a good navigation scheme, Dubai Municipality has failed to benefit from. The breadcrumb is only used in the Directory of Service pages, and when clicking on it to return to the “Main” or “الصفحة الرئيسية” it would take the user back to the Directory of Services page. As a result, it is a misleading navigation link.

### 4.2.3 Presentation layer

Dubai Municipality presentation layer was assessed through questions thirteen to sixteen; the assessment was on the graphics, design elements such as banners, amount of information displayed and colours used in the website. The questions are considered to be supportive and follow-up question to the main hypotheses.

There is a good use of graphics in the site as agreed by 43.33% of the participants and 33.33% rated the use of graphics as neutral. As illustrated in the column chart and table below.

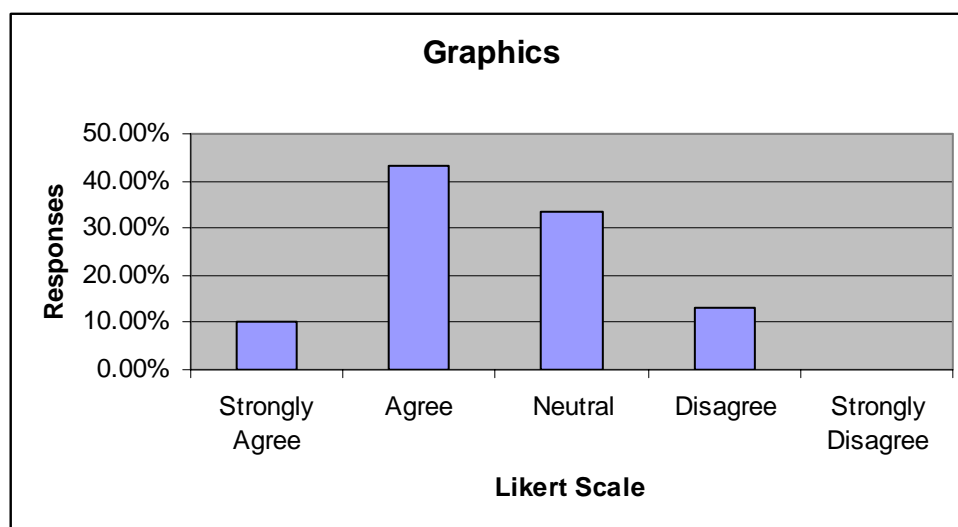


Figure 4-9: Use of Graphics

The use of graphics is very appropriate for this site.		
Strongly Agree	3	10.00%
Agree	13	43.33%
Neutral	10	33.33%
Disagree	4	13.33%
Strongly Disagree	0	0.00%
Total	30	

Table 4-22: Question 13 summary data

Question fourteen asked the user whether “The design elements are not annoying or distracting.” Most of the participants disagreed with the statement, where the design elements are annoying and distracting as shown in the table below. Most participants highlighted that there are a lot of banners on the page which distracts them and the

concept of multiple boxes on the home page distracting their attention too. One of the participants commented “what does an Audi banner need to do on a Municipality website?”

The design elements are not annoying or distracting.		
Strongly Agree	3	10.00%
Agree	9	30.00%
Neutral	8	26.67%
Disagree	10	33.33%
Strongly Disagree	0	0.00%
Total	30	

**Table 4-23: Question 14 data summary**

Question fifteen assessed the amount of information displayed on Dubai Municipality website, “The amount of information displayed is just right”. Around 53.33% thought the amount of information displayed is appropriate. However, 23.33% were impartial, and 23.33% thought that the amount of information is not sufficient.

The amount of information displayed is just right.		
Strongly Agree	3	10.00%
Agree	13	43.33%
Neutral	7	23.33%
Disagree	6	20.00%
Strongly Disagree	1	3.33%
Total	30	

**Table 4-24: Question 15 data summary**

Colours are part of the website presentation layer and were assessed in question sixteen as it can impact the user overall satisfaction of the website. The question asked the participants if the website colours are pleasant. The majority 90% of the participants agreed that the colours are satisfying and pleasing as reflected in the data summary table below. Referring back to the colour-cultural markers chart discussed in the literature review section. The colour blue illustrates virtue, faith and truth to the Middle Easterner.

The colours in this website are pleasant		
Strongly Agree	6	20.00%
Agree	12	40.00%
Neutral	9	30.00%
Disagree	3	10.00%
Strongly Disagree	0	0.00%
Total	30	

**Table 4-25: Question 16 data summary**

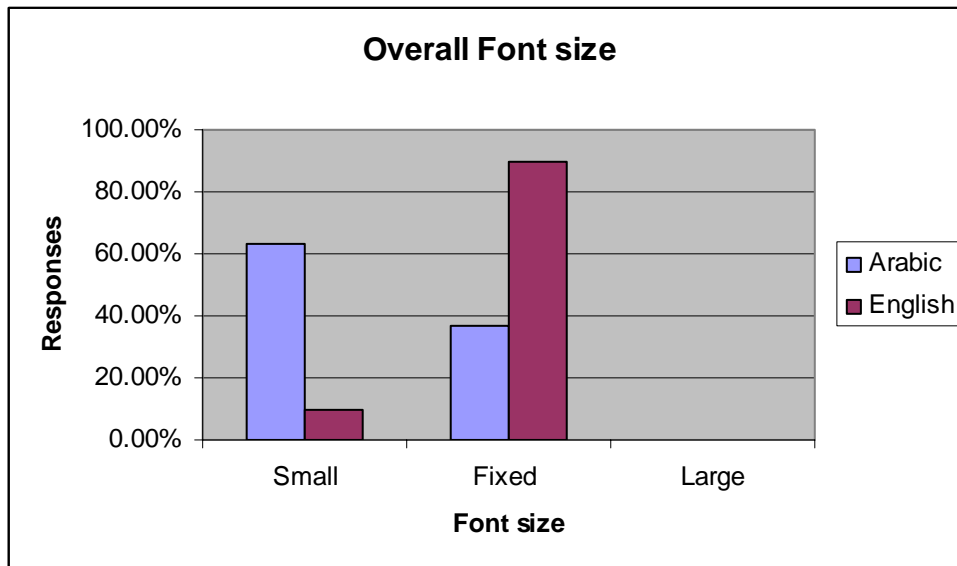
In summary, considering the interplay of graphics, design elements, content and colour and the interplay of user, website manager and marketing business requirements, it is never to easy to launch a culturally-component web user interface that meets the needs of the users and business owners. Indeed, Dubai Municipality website has reached a level of satisfaction in adapting to local cultures.

#### **4.2.4 Text size**

Participants' satisfaction on the website text size was measured in question seventeen. The results showed that 63.33% of the participants considered the Arabic font small and not good enough for the web. On the other hand, 90% of the participants are in agreement that the English font size is just good enough for web use.

Overall font size	Arabic	English
Small	63.33%	10.00%
Fixed	36.67%	90.00%
Large	0.00%	0.00%

**Table 4-26: Question 17 data summary**



**Figure 4-10: Overall font size**

This is one of the important supporting questions to multiple hypotheses. As it plays an important role in the design, finding content or information content and the website navigation hypotheses. Analyzing Dubai Municipality Arabic homepage, it is true that there is inconsistency in font type and size through the website especially in the homepage, top header, breadcrumb and Directory of services (Appendix 3, figure 11 and 12).

In summary, the Arabic version of Dubai Municipality website has reduced the level of readability of most of the participants. The users preferences should be respected by allowing them resize the text as needed using the Web browser's "text size" button.

#### **4.2.5 Overall quality**

Finally, the overall quality of the website was assessed from question eighteen to twenty. The idea is ensure that the purpose of the website is clearly understood by the participants, it is easy to navigate and understand the list of services and finally rate the website taken as a whole.

As the data summary of question eighteen below show, the purpose of the website is clearly known and understood by the participants. Almost 83% of the participants understand the purpose of the site and agree about it.

I understand the purpose of this site		
Strongly Agree	6	20.00%
Agree	19	63.33%
Neutral	3	10.00%
Disagree	2	6.67%
Strongly Disagree	0	0.00%
Total	30	

**Table 4-27: Question 18 data summary**

Although the majority of the participants agreed regarding understanding the concept of Dubai Municipality website, the website is missing an important feature, which is a welcome statement (tagline) which describes the purpose of the site or an overview of the site. The welcome statement (tagline) is a clear and simple way to tell the user what site they have reached, this will help people who come from search engines or who follow links from other sites. Taglines should appear right below, above, or next to the website ID. Taglines are a very efficient way to get the message across because they are the one place on the page where users most expect to find a concise of the website purpose.

Question nineteen asked the participants if they clearly understand the services of Dubai Municipality by looking at the site, 36.67% disagreed and 23.33% found it neutral as shown in the table below. I strongly agree with the participants whom disagree with this question. One of the reasons for users to visit the website is to search or register for a service, therefore, the services that are offered by Dubai Municipality should be highlighted on the homepage.

I clearly understand the services of Dubai Municipality by looking at the site		
Strongly Agree	2	6.67%
Agree	10	33.33%
Neutral	7	23.33%
Disagree	11	36.67%
Strongly Disagree	0	0.00%
Total	30	

**Table 4-28: Question 19 data summary**

Finally, the overall website was assessed by the participants. Total responses of 63.33% gave the website an average score, as illustrated in the table below.

Based on your experience, how would you rate the quality of this website?		
Very high quality	1	3.33%
High quality	8	26.67%
Average	19	63.33%
Below average	2	6.67%
Unacceptable	0	0.00%
Total	30	

**Table 4-29: Question 20 data summary**

In conclusion, Dubai Municipality website scored an average score by thirty participants whom undertook the usability experiment. Because people are flexible and will try again Dubai Municipality must continue to monitor the quality level of your user experience as they introduce more advanced task support, and as users' expectations for usability increase over time. Therefore, it is “wise to adapt some of the six sigma methodologies to aid our quest for improved Web quality” as stated by Nielsen (2003).

### 4.3 Hypothesis Analysis

There are eight hypotheses in which the usability experiment and online questionnaire were built on. They are as following:

- Hypothesis 1: Switching between the two different versions of the website (Arabic/English) is equally easy.
- Hypothesis 2: Arabic and English are identical in terms of design look and feel.
- Hypothesis 3: Search is equally fast in Arabic and English.
- Hypothesis 4: Arabic and English alerts and forms are well translated.
- Hypothesis 5: Users are equally confident while browsing the Arabic or English website.
- Hypothesis 6: Customer service feedback form is easy to find on both Arabic and English.
- Hypothesis 7: Finding a service or information content is equally easy in Arabic and English.
- Hypothesis 8: English and Arabic are equally easy to navigate.

As explained in the Methodology chapter, the decision rule for rejecting the hypothesis is to reject  $H_0$  if  $t \leq 2.045$ . After doing all the calculations the hypothesis



was rejected for number two, three, four, six and seven, and was accepted for the rest of the hypotheses as presented in the table below.

Hypothesis	N	Mean	Stand Dev	Population of Standard Dev.	t-value	Reject Hypothesis if < 2.045
1	30	0.267	0.694	0.117	3.500	accept hypothesis
2	30	0.000	1.034	0.188	0.000	reject hypothesis
3	30	-0.700	1.207	0.220	-3.181	reject hypothesis
4	30	-0.700	0.538	0.098	-7.142	reject hypothesis
5	30	1.77	0.43	0.078	22.692	accept hypothesis
6	30	0.066	0.253	0.046	1.434	reject hypothesis
7	30	-0.600	1.993	0.363	-1.650	reject hypothesis
8	30	2.070	0.690	0.125	16.560	accept hypothesis

**Table 4-30: Results of the t-value test**

The first hypothesis which states that switching between the two different versions of the website (Arabic/English) is equally easy has been accepted which means that the null hypothesis is accepted and it is concluded that there is insufficient evidence to prove that the one alternative is better than the other. Therefore, they are equal. The hypothesis was tested through the usability experiment, where the first fifteen participants were requested to open the website and examine the English website and then switches to the Arabic, the other fifteen participants explored the Arabic website and then switched to the English. The result show, more than 83% of the respondents considered the switch from Arabic to English easy, and more than 93% of the respondents thought that the switch from English to Arabic is easy and straightforward. The result reflects an important point, the easy switch from Arabic to English and vice versa is because of the noticeable and convenient location of the language switch button. The importance of the question lies in helping the website management take a decision on the language (Arabic/English) that shall be used as a landing page for the website.

The second hypothesis which is related to the design consistency (common look and feel) between English and Arabic has been rejected, which means that one of the website languages is better in design than the other. The common look and feel covered areas such as accessibility, layout (header and footer) and colour schemes.

The hypothesis was tested through two measurers, the usability experiment and the online questionnaire. In the usability experiment task, the participant had the chance to explore both the English and Arabic website and then comment if the design consistency is across the two languages. The responses were equivalent to both languages were 86.67% of the respondents agreed that there is a design consistency between Arabic and English. The responses however, go against the hypothesis.

Considering the questions on the online questionnaire, as part of the second hypothesis, the participants had to rate the overall presentation and text size of both Arabic and English. Under the presentation category, the participants had to rate the use of graphics on the Arabic and English side, the amount of information displayed and the colour scheme. The results of the questions are the same to some extent for both Arabic and English. The use of graphics as highlighted by the participants is very suitable and fitting, especially the images used on the page header which reflected a sky shot of the country. Almost 53.33% agreed that there is a consistency in use of graphics. The responses on the amount of information displayed showed that the information is clear and easy to find and there is no clutter or confusion. The majority, 90% of the participants, agreed that the colours are satisfying and pleasing. On the over hand, the importance of web site readability is very essential and has been measured through the online questionnaire. The findings of this question show that more than 63% of the participants found the Arabic font small and difficult to read, and 90% found the English readable and easy to read. In conclusion, rejecting the null hypothesis is true and one of the languages is better than the other. In this case and as the results demonstrate, it seems that English is better than Arabic, where the website readability made the distinction. Arabic version could be made better and readable by increasing the text size and unifying it across all pages.

The third hypothesis states that search is equally fast in Arabic and English has been rejected, which means that searching one of the website languages is faster than the other. The search location was tested using the usability experiment and a supporting question in the online questionnaire. The usability experiment task asked the participants to look for the search box and search for a specific word. The results for searching on both Arabic and English were alike. Both Arabic and English scored 93.33%, which means that the participants found the search location convenient and

easy to find. Further analysis has been done through the online questionnaire to be aware of the preferred language participants would use. The results illustrate that 76.67% of the responses would use the English search to search for any information, while 23.33% chose the Arabic. The participants were then asked to give a reason for their choice. Most of the responses were between feeling comfortable using English search, others believed that search results are more accurate in English, and English keywords are easier to think of. In conclusion, rejecting the null hypothesis is true and English search does perform better than Arabic. Although it has not been statistically justified the reasons the English search performs better could be related to the search utility it self. Most or probably all search engines face problems with the Arabic language feature related to Arabic stemming of words as an example the search results differ or may not be found between if searched for “الدفع الإلكتروني” (e-payment or ePay) and “الدفع الالكتروني”, or between (official) “مسئول” and “مسئول” although they carry the same meaning but might differ in spelling. Another reason could possibly be typing in Arabic as it requires switching the keyboard language and then typing. Most participants faced some difficulties and were slow in typing. Enhancing the search tool or providing an online keyboard may help in solving the Arabic search difficulty. In addition, using simplified and common words, use short and direct statements could solve the problem.

The fourth hypothesis stated that Arabic and English alerts and forms are well translated. This hypothesis was also rejected which means that alerts and forms on one either Arabic or English are appropriately translated. The usability experiment tasks, reflected in task 4, 5 and task 7 will help identify the language which has proper translation to alerts and forms. The tasks request the participant to search for a specific form to read, fill a registration form, and perform a specific action to check if there is a proper translation to alerts and messages. Task four asked the participants to search for the “Register social clubs” form located under the Administrative Services category. The participant on the English version of the website downloaded the form and scanned it. The form was written in Arabic. This is considered to be an example of Arabic forms available on the English version of the website. Task five, asked the users to click on the submit button on the feedback form and notice the alerts. The English form displayed English alerts, where the Arabic

form displayed English alerts; the result is there is no proper handling to alerts. Task seven asked the users to fill a registration form; the form fields were in English.

Throughout the observation, participants highlighted that the Arabic icons display English text while mouse is hovered over the icon. In conclusion, it is essential to provide alerts and help messages with the correct language as it helps and guides the user while working on the website. It is clear that the Arabic version of the website lacks correct and proper translation of text, in instance there is no complete translation of the website messages, prompts, error messages, help support and links. Therefore, the hypothesis is true where English alerts and forms are well translated.

The fifth hypothesis states that users are confident while browsing the Arabic or English website. This hypothesis has been accepted which means that the null hypothesis is accepted and it is concluded that there is insufficient evidence to prove that the one alternative is better than the other. Therefore, they are equal. The hypothesis confidence level was tested through the online questionnaire after completing all usability tasks. The results illustrated that almost seventy seven percent of the participants felt more confident using English rather than Arabic. Although all participants were Arabic natives; Arabic is their first language and they could read, write and speak Arabic they all have a preference of using English.

The observer believes that the results are going against the hypothesis. Although it has not been statistically justified, the reasons that possibly made the participants feel more confident in using English are, participants practice English more in their daily life style as it is the business universal language; in universities and at the workplace, therefore it is difficult to work with Arabic. Besides, the English language could be more comprehensible and phrases are directly to the point, where on the other hand every Arabic word has multiple synonymy. It could also be the possibility that people communicate in Arabic with different dialects, and this dialect is not the one used on the internet (Standard Arabic). The other reasons could be the illusion that English is one's ticket to look trendy and enthrall others with how much s/he knows about the language. Or maybe, as some participant's case, they have been lulled into thinking that English is cooler than Arabic.

Customer service is very crucial and should be carefully presented and observed on all websites. The sixth hypothesis is related to finding the customer service form. The hypothesis states that customer service feedback form is easy to find on both Arabic and English. The hypothesis was rejected which means that one of the website languages is better than the other. The hypothesis was tested through the usability experiment. Task five in the usability experiment requested the participants to search for the “Feedback Form”; the task measured the number of wrong clicks the participants has made until they have found the feedback form. The average wrong click on the English version is 2.67 and 3.33 on the Arabic version, where the maximum number of wrong click is 7 in English and 9 in the Arabic. As the usability observer, this hypothesis should be accepted. The easiness or difficulty of finding the form is related to how clear the website navigation and the proper naming of each category are done. The navigation should visualize the user with the current location and the underlying information; poor information structure will always lead to poor usability. In this scenario, the improper naming to the categories resulted in the wrong clicks of the misleading links.

The importance of navigation has been measured through the online questionnaire. The participants were asked if the Arabic navigation design made the website easy to navigate or the English navigation design made the website easy to navigate. The results show that 53.33% agreed that the English website is easier than Arabic. This does not reflect that the English feedback form is easier to find than the Arabic, because the percentage is low compared to the 46.67% whom agreed that the Arabic site navigation is easier.

Hypothesis seven stated that finding a service or information content is equally easy in Arabic and English. The hypothesis was rejected which means that one of the website languages is better than the other. The hypothesis was tested through the usability experiment and online questionnaire. The usability experiment task asked the participants to search for a service. The results showed that more than 86% of the participants found the English search easier and 6% found the search difficult. On the other hand, 60% found the Arabic search easier and 26.67% found the Arabic search difficult. The time to complete a search has been calculated and the average range to search for a service in English is 1:20:19 which is less than the Arabic which scored

1:34:38. On the web every second makes a difference to the user's experience. Therefore, this confirms that finding a service or information content is easy in English than Arabic.

The ease of finding a service or information on any of the languages could be directly connected to how well the website navigation is structured. The website navigation has been measured earlier and the results show that 53.33% agreed that the English navigation is easier than Arabic. The ease of finding a service could also be connected to the search utility available. The search has also been studied on both languages and the results were equivalent for both Arabic and English, as they are both easy to use. The fact that English keys on the keyboard are much easier to memorize than the Arabic could be a factor which makes it easier to type and search. In addition, the text size could possibly be a reason for why English is considered easier in finding a service or information content.

Last, hypothesis eight stated English and Arabic are equally easy to navigate. The hypothesis has been accepted which means that the null hypothesis is accepted and it is concluded that there is insufficient evidence to prove that the one alternative is better than the other. Therefore, they are equal. The navigation question was part of the online questionnaire. Indeed, this hypothesis has many supporting questions. The questionnaire question asked the participants to state explicitly on a Likert scale whether English or Arabic are easier to navigate. The results show, almost 70% agreed that the English navigation is easier and almost 50% agreed that the Arabic is easy to navigate. It could be true that both languages are equal, if we consider the analysis of the supporting questions and other usability facts.

One of the points that could possibly lead to an equal ease on navigation is the location of the navigation menu. Currently, the usability advisors encourage website developers to "list all the top levels of the site on a stripe down the left side of the page" (Nielsen, 2000). The benefit of this design is that users are constantly reminded of the full scope of services available on the site. This could be reflected on the Arabic website as well, list the entire top levels of the site on a stripe down the right side of the page. This supports the fact that English and Arabic are equally easy to navigate, as this is where the navigation menus are currently located. Another factor

that could be part of the navigation ease and equality is the design consistency between both Arabic and English as this increases the user's confidence level and increases the user's knowledge on the site.

In conclusion, this section analyzed the eight hypotheses developed for this research and explaining what has been accepted and what has been rejected. The section included a critical analysis about implications and reason of each hypothesis and the results that has been found based on the usability experiment and the online questionnaire.

#### **4.4 Recommendations and extended analysis**

This section would summarize and will highlight on some findings which was not detected from both the usability experiment and the online questionnaire, and would elaborate on other important usability issues and give some recommendations.

- The website header needs to be connected or close to the main website navigation and both should be written in a readable font size and type. Currently, there is a banner (advertisement banner) between the two navigations, and the top menu font size is small.
- The alerts and forms needs to be well translated from English to Arabic or vice versa, especially crucial alerts such as outage memos (Appendix 3, Figure 13).
- Spelling errors and sentence structure in both languages needs to be revised and fixed. Example in the screen shots below (Appendix 3, Figure 14 and 15).
- It is essential to keep the website updated with the latest rules and regulations, important links and emergency numbers.
- Security pop-ups should be eliminated or controlled on the website for it has been appearing frequently during the usability experiment (Appendix 3, Figure 16).

- The website should provide clear instructions on “how to” and if any software or application such as Adobe is required to fully browse the website.
- Eliminate unnecessary banners and ads, unless they add value to the department itself. “From a usability perspective, it would be best to eliminate advertising, if you do need to run ads, you should consider them part of the page overhead together with the navigation options, meaning that the navigation design will have to be reduced in weight” (Nielsen, 2000).
- The website download time is very important. Throughout the usability experiment, and on an average of half a minute (0:48:54), the participants took to download the website. In general, they faced slow response and delay in downloading the website.
- Having content mirroring would be very beneficial especially for a bilingual websites with huge number of visitors each day who come from different backgrounds and cultures.

## **4.5 Analysis summary**

The summary of the usability analysis discussed above will be analyzed in this section of the report. A total of eight hypotheses were developed and then analyzed. The results showed that five out of eight hypotheses were rejected and 3 were accepted, based on the t-test outcome.

In order to test the website a usability experiment was developed and thirty participants were involved in the usability experiment. A total of thirty responses were obtained. Besides, the participant had to fill in an online questionnaire which focused on perceiving the participants profile to make sure that they are within the defined user criteria and other usability matters

The usability experiment consisted of ten different tasks; each task had its objective and all contributed together to answer the main research question which is, which is



the most usable language on Dubai Municipality website, Arabic or English. On the other hand, the online questionnaire questions were divided into five main categories, experiment supporting questions, navigation, presentation layer, font and overall quality which all supported the main goal of the research. The results were analyzed for each question by performing t-test and comparing the means, and a concise summary was provided at the end of each part. In order to describe the results in a significant way, the results were illustrated in the form of data summary tables, graphs and screen shots (Appendix 3).

Out of the thirty Arabic native participants surveyed, 76.67% felt more confident using English rather than Arabic, and 83.33% would like to fill an online form in English. In addition, 76.67% would use English to search for information. The data indicates that English is more usable than Arabic on Dubai Municipality website. The data was inconclusive until the analysis of both the usability experiment and online questionnaire were analyzed. Most of the usability tasks were used to test the hypotheses and to highlight the reasons for why English is usable than Arabic and vice versa, and what actions are required to overcome the usability problem.

From comparing the two methods used, usability experiment and online survey, it is clear that their results are very much consistent and a conclusion can be made. Following the analysis the next chapter presents the major conclusions of this research.

## **Chapter Five**

### **Conclusions**

The previous chapter performed the data analysis for the usability experiment and the online questionnaire. This chapter documents the major findings of this research. Rest of the chapter is divided into two sections. The first section summarizes the major steps followed in this research, and the second section documents final conclusion and the concluding remarks.

#### **5 Research Summary**

The core aim of the research is to evaluate usability standards for Arabic and English, undertaking Dubai Municipality bilingual (Arabic and English) website as a case; to identify which website version is more usable, and to verify the gaps and areas of improvements between Arabic and English. The evaluation was based on pre-defined usability criteria which both the usability experiment and online questionnaire were designed upon.

The literature review, in depth, covered the usability definition suggested by usability experts and the International Standard Organization. In addition, the five essential usability characteristics which are learn-ability, efficiency, memorability, low error and satisfaction, and the benefits associated with implementing usability. In addition, the literature review discussed the usability criteria through understanding the cultural differences by identifying the localization elements and generalizing them to cultural markers that are specific to this given culture. The usability criteria section also discusses the sources of usability criteria which are the organizational goals, computing environment, and user profile. It also talked about the usability criteria for localised website which has been developed by Becker (2006). The last sections in this topic listed the selected usability criteria which will used to compare and evaluate the Arabic and English usability standards.

Moreover, the literature review provided thoroughly the main Usability Evaluation Methods which is divided into two main categories; the Usability Inspection Methods and Usability Testing Methods. The Inspection Methods which were studied are

Heuristic Evaluation and Cognitive Walkthrough for they are the frequently used methods. On the other hand, the Testing Methods that were studied are Thinking Aloud, Field Observation and Questionnaires. The section also covered a comparison between the Testing Methods and Inspection Methods. Determining the number of evaluators to be used in the experiment has been discussed as well. The last part of the section included a discussion about the usability technique which will be used in the research which is the thinking aloud and questionnaire Usability Testing Methods. The reason the Thinking Aloud technique was used is because the Thinking Aloud is a frequently and widely used method for usability testing (Waes, 2000) and is a popular and effective method for usability testing. Thinking Aloud framework and procedure was discussed. The questionnaire was used because it is the most widely used survey instrument across to gather qualitative details. At this point of the research, the usability criteria were identified and the usability testing method was selected.

The methodology section comes next and explains the approach which will be followed to implement the usability test and define the required data that needs to be gathered. The data required to be collected is a qualitative observation of what the participants think or do and quantitative measures such as the time takes to complete a task. In addition, the methodology section covers the details about the testing environment, the defined users' criteria, analysis on the developed usability experiment tasks and online questionnaire, and it also included a description on how the results will be validated via hypothesis testing using the Paired t-test. The steps that will be taken to perform the test have been discussed. The chapter is concluded with a table which summarizes how each criterion is associated with a hypothesis or more and then a description on how it will be measured (experiment or questionnaire).

All the information gathered from the literature review such as the information on cultural marker, usability criteria and inspection methods made it possible to develop a well-managed usability experiment and online questionnaire. The usability test engaged thirty participants whom are acquainted with the basic knowledge on how to use the web, and can read, write and speak both Arabic and English. The testing location was Dubai eGovernment training room. The testing process was divided into two phases which started with the usability experiment and ended with the online

questionnaire. With one observer and one participant at a time, participants were asked to complete ten (10) scenarios or “real-life” tasks on Dubai Municipality website, and once they are finished they had to answer twenty (20) questions on the online questionnaire, which could be accessed through the web. Fifteen of the participants started with the English experiment and the other fifteen started with the Arabic experiment. The major findings from the usability experiment and online questionnaire for this research was then discusses in the data analysis chapter.

The data collected from the usability experiment and online questionnaire has been analyzed in depth in the previous chapter, and the conclusions of the data analysis are presented in the section along with some concluding remarks.

## **5.1 Conclusions**

Based on the selected criteria, the analysis of the usability and experiment and online questionnaire indicates that English is practical than Arabic, where users are more confident browsing the English version. Consequently, the research aim has been achieved and a statement could be presented that English websites are more usable than Arabic. The gaps between both are identified and recommendations are suggested to improve the Arabic website.

A main point which was interesting in the research and was mentioned in the literature review chapter is the availability of usability guidelines for localised websites written by practitioners in the field, but not much study has been done over these criteria for the Middles Easter websites.

The main findings in the research show that Arabic and English website deign is apparent and there is a common look and feel. The website has used the blue colour as an important localised element. In addition the website design supports the bi-directional (alignment) layout of information content which means the design layout has taken into account the text flow when the language of the website is switched. In addition, there is a design consistency in terms of the position of the navigation menus, textual information and search box. Summing up, both Arabic and English are clear in terms of website design.

In terms of information content, the English content was more usable than Arabic. The website lacks correct and proper translation of text into the native language which is Arabic, in instance there is no complete translation of registration forms, prompts, error messages, help support and links. Furthermore, the Arabic text, in some parts of the website is not coherent and text size is small and causes a readability problem. Although the content inconsistency problem appears in some of the English version content as well, it needs to be controlled and fixed in Arabic, especially the text size.

Another finding is although all participants were Arabic natives; Arabic is their first language they all have a preference of using English to browse and search for any information. The confidence level of the participants was measured and results showed that the users felt more confident using the English website than Arabic. The reasons discussed in the research could be summarized; users practice English more as it is a universal language and English language is more comprehensible. In addition, users use a different dialect while communicating, where the web uses a Standard Arabic. Another factor could be that English keys on the keyboard are much easier to memorize than the Arabic.

The recommendations on the factors which caused the Arabic website to be less usable than English could be summed up to; reduce clutter and unnecessary design, enlarge the text font size, provide proper translation for registration forms, prompts, error messages, help support and links. In addition, the use of simple and direct Arabic word, enhance the search utility, improve navigation and customer support.

“Why didn’t we do this sooner? What everyone says at some point during the first usability test of their website” (Krug, 2006). The usability testing gets done either too late, too little and for all wrong reasons. The researcher conclusion and the foremost lesson learnt from this research is that usability testing must to be scheduled and given an adequate amount of time in every project; whether it is a website, a prototype of a site, or some sketches of individual pages. In addition, testing is an iterative process; once a problem is detected it is fixed and tested again, and testing with one user is much better than testing none or test the product near the end.

As the main aim of the research was fulfilled, it is necessary to ensure that the research objectives mentioned earlier in the paper has also been achieved. The research did examine and comprehensively discussed and presented the universal accepted guidelines for usability and analyzed them. Besides, the research identified the usability factors and usability criteria that are being used. In addition, Dubai Municipality website has been analyzed through the studying the effect of bilingual websites and usability through usability tests.

In conclusion, the usability testing has been around for sometime and the basic idea is simple. It is the best way to know the website or product and to know if it is easy enough to use, especially if it requires language translation and the website is used by multicultural audience.

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# APPENDIX 1

## Usability Testing (English Test)

Thank you for coming today.

I am conducting a research about how usable Dubai Municipality website is by evaluating the interface in addition to the content of the website. The information you will give us will be used to improve the site.

I will give you several tasks to complete using the website. The tasks will be given to you and I will ask you to read each task aloud and then try to complete the task. As you complete each task, I will ask you to think aloud and try to complete it.

Throughout the session, I will encourage you to express your opinions; comment on what information is clear or unclear, confusing or difficult to understand.

Participants Tasks	Duration
Task 1: Getting started	
Task 2: Common Look and Feel	
Task 3: Search for an online service	
Task 4: Downloading Application Form	
Task 5: Proper Alerts Translation	
Task 6: Search box	
Task 7: Service Registration	
Task 8: Customer Support	
Task 9: Directory of Services	
Task 10: Home Page	
<b>Total</b>	

**Confidentiality**

Participation in this usability study is voluntary. All information will remain strictly confidential. The descriptions and findings may be used to help improve the interface of Dubai Municipality website. However, at no time will your name or any other identification be used. You are at liberty to withdraw consent to the experiment and discontinue participation at any time without prejudice. If you have any questions after today, please contact Hamdah Bin Kalban at 0504517369.

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**Participant's Signature**

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**Date**

Hamdah Bin Kalban

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**Usability Consultant**

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**Date**

### Task 1: Getting started

Launch an Internet Explorer Browser and type the following URL:  
<http://www.dm.gov.ae>. Take a few minutes to explore this page.

Now switch to the English version of the website.

How easy was the switch to English? **Difficult** **Easy**

5 4 3 2 1

Time to complete a task: \_\_\_\_\_



## **Task 2: Common Look and Feel**

Common look and feel is the standard to define how all websites should look; it covers such areas as accessibility, layout (header and footer), colour schemes and bilingualism.

After exploring the website on both languages, do you think there is a design consistency such as common look and feel across the pages?

**Yes**

**No**

Satisfaction: \_\_\_\_\_

### Task 3: Search for an online service

You have decided along with your friends to gather in Al Mamzar Park on Wednesday July 25, 2007. You are in charge of renting the Chalet, so you decide to perform the Chalet booking online.

Try to find the request for booking Al Mamzar Park Chalet.

The process of searching for an online service is

<b>Difficult</b>				<b>Easy</b>
5	4	3	2	1

Time to complete a task: \_\_\_\_\_

Number of steps to complete a task: \_\_\_\_\_

Satisfaction: \_\_\_\_\_

#### **Task 4: Downloading Application Form**

You would like to open a Social Club in Dubai. You need to download the application form.

Click on the Directory of Services located under DM Services to be found in the main menu, click on Admin Affairs Services >> Administrative Services >> Register social clubs.

Click “open” and scan through the document.

Did you experience any problems downloading the file? **Yes** **No**

Time to complete the task: \_\_\_\_\_

### **Task 5: Proper Alerts Translation**

You heard that there is a way on the website to send a suggestion or comment for improvements, additions or features.

Try to find the feedback form on the website. Do not fill any fields and click “Submit”.

Were the alerts well translated to English?   **Yes**                      **No**

Is this where you expected the feedback form to be?                      **Yes**                      **No**

In the previous task you have downloaded an application form, was there a proper text translation to English?   **Yes**                      **No**

Time to complete the task: \_\_\_\_\_

Number of steps to complete a task: \_\_\_\_\_

Recall: \_\_\_\_\_

**Task 6: Search box**

I am going to give you a word to search for, and will ask you to use the Search box on the page to do the search.

Search for the word “irrigation”

Was the search box location convenient and easy to find?

**Yes**

**No**

Tell us where you want us to place the search box to make the search even better.

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Time to complete the task: \_\_\_\_\_

Number of steps to complete a task: \_\_\_\_\_

### Task 7: Service Registration

You are a regular visitor to Al Safa Park therefore you decide to apply for an annual membership to visit the park.

Do the necessary to register for the service under the Public User Registration.

How was the process of filling in the user registration form?

Difficult				Easy
5	4	3	2	1

The process of selecting a service from the service list was

Difficult				Easy
5	4	3	2	1

Time to complete the task: \_\_\_\_\_

Number of steps to complete a task: \_\_\_\_\_

**Task 8: Customer Support**

Imagine you have searched the website for an answer to a question about the payment methods available for the online services, and you are unable to find an answer to your question. What would you do at this point?

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### Task 9: Directory of Services

Let us return to the Directory of Services page. The Directory of Services provide you with detailed information about the services either by category, department, or by advanced search. We are interested in determining how well each of the search strategies. I am going to give you a service to search for, and I will ask you to use a particular section to do the search.

#### Category Tab:

Using the “Category” tab, search for the following service “Request for Waste Collection” and then circle the number which most reflects your sentiment.

Difficult			Easy	
5	4	3	2	1

#### Department Tab

Using the “Department” category search for the same service “Request for Waste Collection” and then circle the number which most reflects your sentiment.

Difficult			Easy	
5	4	3	2	1

#### Advanced Search Tab

Using the Advanced Search function search for the same service again and then circle the number which most reflects your sentiment.

Difficult			Easy	
5	4	3	2	1

Having multiple ways to search for an online service is

Bad	Good
-----	------

Time to complete the task: \_\_\_\_\_

Satisfaction: \_\_\_\_\_



### Task 10: Home Page

I would like to direct your attention to the website homepage. Click on the “Home” link. What do you think of the Homepage?

**Terrible**

**Wonderful**

5      4      3      2      1

Satisfaction: \_\_\_\_\_

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\_\_\_\_\_ :  
\_\_\_\_\_ :

:8

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:9

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" "

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1 2 3 4 5

\_\_\_\_\_

" "

.

1 2 3 4 5

\_\_\_\_\_

" "

.

1 2 3 4 5

\_\_\_\_\_  
\_\_\_\_\_

:

:

:10

"

"

.

1

2

3

4

5

# APPENDIX 2

Hello: Thank you for taking part in the Usability Testing experiment. You are now invited to participate in the second part of the experiment which is the questionnaire. It will take approximately five minutes to complete the questionnaire. Your participation in this study is highly appreciated. However, if you feel uncomfortable answering any questions, you can withdraw from the survey at any point. It is very important for us to learn your opinions. Your survey responses will be strictly confidential and data from this research will be reported only in the aggregate. Your information will be coded and will remain confidential. If you have questions at any time about the questionnaire or the procedures, you may contact Hamdah Bin Kalban at 0504517369 or by email at the email address specified below. Thank you very much for your time and support. Please start with the survey now by clicking on the Continue button below.

## User Profile

Gender:

1. Male
2. Female

Your age group:

1. 20 - 25
2. 26 - 30
3. 30 - 40
4. 40 - 50
5. Other \_\_\_\_\_

What is your education level?

1. Bachelors degree
2. Master
3. Doctor
4. Professor
5. Other \_\_\_\_\_

Employment Status:

1. Employed
2. Self-Employed
3. Unemployed
4. Student
5. Home Duties
6. Retired

What is your native language?

1. Arabic
2. English
3. Other

What do you use the internet for?

1. E-mails
2. Web Searches
3. Performing online transactions
4. Reading Newspaper
5. Other

## General Experiment Questions

You felt more confident using which language of the website



1. Arabic
2. English

If you had the chance to fill an online form again, in which language will you perform this task?

1. Arabic
2. English

Please specify your reasons

If you had the chance to search for an information, in which language will you perform this task?

1. Arabic
2. English

Please specify your reasons

#### Navigation Questions

Strongly disagree	Disagree	Neutral	Agree	Strongly Agree	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Arabic navigation design makes the site easy to navigate
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	English navigation design makes the site easy to navigate

#### Presentation

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	The use of graphics is very appropriate for this site.

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	The design elements are not annoying or distracting.

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	The amount of information displayed is just right.

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	The colours in this website are pleasant

#### Font size

Large	Fixed	Small	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	The Arabic font size in the Directory of Services was
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	The English font size in the Directory of Services was
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Overall Arabic version font size
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Overall English version font size

#### Quality

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	I understand the purpose of this site

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	I clearly understand the services of Dubai Municipality by looking at the site

Based on your experience, how would you rate the quality of this website?

1. Very high quality
2. High quality
3. Average
4. Below average
5. Unacceptable

# APPENDIX 3

→ Register social clubs

<b>Service Name</b>	Register social clubs
<b>Service Description</b>	This form is helping the external customer to get the right information about the way of the registration the social clubs license.
<b>Customer Care Information Telephone</b>	+971(04)2063060
<b>Customer Care Information Fax</b>	-
<b>Customer Care Information Working Hours</b>	7:30 - 14:30
<b>Customer Care Information Location</b>	-
<b>Approval location</b>	Administrative services section
<b>Customer Care Information Email</b>	niismail@dm.gov.ae

**Relevant Information**

<b>Department</b>	Admin affairs department
<b>Section</b>	Admin services section

**Required Fees**

<b>Fees</b>	No Fees Required
-------------	------------------

**Application Procedures**

Serial No	Procedures	Supporting Document	Location
1	-Filled in application form -Approval from the Office of the Ruler	-Filled in application form. -Approval from the Office of the Ruler.	Main building of the Municipality 4th floor Tel.: 2063468

Print    Apply    **Attachment**

Figure-6-1: Downloading form

المرفق	نفذ	اطبع
--------	-----	------

Figure 6-2: Downloading form – Arabic buttons

**Feedback**

Please take a few moments to provide the following information about yourself before providing your feedback:

\* **First Name:**

\* **Last Name:**

\* **Gender:** Male

\* **Occupation:** Accountant

\* **E-Mail Address:**  @mailservice.com

**City:**

**Country:**

**Postal Code:**

**Feedback:**

Fields indicated with a \* are mandatory

**Microsoft Internet Explorer** Required information missing

OK

Figure 6-3: English feedback form and alerts

**الملاحظات**

برجاء أعطنا بعضاً من وقتك لتزويدنا بمعلوماتك الشخصية قبل الإدلاء بآرائك وملاحظاتك:

\* **الاسم الأول :**

\* **اسم العائلة :**

\* **الجنس :** ذكر

\* **الوظيفة :** محاسب

\* **البريد الإلكتروني :**

\* **المدينة :**

\* **البلد :**

\* **صندوق البريد :**

\* **الملاحظات :**

**Microsoft Internet Explorer** Required information missing

OK

\* **حقن إجباري**

Figure 6-4: Arabic feedback form and alerts

**User Management** eHelp

الموقع العربي  **Search**

**Login**

Username:

Password:

**Register** **Enter**

**Welcome to the DM Portal's Online Registration System.**


مرحباً بكم في نظام بلدية دبي للتسجيل المباشر

Please select one of the following options:

- Apply for Company and Admin. User Registration** تطلب تسجيل الشركة والمستخدم
- Apply for Public User Registration** تطلب تسجيل مستخدم عام
- Request for new Password( Company admin users only )** تطلب استعادة كل من مرور جديدة للمستخدم (الذي ل فقط)

Figure-6-5: User registration

https://portal.dm.gov.ae - Login - Microsoft Internet...

 **بلدية دبي**  
DUBAI MUNICIPALITY

Username:

Password:

**Register** **Enter**

Done Internet

Figure 6-6: Login Box

Available Services & Roles		الخدمات والصلاحيات المتوفرة
Please select the checkboxes to indicate your selection of the services.		
Department	Service	Options To view roles for the checked Service "click on the service link"
Finance department Building department General projects department Drainage and irrigation department <b>Planning and surveying department</b> Public health department General parks and horticulture department Environment department	<<Prev 1 2 3 4 5 Next>> <input type="checkbox"/> Defects Liability Certificate Regarding Survey Monuments. <input checked="" type="checkbox"/> <b>Digital Terrain Model Data Request Form</b> <input checked="" type="checkbox"/> <b>General N.O.C to Start Project</b> <input checked="" type="checkbox"/> <b>NOC for Removal of Survey Monuments after Completion of Pro</b> <input type="checkbox"/> Request for Change Commercial Name	<input checked="" type="checkbox"/> SER328_EFormView
For details regarding services please use the links provided on the information panel on the left side of this page.		

Figure 6-7: Services and roles form

**Personal Details**
البيانات الشخصية

**Title:** Mr ▼
**\*First Name:** 
**Middle Name:** 
**\*Last Name:** 
**Mother's Name:** 
**Date of Birth:**  please enter date as (dd/mm/yyyy)

**Contact Details**
بيانات الاتصال بالتفصيل

**\*Email ID:**   
 Please enter a valid e-mail address, otherwise you will not receive your userid and password.

**\*Re enter EMAIL :**

**\*Office Telephone No.:** 
**FAX:**

**Mobile No.:**  -  (e.g 050-5023285)

**Pager :**

**Home Address:**

**Street:**

**Emirates:** Dubai ▼

**Country:** UAE
**Postal Code:**

**P O Box:** 
**Home Phone:**

**News Categories**
أخبار

Dubai Municipality publishes different types of news items on the Dubai Municipality e-Government portal. These news items can be sent to you in the form of a DM newsletter.

**Do you want to receive DM newsletter through email ?**  
 Yes ☒ No ☐

**In which language do you want to receive the DM newsletter email ?**  
 English ☒ Arabic ☐ Both ☐

Everytime we update news item in any of the following categories selected by you, a copy of this news item will be sent to your email you have mentioned during Registration of the User account.

Please specify the News Categories that you are interested in.

<input type="checkbox"/> Central Lab	<input type="checkbox"/> City Planning	<input type="checkbox"/> Customer Care
<input type="checkbox"/> DM Internal	<input type="checkbox"/> DM International	<input type="checkbox"/> Environment
<input type="checkbox"/> Events	<input type="checkbox"/> Markets & Abattoirs	<input type="checkbox"/> New Projects (Roads, buildings & other public utilities)
<input type="checkbox"/> Parks & Recreation	<input type="checkbox"/> Public Health	<input type="checkbox"/> Public Transport

**Available Services & Roles**
الخدمات والصلاحيات المتوفرة

Please select the checkboxes to indicate your selection of the services.

Department	Service	Options
Common Services Admin affairs department Finance department Building department General projects department Drainage and irrigation department Planning and surveying department Public health department		To view roles for the checked Service "click on the service link"

For details regarding services please use the links provided on the information panel on the left side of this page.

**Terms & Conditions**
شروط المحدد

Please read our Terms & Conditions and Privacy Policy

☐ I agree to Dubai Municipality Terms & Conditions and I have read the Privacy Policy.

Figure 66-8: User Registration form



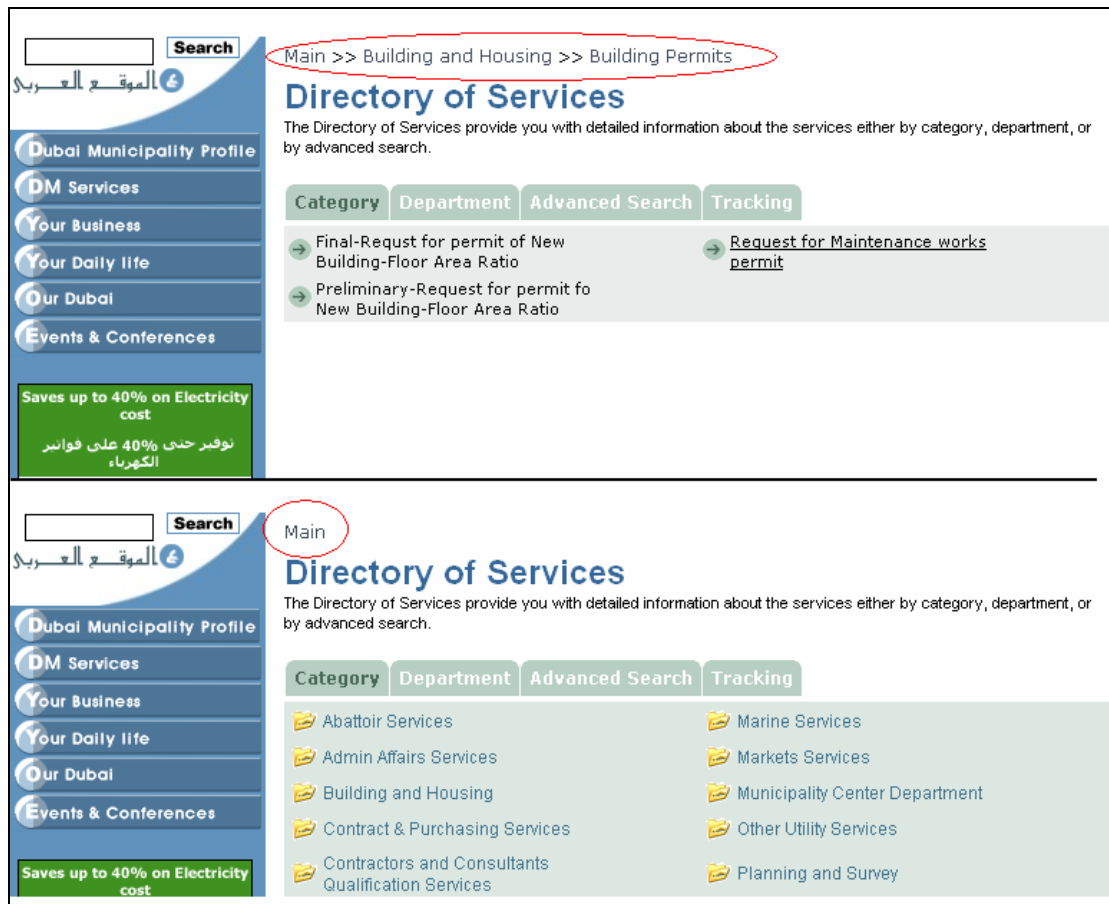


Figure 66-9: English breadcrumb





Figure 6-13: Outage Memo

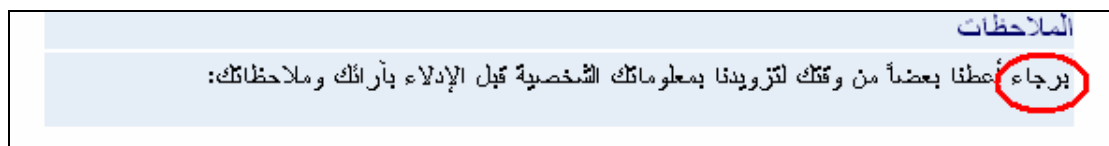


Figure 6-14: Sentence structure – Arabic

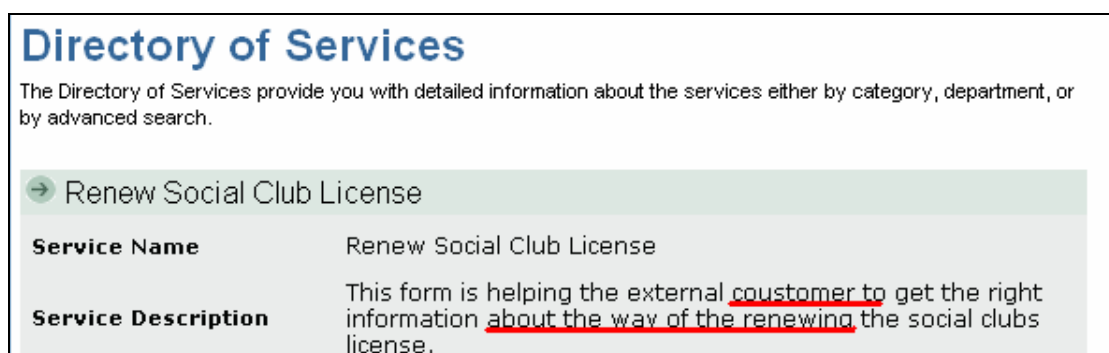
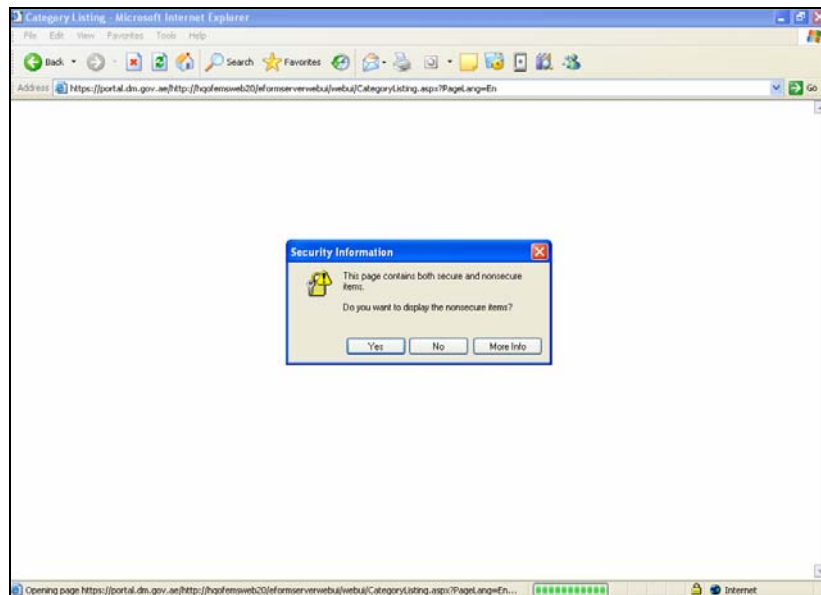


Figure 6-15: Spelling and sentence structure



**Figure 6-16: Security Information pop-up on DM website**

# APPENDIX 4

## Hypothesis data analysis

Hypothesis 1: Switching between the two different versions of the website (Arabic/English) is clear.

Subject	Arabic to English	English to Arabic
1	3	2
2	1	1
3	1	1
4	1	1
5	2	1
6	2	2
7	1	1
8	4	2
9	3	4
10	2	1
11	1	1
12	1	1
13	4	5
14	1	1
15	2	1
16	1	1
17	2	1
18	1	1
19	1	1
20	1	1
21	3	2
22	1	1
23	1	1
24	1	1

Difference	squared
1	1
0	0
0	0
0	0
1	1
0	0
0	0
2	4
-1	1
1	1
0	0
0	0
-1	1
0	0
1	1
0	0
1	1
0	0
0	0
0	0
1	1
0	0
0	0
0	0

Key	
1	Easy
2	
3	
4	
5	Difficult

Mean	0.266667
s2	0.6396
ox	0.116774

25	2	1	1	1
26	2	2	0	0
27	1	1	0	0
28	1	1	0	0
29	1	1	0	0
30	2	1	1	1
<b>Total</b>	<b>50</b>	<b>42</b>	<b>8</b>	14

30

Mean

1.666666667

1.4

0.266667

**Hypothesis 2: There is a design consistency (common look and feel) between English and Arabic.**

Subject	English	Arabic	Difference	Squared
1	1	1	0	0
2	1	1	0	0
3	1	1	0	0
4	1	1	0	0
5	1	1	0	0
6	1	1	0	0
7	1	1	0	0
8	1	1	0	0
9	1	1	0	0
10	1	1	0	0
11	0	0	0	0
12	1	1	0	0
13	0	0	0	0
14	0	0	0	0
15	1	1	0	0
16	1	1	0	0
17	1	1	0	0
18	1	1	0	0
19	1	1	0	0
20	1	1	0	0
21	1	1	0	0
22	1	1	0	0
23	1	1	0	0
24	1	1	0	0
25	1	1	0	0
26	1	1	0	0
27	1	1	0	0



28	1	1	0	0
29	0	0	0	0
30	1	1	0	0

**Total                    30                    26                    26                    0                    0**

Mean                                    0.866667                    0.866667                    0

**Hypothesis 3: Searching for an online service is faster in English than Arabic**

Subject	English	Arabic	Difference	squared
1	2	4	-2	4
2	4	5	-1	1
3	1	1	0	0
4	1	1	0	0
5	2	2	0	0
6	1	1	0	0
7	2	2	0	0
8	2	3	-1	1
9	1	1	0	0
10	2	3	-1	1
11	2	4	-2	4
12	1	1	0	0
13	3	2	1	1
14	1	5	-4	16
15	1	1	0	0
16	1	2	-1	1
17	2	4	-2	4
18	4	5	-1	1
19	1	1	0	0
20	1	1	0	0
21	2	2	0	0
22	1	1	0	0
23	2	2	0	0
24	2	3	-1	1
25	1	1	0	0
26	2	3	-1	1

English Time	Arabic Time
--------------	-------------

0:43:31	0:17:54
0:56:31	0:22:10
0:56:41	0:30:30
1:00:31	0:31:16
1:02:28	0:32:02
1:02:31	0:32:40
1:02:45	0:34:21
1:04:14	0:36:43
1:04:28	0:35:13
1:05:05	0:37:21
1:05:27	1:01:01
1:06:12	1:01:12
1:06:28	1:02:17
1:08:03	1:03:22
1:08:57	1:04:27
1:09:38	1:05:27
1:10:38	1:11:30
1:12:28	1:15:34
1:12:31	1:38:19
1:16:00	1:40:19
1:20:00	1:42:19
1:22:30	1:48:44
1:27:24	1:50:34
1:30:24	2:30:04
1:50:17	2:39:16
1:55:10	3:17:22
2:00:14	3:09:40
2:03:34	3:13:40
2:12:19	3:19:45

27	2	4	-2	4
28	1	1	0	0
29	3	2	1	1
30	1	5	-4	16

Total	30	52	73	-21	57
mean	1.733333	2.433333			-0.7

2:52:34	6:33:56
---------	---------

	English	Arabic
Minimum	0:43:31	0:17:54
Maximum	2:52:34	6:33:56
Median	1:09:18	1:04:57
Average	1:20:19	1:34:38

**Hypothesis 4: Alerts/Forms are well translated**

<b>Subject</b>	Alerts well translated to English	Alerts well translated to Arabic	difference	squared
1	1	0	1	1
2	1	0	1	1
3	0	0	0	0
4	1	0	1	1
5	1	0	1	1
6	0	0	0	0
7	0	0	0	0
8	0	0	0	0
9	1	0	1	1
10	1	1	0	0
11	1	1	0	0
12	1	0	1	1
13	1	0	1	1
14	1	0	1	1
15	1	0	1	1
16	1	0	1	1
17	1	0	1	1
18	1	0	1	1
19	1	0	1	1
20	1	1	0	0
21	1	1	0	0
22	1	0	1	1
23	1	0	1	1
24	1	0	1	1

25	1	0	1	1
26	1	0	1	1
27	1	0	1	1
28	1	0	1	1
29	0	0	0	0
30	1	0	1	1

**Total     30**

	<b>5</b>	<b>26</b>	<b>-21</b>
Mean	0.83333333	0.13333333	0.7

### Hypothesis 5: Users are more confident browsing the version of their native language

#### What is your native language?

Arabic	30	100.00%
English	0	0.00%
<b>Total</b>	<b>30</b>	

Mean	1.00
Standard Dev.	0.00
Variance	0.00

#### You felt more confident using which language of the website

Arabic	7	23.33%
English	23	76.67%
<b>Total</b>	<b>30</b>	

Mean	1.77
Standard Dev.	0.43
Variance	0.19

**Hypothesis 6: Customer service feedback form was clear to find in both languages**

Subject	English	Arabic	difference	squared
1	0	0	0	0
2	0	0	0	0
3	0	0	0	0
4	0	0	0	0
5	0	0	0	0
6	1	1	0	0
7	0	0	0	0
8	0	0	0	0
9	0	0	0	0
10	0	0	0	0
11	1	0	1	1
12	0	0	0	0
13	0	0	0	0
14	0	0	0	0
15	0	0	0	0
16	0	0	0	0
17	1	1	0	0
18	0	0	0	0
19	0	0	0	0
20	0	0	0	0
21	0	0	0	0
22	0	0	0	0
23	0	0	0	0
24	1	0	1	1
25	0	0	0	0
26	0	0	0	0
27	0	0	0	0

28	0	0
29	0	0
30	1	1

0	0
0	0
0	0

<b>Total</b>	<b>30</b>	<b>5</b>	<b>3</b>	<b>2</b>	<b>2</b>
--------------	-----------	----------	----------	----------	----------

mean	0.166667	0.1	0.066667
------	----------	-----	----------



**Hypothesis 7: It is easier to find a specific service or content on the Arabic version**

Subject	English wrong clicks	Arabic wrong clicks	difference	squared
1	2	6	-4	16
2	4	7	-3	9
3	3	3	0	0
4	2	3	-1	1
5	5	9	-4	16
6	2	3	-1	1
7	4	4	0	0
8	4	5	-1	1
9	7	3	4	16
10	3	4	-1	1
11	2	4	-2	4
12	1	3	-2	4
13	2	4	-2	4
14	3	2	1	1
15	1	3	-2	4
16	2	2	0	0
17	3	1	2	4
18	4	6	-2	4
19	4	4	0	0
20	3	2	1	1
21	2	1	1	1
22	1	1	0	0
23	5	2	3	9
24	0	4	-4	16
25	1	3	-2	4

26	2	4
27	4	2
28	3	4
29	1	1
30	0	0

**Total**

**30**

**80**

**100**

-2	4
2	4
-1	1
0	0
0	0

**-20**

**126**

### Hypothesis 8: English version is easy to navigate

#### Navigation Questions

Arabic navigation design makes the site easy to navigate

Strongly Agree	7	23.33%
Agree	9	30.00%
Neutral	<b>14</b>	<b>46.67%</b>
Disagree	0	0.00%
Strongly disagree	0	0.00%

<b>Total</b>	<b>30</b>
--------------	-----------

Mean	2.23
Standard Dev.	0.82
Variance	0.67

English navigation design makes the site easy to navigate

Strongly Agree	6	20.00%
Agree	<b>16</b>	<b>53.33%</b>
Neutral	8	26.67%
Disagree	0	0.00%
Strongly disagree	0	0.00%

<b>Total</b>	<b>30</b>
--------------	-----------

Mean	2.07
Standard Dev.	0.69
Variance	0.48

## Questionnaire Data Analysis

### Q20

Gender:

Male

**16**    **53.33%**

Female

14    46.67%

**Total**

**30**

Mean

1.47

Standard Dev.

0.51

Variance

0.26

### Q2

Your age group:

20 - 25

10    33.33%

26 - 30

**17**    **56.67%**

30 - 40

3    10.00%

40 - 50

0    0.00%

Other

0    0.00%

**Total**

**30**

Mean

1.77

Standard Dev.

0.63

Variance

0.39

**Other Option [Other]**

## Q21

What is your education level?

Bachelor's degree	27	90.00%
Master	2	6.67%
Doctor	0	0.00%
Professor	0	0.00%
Other	1	3.33%
<b>Total</b>	<b>30</b>	
Mean	1.20	
Standard Dev.	0.76	
Variance	0.58	

## Other Option [Other]

Higher Diploma

## Q21

Employment Status:

Employed	26	86.67%
Self-Employed	2	6.67%
Unemployed	1	3.33%
Student	0	0.00%
Home Duties	1	3.33%
Retired	0	0.00%
<b>Total</b>	<b>30</b>	
Mean	1.27	
Standard Dev.	0.83	

Variance	0.69
----------	------

### Q16

What is your native language?		
Arabic	30	100.00%
English	0	0.00%
Other	0	0.00%
<b>Total</b>	<b>30</b>	
Mean	1.00	
Standard Dev.	0.00	
Variance	0.00	

### Other Option [Other]

### Q20

What do you use the internet for?		
E-mails	21	28.00%
Web Searches	27	36.00%
Performing online transactions	10	13.33%
Reading Newspaper	15	20.00%
Other	2	2.67%
<b>Total</b>	<b>75</b>	
Mean	2.33	
Standard Dev.	1.17	
Variance	1.36	

## Other Option [Other]

Networkign with friends  
forums

### Q17

You felt more confident using which language of the website

Arabic	7	23.33%
English	<b>23</b>	<b>76.67%</b>
<b>Total</b>	<b>30</b>	
Mean	1.77	
Standard Dev.	0.43	
Variance	0.19	

### Q18

If you had the chance to fill an online form again, in which language will you perform this task?

Arabic	5	16.67%
English	<b>25</b>	<b>83.33%</b>
<b>Total</b>	<b>30</b>	
Mean	1.83	
Standard Dev.	0.38	
Variance	0.14	

### Q22

If you had the chance to search for an information, in which language will you perform this task?

Arabic	7	23.33%
English	23	76.67%
Total	30	

Mean	1.77
Standard Dev.	0.43
Variance	0.19

Q24

Navigation Questions

Arabic navigation design makes the site easy to navigate

Strongly Agree	7	23.33%
Agree	9	30.00%
Neutral	14	46.67%
Disagree	0	0.00%
Strongly disagree	0	0.00%
Total	30	

Mean	2.23
Standard Dev.	0.82
Variance	0.67

English navigation design makes the site easy to navigate

Strongly Agree	6	20.00%
Agree	16	53.33%
Neutral	8	26.67%



Disagree	0	0.00%
Strongly disagree	0	0.00%
Total	30	
Mean	2.07	
Standard Dev.	0.69	
Variance	0.48	

#### Q4

The use of graphics is very appropriate for this site.

Strongly Agree	3	10.00%
Agree	13	43.33%
Neutral	10	33.33%
Disagree	4	13.33%
Strongly Disagree	0	0.00%
Total	30	

Mean	2.50
Standard Dev.	0.86
Variance	0.74

#### Q5

The design elements are not annoying or distracting.

Strongly Agree	3	10.00%
Agree	9	30.00%
Neutral	8	26.67%

Disagree	10	33.33%
Strongly Disagree	0	0.00%
Total	30	
Mean	2.83	
Standard Dev.	1.02	
Variance	1.04	

#### Q6

The amount of information displayed is just right.

Strongly Agree	3	10.00%
Agree	13	43.33%
Neutral	7	23.33%
Disagree	6	20.00%
Strongly Disagree	1	3.33%
Total	30	

Mean	2.63
Standard Dev.	1.03
Variance	1.07

#### Q7

The colours in this website are pleasant

Strongly Agree	6	20.00%
Agree	12	40.00%
Neutral	9	30.00%

Disagree	3	10.00%
Strongly Disagree	0	0.00%
Total	30	

Mean	2.30
Standard Dev.	0.92
Variance	0.84

Q25

Font size

The Arabic font size in the Directory of Services is

Small	21	70.00%
Fixed	9	30.00%
Large	0	0.00%
Total	30	

Mean	1.30
Standard Dev.	0.47
Variance	0.22

The English font size in the Directory of Services is

Small	3	10.00%
Fixed	27	90.00%
Large	0	0.00%
Total	30	

Mean	1.90
Standard Dev.	0.31

Variance	0.09	
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Overall Arabic version font size

Small	19	63.33%
Fixed	11	36.67%
Large	0	0.00%
Total	30	

Mean	1.37
Standard Dev.	0.49
Variance	0.24

Overall English version font size

Small	3	10.00%
Fixed	27	90.00%
Large	0	0.00%
Total	30	

Mean	1.90
Standard Dev.	0.31
Variance	0.09

Q13

I understand the purpose of this site  
Strongly Agree

6	20.00%
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Agree	19	63.33%
Neutral	3	10.00%
Disagree	2	6.67%
Strongly Disagree	0	0.00%
Total	30	

Mean	2.03
Standard Dev.	0.76
Variance	0.59

#### Q14

I clearly understand the services of Dubai Municipality by looking at the site

Strongly Agree	2	6.67%
Agree	10	33.33%
Neutral	7	23.33%
Disagree	11	36.67%
Strongly Disagree	0	0.00%
Total	30	

Mean	2.90
Standard Dev.	0.99
Variance	0.99

#### Q23

Based on your experience, how would you rate the

quality of this website?

Very high quality	1	3.33%
High quality	8	26.67%
Average	19	63.33%
Below average	2	6.67%
Unacceptable	0	0.00%
Total	30	

Mean	2.73
Standard Dev.	0.64
Variance	0.41