Assessment of websites: A Case Study of Federal Ministry of Science and Technology

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Abstract: The study examined the link position of different Federal Government websites. Like the front desk in office, now websites are very important tool to engage their users. Many governments are approaching towards interactive websites where citizens get response on daily basis. This study will analyze the web links on sixteen (16) federal government departments working under the Ministry of Science and Technology (MoST). The analysis will be based on web links types and quantity. This study provided the some recommendations based on survey response from these government departments. It will help the web designer to improve layout of these websites which will ultimately improve the users' satisfaction and trust on government websites.

1. Introduction

The way users navigate in websites (and in other electronic documents) is considered 'a fundamental part of the reading process'. One of the main ways of navigating in websites is through the use of links that are considered one of the main elements of a website (W3C,1999a; Nielsen, 2000; Ling and van Schaik, 2004). This is because the links (also called hyperlinks or weblinks) are the elements that connect one web resource to another (W3C, 1999a). According to Nielsen (2000) the web is a 'navigational system' and the action of clicking on a link to move around the web is the basic user interaction. Researchers claim that the way links are displayed can affect the user's performance while trying to find information on screen (e. g. Marks and Dulaney, 1998; Kanerva, Keeker, Risden, Schuh and Czerwinski, 1998; Czerwinski and Larson, 2002; Ryan, Field and Olfman, 2003). However, little experimental research on the way links are displayed in websites has been done (Sears, 2000; Shneiderman and Plaisant, 2005).

There are a number of ways in which links can be arranged in websites. For example, links can be arranged together or in different groups, links can be placed in different areas of the screen, and links can have different structures and formats. Although several studies have investigated the effect that the position of links on a web page has on users' performance, it is still not clear which position most helps users to find information on a web page. On the other hand, fewer links on a single web page may mean more levels of web pages. A number of studies investigated the relationship between the number of links per screen (breadth) and the number of levels in a hierarchy (depth). Their findings suggest that users perform faster with broader structures than with deeper structures.

Scope of this Study

The study focused on federal government websites. This was done in order to narrow down the scope. In this way, this paper examines the innovation capacity of the public sector organizations by focusing on scientists and engineers' role for sustainable economic growth of the country. Analyzing data collected from 16 Research and Development (R&D) public sector organizations, this paper confirms that all the surveyed government organizations have scientists and engineers working for them. Web indicators are used to provide a better understanding of the current weaknesses and strengths of these public sector organizations. The involvement of key stakeholders is crucial to provide better services through government websites.

Like other information websites, the main purpose of PMoST websites is to provide information for citizens. Information websites usually differ from other types of websites. Therefore, the research focuses on the arrangement of links on web pages. Five features of arrangement of links in government websites were investigated: position of links on a web page, position of links in relation to web content, types of links, number of links, and number of groups of links. Position of links on a webpage refers to five areas of the web page: top, left, centre, right, and bottom. Position of links in relation to web content refers to presenting links together or separately from the web content. Types of links refer to different structures and formats of links. Number of links refers to the quantity of links on a web page, and number of

groups of links refers to the division of links into different groups on a web page.

It is important to highlight that this paper does not cover other graphic design elements than the graphic layout of the links, such as: typeface, colour, and characteristics of illustrations. This was done in order to narrow down the scope of this research paper.

2.   Research Questions

1. How can one screen layout help the user to find information on federal government websites more easily than the other?
2. Why the number of links important for providing information to the user with focus on federal government websites?

It is crucial for the PMoST should have 'Science and Technology Management Information Systems (STMIS)' where all data of R&D manpower and web indicators available to improve the overall performance of federal government websites. Web usability assessment of the public sector organizations is still an under-researched area in developing countries like Pakistan.

3.   Literature Review

Most studies of link position on screen arrange links at the top and at the bottom of a web page in a horizontal arrangement, and links on the right and on the left in a vertical arrangement (e. g. Schalk and Ling, 2001a, 2001b; Bernard and Hamblin, 2003; Pearson and van Schaik, 2003). However, they do not all consider the difference between orientation and position.

Pearson and van Schaik (2003) and Bernard and Hamblin (2003) interpreted the results in relation to link orientation. They did not find significant differences between horizontal cascading links (displayed at the top) and vertical cascading links (displayed on the left). In contrast, Pearson and van Schaik (2003) found that horizontal links (placed at the top and bottom) were faster than vertical links (placed on the right and left) for visual search tasks. On the other hand, they found that vertical links (placed on the left and right) were faster than horizontal links (placed at the top and bottom) for interactive search tasks.

The decision of how many links to display on screen is usually based on the amount of content to be displayed and the format in which this content will be displayed. Apart from these features, it seems that some designers have been choosing the number of links based on a theory called 'Magical Number Seven, Plus or Minus Two' (Bailey, 2000). This theory

was created by George A. Miller (1956) and it claims that the number seven, plus or minus two, is a limit on people's capacities for processing information. Miller developed this theory based on the findings of different studies on the upper limit capacity of people for processing information (called channel capacity). The human capacity for identifying stimuli such as different tones/pitches, taste intensities, and visual position were investigated by asking people to observe a stimulus and then try to identify it. Citing various studies, he claims that the span of absolute judgment (i.e. measured by asking the observer to name a single stimulus immediately after it is presented) can distinguish about seven categories and that the span of immediate memory (i.e. measured by asking the observer to name a stimulus after the presentation of several stimuli in succession) is about seven items in length. Larson and Czerwinski (1998) claim that short-term memory seems not to be an important factor when users search links on a website.

Figure 1: Pakistani Federal Ministry of Science and Technology (PMoST) website
Source: http://www.most.gov.pk

The analysis of federal government websites showed that in general these websites display many links and groups of links on screen (see figure 1). The effect of the number of groups of links on user search performance in websites still needs to be answered.

According to the United Nations e-Government Survey, measured for 193 countries, in e-Government Development Index (EGDI) Pakistan's ranking was 137 in 2003, which improved to 136 in 2005 and to 131 in 2008. However, in 2010 its ranking dropped drastically by 15 ranks to 146 (Figure 2). In e-Participation (EPART) Pakistan's ranking dropped as well. Pakistan can improve its ranking by focusing on and by finding out ways to improve federal government websites.
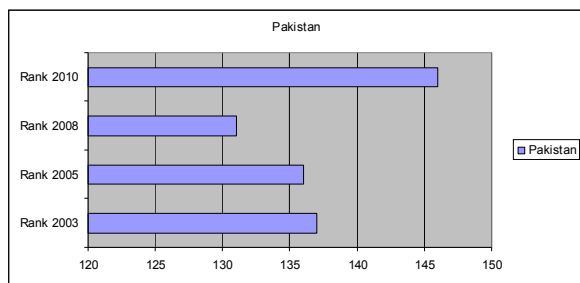
Figure 2: UN e-Government Index for Pakistan
Source:　http://www.unpan.org/egovkb

An Analysis of the Arrangement of Links in website

There are many different ways of arranging links on government websites. The governments of countries around the world state that government websites should be accessible to all people, including those with disabilities. Furthermore, the governments of some countries (e.g. Canada, UK) also state that websites should be usable (i.e. interface designed so that they can be easily used by citizens). The main topics related to the arrangement of links in government websites can be divided into accessibility and usability features.

According to Henry (2002), usability problems affect the performance of all users equally, independent of whether the users are disabled or not. He complements this by saying 'in the context of usability, accessibility means designing a user interface to be effective, efficient and satisfying for more people in more situations' (Henry, 2002). Web accessibility is concerned with making websites accessible especially to people with disabilities, whereas web usability is concerned with making websites usable for all people. 'Web accessibility means access to everyone, regardless of disability'. This definition was formulated by the Web Accessibility Initiative (W3C, 2004) and has been used by different governments and organizations.

The World Wide Web Consortium (W3C) is an international consortium that aims to ensure long-term growth for the web by developing protocols and guidelines. The Web Accessibility Initiative (WAI) was established by W3C in 1997 and is sponsored by governments. The WAI aims to ensure that Web technologies support accessibility by developing guidelines for accessibility and educational materials, among other activities. The concept of 'design for all' means that websites must be accessible to 'as broad a range of users as possible' (Europe's Information Society, 2005). The main point of agreement in these different definitions is the fact that they all concern

web access by disabled people as well as by people with other problems in accessing websites (e. g. language and technological barriers). However, federal government websites in Pakistan are not available in the national and local languages (Arfeen, & Khan, 2009). It can be considered as weakness of government that they are focusing on educated minority in developing countries like Pakistan.

Figure 3: Government of Pakistan web portal
Source:　http://pakistan.gov.pk

The usability of a website can be defined as the effectiveness, efficiency, and satisfaction with which web users can complete tasks. 'Display navigation and identity in the top and left areas of the screen' (IBM Corporation, 2004) there is a lack of knowledge about how government websites currently present links. Therefore, the analysis will identify a variety of ways in which links are arranged in government websites and their frequency of use.

The main aim of this study was 'to present facts and conclusions that define a country's e-government environment and demonstrate its innovation capacity to sustain online development of the federal government.

4.　　Recommendations

There should be some mechanism to be installed by the I.T. Manager of PMoST to monitor the quality of websites of each S&T Organization and advise them accordingly.

The IT Manager of PMoST to coordinated closely with S&T organization and guide them for effective linkages.

IT Manager of PMoST may keep a watch on the level of inter activity / inter linkages with website of S&T organization and stakeholders.

Deepening of website of PMoST with development of links with all the R&D organization/universities working under PMoST.

For better coordination in routine official matters, the available IT facilities such as email may be used, so that speedy actions on correspondence be ensured.

Avoid displaying important links in the bottom area of the screen (unless they are repeated in different areas of the screen).

5. Conclusion

During the e-Government implementation, there have been several problems in federal government like weak innovation capacity and low technology intensity. Federal government website should be available in the national and local languages. In this way less educated can gain from online initiatives that empower them to make decision based on what is in their best interest.

It can be concluded that the decision about the type of link should be taken in relation to the number of links to be displayed. With fewer links, a stable format seems to help most users to find information on screen; however, with many links, the use of expandable or sequential links seems more helpful. This recommendation supports the guidelines of the IBM Corporation (2004) which recommends that the main links should appear on every page of the website. The use of cascading links in government websites is not recommended even though users seem to like this type of link. This is because cascading links may cause accessibility problems and they also require more ability from users than the other types of links.

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