Usability Evaluation of the Cotton Economics Research Institution Web Site

Research Paper

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Abstract

Web site usability is a key factor that site designers focus on to ensure a site’s audience can read, navigate, access, and understand its content. This study examines the general appearance, navigation, and speed and efficiency of the Cotton Economics Research Institute’s (CERI) Web site as well as the demographics of the site’s users. A survey instrument was designed to collect data and received acceptable reliability scores for each section of usability: general appearance, 0.86; navigation, 0.90; speed and efficiency, 0.91.

This research finds the CERI Web site meets its audience’s satisfaction and is usable in the areas of general appearance, navigation, and speed and efficiency. It is recommended to perform usability tests on the target audience in the early development stages of a Web site and continue to periodically test the site. It is also recommended to continually manage a site to keep it as current as possible.

Key Words: Usability, Web site, Cotton, Design
Introduction/ Theoretical Framework

The agriculture industry has provided a livelihood for Texans since the mid-1800’s and is still a key factor in the state’s economy. The food and fiber industry in Texas involves production, processing, and marketing of agricultural products to bring a final product to the consumer (Fannin, 2005). As with any industry, technology brought changes and advancements to each of these activities, leading to more production and variety to the consumer.

Cotton is the leading cash crop in Texas with an estimated total economic impact of $5.76 billion while providing 48,645 Texas jobs (Robinson & McCorkle, 2006). While cotton is planted throughout the entire state, the heaviest of plantings lies in the High Plains region (Robinson & McCorkle, 2006). More than 200,000 bales of cotton are produced in the High Plains each year (National Cotton Council, n.d.).

It is important for those involved in the cotton industry to have a source of reliable and usable information to continue being productive. The Cotton Economics Research Institute (CERI) Web site focuses on bringing economic research findings to several different audiences associated with the cotton industry (Ethridge, personal communication, October 17, 2006). The CERI audience is categorized based on their affiliation with the cotton industry. These categories are farmers, agricultural business, extension, teaching, research, mass media, and other. It is important that each of these audiences find the CERI Web site easy to use in order to meet their information needs (Nielsen, 2000).

Web usability is an important aspect of the Web development process because it insures a site is readable, usable, and accessible to its users (Baehr, 2007). Nielsen (2000) and Krug (2000) state that all Web sites must be evaluated on usability. The framework demonstrated in Figure 1 deals with Web site usability and Nielsen’s (1993) approach to understanding general usability.
To evaluate the usability of the CERI Web site, the researchers focused on satisfaction, learnability, and efficiency.

Figure 1. The context of usability in general (Nielsen, 1993).

Effective Web site design is key to find information quickly (Axtell, 2006). If the viewer cannot maneuver through a Web site fast and with ease, they will leave the site in less than a minute (Nielsen, 2000). Determining how a site should be designed relies on what the users like, find easy to use, and where they stumble (Nielsen, 2000). Nielsen (1993) suggests that a site have easy-to-use navigation, frequent updating, minimal download times, high-quality content, and relevance to users.

The uses and gratification approach theory “suggests that media users play an active role in choosing and using the media” (Blumer & Katz, 1974). It is said to be “perhaps the dominant paradigm for explaining media exposure in the field of communication studies” (LaRose,
Mastro, & Eastin, 2001). The theory relates to this study because it looks at “the motivations for media exposure, how media are used and the rewards derived from that use; it focuses on the receiver or user of a medium and his or her purpose(s) for using it” (Garrison, 2003, p.2).

According to the uses and gratification theory, media consumers have free will to decide how they will use the media and how it will affect them. The theory has the following three objectives: determine how people use mass communications to meet their needs, discover other reasons for individuals’ use of the media, and determine individual consequences of media use, whether negative or positive (“Uses and Gratifications Approach,” n.d.).

Purpose and Objectives

By understanding users’ perceptions, design principles, and design conventions a Web site developer can tailor a site to be more effective for its users (Baehr, 2007). For this reason, the purpose of this study was to determine the external users’ perception of the usability of the CERI Web site. The following objectives were developed to accomplish in this study:

1. Determine the overall usability of the CERI Web site by its identified audiences.
2. Determine if there were differences in overall usability satisfaction among identified users of the CERI Web site.
3. Describe the identified audiences’ satisfaction of the CERI Web site.

Methodology

A survey research design was used for this study. Fraenkel and Wallen (2006) describe survey research as asking questions to collect information from a specific group of people in order to describe the population. Specifically, the survey measured the satisfaction of the appearance of the CERI Web site (five questions), the navigation of the Web site (nine questions), speed and efficiency of the Web site (four questions), overall satisfaction of the Web
Factors such as gender, occupation, type of Internet connection, education level, hours per week spent using the Internet, and location of residency were all intervening variables influencing the perception of usability of the users of the CERI Web site that the researcher considered.

**Population and Sample**

The population for this study included the entire viewing audience of the CERI Web site. The researcher used the existing database of CERI contacts to create a purposeful sample of the population (N = 216). Audiences were purposefully sampled because it is important to conduct usability testing with the target audience (Krug, 2000). The entire sample was personally contacted by the researcher through e-mail asking for their participation in this study.

A total of 66 (30.6%) surveys were collected at the conclusion of the study, creating a threat of nonresponse error which is described as one of four distinct types of potential survey error (Dillman, 2000). Linder, Murphy, and Briers (2001) recommend comparing early to late respondents as an acceptable procedure for addressing nonresponse error. They also suggest arbitrarily and operationally defining late respondents as those who respond after the last contact or as the later 50% of all respondents in cases where the number of responses are low to prevent reducing the statistical power of any comparison (Linder et al., 2001). Therefore, the late respondents were classified as those who responded after the fourth contact sent on September 4, 2007, because this was after the last contact and after a significant quantity of responses.
Early respondents were compared to late respondents using an independent samples t-test to ensure no significant differences existed between the two groups. As recommended by Linder et al. (2001), comparison was made on primary variables of interest: general appearance, navigation, speed and efficiency, and overall usability. The test showed no statistically significant relationships between early and late respondents on the primary variables. Linder et al. (2001, p.52) advises that only if no differences are found should results be generalized to the target population. For this reason, nonrespondents were assumed to be typical of respondents and nonresponse was removed as a threat.

**Instrumentation**

The survey instrument used to conduct this study was adapted from the instrument used in Axtell’s (2006) study looking at external user preferences of the USDA-ARS Ogallala Initiative Web site. The Axtell (2006) study yielded a Cronbach’s Alpha of 0.92.

To determine face and content validity the survey was reviewed by a panel of faculty with experience in usability research. A pilot test was sent to a selected group of graduate students and individuals involved in agriculture throughout the region. A Cronbach’s Alpha for each section of questions yielded 0.86 for general appearance, 0.90 for navigation, and 0.91 for speed and efficiency.

The survey was created using zoomerang.com. Zoomerang is used for creating and distributing online surveys. The company’s survey software also records and tallies completed survey results.

General appearance, navigation, and speed and efficiency were measured using a 4-point Likert scale of 1 to 4, 1 = strongly disagree, 2 = disagree, 3 = agree, 4 = strongly agree. The participants also rated their overall satisfaction of the CERI Web site using a 4-point Likert scale.
of 1 = not at all satisfied, 2 = somewhat satisfied, 3 = satisfied, 4 = very satisfied. A question asking if the site met the participants’ professional needs was answered by a yes or no response. Space was also provided for additional comments if the site did meet the participants’ professional needs. The participants were also asked to list any additional comments or recommendations they had for improving the CERI Web site.

Demographic questions collected gender, occupation, education level, internet connection or bandwidth speed, time spent per week using the internet, state of residency, and zip code data.

Data Collection

The participants for this study were contacted by e-mail explaining the purpose of the study and thanking them for their time and participation. Links were provided in the e-mail that the participants clicked to access the CERI Web site and the Zoomerang online survey. The contacts were asked to follow the first link to view the CERI Web site and take some time navigating and analyzing the site to determine what they liked about it and what they would like to see improved. The e-mail then instructed the participants to click on the Zoomerang link to complete the survey.

This email also informed the participants that the survey was strictly confidential and their names will not be released under any circumstances. Their right to withdraw from the study for any reason without any repercussions was also stated.

Three additional e-mails were sent to the contacts over a period of 26 days reminding them to complete the survey for the study. The study was concluded at the end of 30 days and results were collected.
Data Analysis

The collected data was analyzed using Statistical Package for Social Sciences (SPSS) for Windows. Data collected concerning the demographics of the study’s participants was also reported. Analysis of variance (ANOVA) was used to examine how users’ preferences compared across different user groups. An alpha level of .05 was used for all statistical tests.

Findings

Of the 66 participants, 50 (76%) were male and 15 (23%) were female. There were 55 (83.5%) from Texas, three (4.5%) from North Carolina, two (3%) from Washington D.C., two (3%) from Virginia, two (3%) from Tennessee, one (1.5%) from California, and one (1.5%) from Louisiana.

Participants also were asked to list their occupation from choices provided: farming, agricultural business, extension, teaching, research, mass media, and other. The ‘teaching’ category had the highest response of twenty-one (31.8%). Eighteen listed ‘other’ (27.3%), mass media had nine (13.7%), agricultural business had seven (10.6%), extension had seven (10.6%), research had three (4.5%), and farming had one (1.5%).

The number of hours per week spent on the Internet for professional/business purposes reported by participants ranged from less than one hour to more than 10 hours. Twenty-four (36.4%) participants spend more than 10 hours, 20 (30.3%) spend six- to 10- hours, 20 (30.3%) spend one- to five- hours, and only two (3%) participants spend less than one hour on the Internet for professional/business purposes.

There was a practical difference in responses for time spent per week on the Internet for purposes other than professional/business. Thirty-two (48.5%) participants spend one- to five-
hours, 20 (30.3%) participants spend less than one hour, 12 (18.2%) spend six- to 10-hours, and only two (3%) of participants spend more than 10 hours a week on the Internet.

The final question of the survey asked if the participants had any Web design experience. This question was answered by a yes or no response and additional space was available for them to explain their experience. Eleven (16.6%) participants responded that they had experience in Web design, 54 (81.8%) answered that they had no experience with Web design, and one (1.6%) did not respond. Of the 11 participants who answered ‘yes’ nine responded with additional comments.

Table 1

*Participants Responses Describing Web Design Experience (N=9)*

<table>
<thead>
<tr>
<th>response</th>
</tr>
</thead>
<tbody>
<tr>
<td>Just college level classes- no professional experience</td>
</tr>
<tr>
<td>For business purposes I am the webmaster for our departmental website</td>
</tr>
<tr>
<td>Have built and maintain business websites and blog sites.</td>
</tr>
<tr>
<td>Very basic knowledge - currently Webmaster for three sites</td>
</tr>
</tbody>
</table>

*Results Related to Objective One:*

Objective one was to evaluate the overall usability of the Cotton Economics Research Institute (CERI) Web site by the identified audiences. Participants answered questions pertaining to usability using a 4-point Likert scale of 1 to 4, 1 = strongly disagree, 2 = disagree, 3 = agree, 4 = strongly agree. Questions were grouped into the categories of general appearance, ease of navigation, and speed and efficiency.

Table 2 illustrates findings related to general appearance; the responses were similar for each question. The highest average showed participants agree that the home page is aesthetically
pleasing ($M = 3.33, SD = 0.64$), while the lowest average for general appearance showed participants agree that other pages of the site are aesthetically pleasing ($M = 3.11, SD = 0.52$).

Table 2
*Participants’ Responses to Questions about General Appearance of the CERI Web Site (N =66)*

<table>
<thead>
<tr>
<th>General Appearance Question</th>
<th>Mean ($M$)</th>
<th>Median ($Mdn$)</th>
<th>Standard Deviation ($SD$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>The home page is aesthetically pleasing.</td>
<td>3.33</td>
<td>3.00</td>
<td>0.64</td>
</tr>
<tr>
<td>The home page layout invites you to consume information placed on the site.</td>
<td>3.15</td>
<td>3.00</td>
<td>0.58</td>
</tr>
<tr>
<td>The home page is clearly designed.</td>
<td>3.30</td>
<td>3.00</td>
<td>0.53</td>
</tr>
<tr>
<td>Other pages of the site are aesthetically pleasing.</td>
<td>3.11</td>
<td>3.00</td>
<td>0.52</td>
</tr>
<tr>
<td>Total General Appearance Score</td>
<td>3.21</td>
<td>3.20</td>
<td>0.46</td>
</tr>
</tbody>
</table>

*Note: 1 = strongly disagree, 2 = disagree, 3 = agree, 4 = strongly agree*

Table 3 illustrates the participants’ responses regarding the study’s questions about navigation of the CERI Web site. The average numbers showed all participants agree with each navigation question. The highest average showed participants agree that the overall CERI Web site is easy to navigate ($M = 3.44, SD = 0.58$). The lowest average showed participants agreed that they are aware of where they are on the Web site at all times ($M = 3.12, SD = 0.62$).
Table 4 is a detailed look at the responses to the speed and efficiency of the CERI Web site. The highest average of participant responses showed they agree the Web pages load quickly in their browser \((M = 3.42, SD = 0.56)\), followed by them agreeing that Adobe PDF files...
download quickly in their browser \((M = 3.21, \ SD = 0.48)\), agreeing that photos download quickly in their browser \((M = 3.20, \ SD = 0.64)\), and agreeing that Power Point presentations download quickly in their browser \((M = 3.12, \ SD = 0.45)\).

Table 4

*Participants’ Responses to Questions about Speed and Efficiency of the CERI Web Site \((N =66)\)*

<table>
<thead>
<tr>
<th>Speed and Efficiency Question</th>
<th>Mean ((M))</th>
<th>Median ((Mdn))</th>
<th>Standard Deviation ((SD))</th>
</tr>
</thead>
<tbody>
<tr>
<td>The Web pages load quickly in my browser.</td>
<td>3.42</td>
<td>3.00</td>
<td>0.56</td>
</tr>
<tr>
<td>The photos download quickly in my browser.</td>
<td>3.20</td>
<td>3.00</td>
<td>0.64</td>
</tr>
<tr>
<td>The Adobe PDF files download quickly in my browser.</td>
<td>3.21</td>
<td>3.00</td>
<td>0.48</td>
</tr>
<tr>
<td>The Power Point presentations download quickly in my browser.</td>
<td>3.12</td>
<td>3.00</td>
<td>0.45</td>
</tr>
<tr>
<td>Total Speed and Efficiency Score</td>
<td>3.24</td>
<td>3.13</td>
<td>0.43</td>
</tr>
</tbody>
</table>

*Note: 1 = strongly disagree, 2 = disagree, 3 = agree, 4 = strongly agree*

Participants’ responses to all usability questions asked in the study are shown in Table 5.

The average usability score indicates that participants agree the CERI Web site is usable \((M = 3.23, \ SD = 0.40)\).
Table 5

Participants’ Responses to Questions about Usability of the CERI Web Site (N =66)

<table>
<thead>
<tr>
<th>Usability Questions</th>
<th>Mean (M)</th>
<th>Median (Mdn)</th>
<th>Standard Deviation (SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Usability Score</td>
<td>3.23</td>
<td>3.25</td>
<td>0.40</td>
</tr>
</tbody>
</table>

*Note: 1 = strongly disagree, 2 = disagree, 3 = agree, 4 = strongly agree*

Results Related to Objective Two:

Objective two was to determine if there was a difference in overall usability satisfaction among users of the CERI Web site. The participants chose from the occupation categories of farming, agricultural business, extension, teaching, research, mass media, and other. A one-way ANOVA test was conducted on the questions pertaining to the appearance, navigation, and speed and efficiency of the CERI Web site. An additional one-way ANOVA test was ran grouping all of these sections together to determine the overall usability of the Web site. The test showed no significant findings.

Results Related to Objective Three:

Objective three identified audience satisfaction of the CERI Web site. More than 87% (n = 58) of the participants surveyed were satisfied or very satisfied with the CERI Web site. Only nine percent (n = 6) of participants were somewhat satisfied and three percent (n = 2) were not at all satisfied. Table 6 lists additional comments or recommendations made by participants.
Table 6

*Participants Comments and Recommendations of the CERI Web Site (N = 66)*

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Publication information could maybe be organized for intended audiences such as policy makers, producers, etc.

Maybe include interviews with local producers, members and directors of commodity groups, and members of the Congressional delegation.

I would like the price pages to be a little more organized and spread out to be able to read a little easier.

Maybe there could be more resources devoted to the farm bill. Maybe its own link?

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When asked if the CERI Web site met participants’ professional needs, 89% \( (n = 59) \) indicated yes while 11% \( (n = 7) \) stated no. Table 7 lists additional comments of how the CERI Web site does or does not meet the participants’ professional needs.

Table 7

*Participants Comments of Professional Use of the CERI Web Site (N = 66)*

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Very good source of technical and economic related information for extension professionals. It is easy to navigate on this site. It has lots of useful information.

As a producer, it is nice to be able to see economic outlooks and governmental opinions on what the market holds.

I particularly like the price quotes and think producers could find this useful as long as it is kept current.

Although I am no longer actively involved with the cotton industry I found the site to provide easy access to information that would have been relevant in my "earlier life."
Conclusions and Recommendations

The popularity of the Internet as an information source is growing every day. Its increasing audience has led to an escalating number of available Web sites. The key to an acceptable Web site is usability. A user is not going to spend time on a site that they cannot navigate or find useful information quickly, but will exit out of the site and move on to one that meets their needs.

Web designers should make sure the content of their site is current, reliable, and easy to access. Usability tests should be performed in the beginning stages of a site’s development and continue periodically throughout its existence. It is important that usability tests are conducted with the target audience, for it is their needs and interests that a site must meet. The usability surveys will vary for different Web sites since each site is developed for a particular purpose. For example, educational sites providing students notes and resources will ask different usability questions than commercial sites where products are purchased with tools such as a shopping cart. By simply conducting a usability test, a Web designer can adapt a site that may be deemed unusable by its users into one that is highly viewed and used.

The Cotton Economics Research Institute Web site received positive feedback showing the majority of the participants are satisfied with the site’s appearance, navigation, and speed and efficiency. Improvements should be made to the site such as reorganizing text on pages so that it is easier to read, adding links suggested by participants (e.g. Plains Cotton Growers and Texas Cooperative Extension), and updating the market prices. Updating the site will be the most important management feature in order for it to remain active and useful. The information which
the Web site consists of is constantly changing, and the user must have the most current information for the site to be helpful.

Unfortunately, the response to the email survey was low. It is recommended to personally contact the participants by phone asking for their involvement before sending them the e-mail (Dillman, 2000). This added action will further make the participants aware of the purpose of the study and prove to them that the researcher is dedicated and interested in their opinions.

With people becoming more dependent on the Internet as an information source, it is incredibly important for Web site developers to make sure they design sites that are acceptable by the target audience. Usability is the key to this acceptance, and usability tests are the key to making sure a site is considered usable.

References


Uses and gratifications approach (n.d) Retrieved October 2, 2006, from