

Factor identification of website usability characteristics to end- user satisfaction: a case study at University of Colombo

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Abstract

The case study aims to identify the pattern of correlation of the usability characteristics in the library website of the University of Colombo with respect to user satisfaction. A questionnaire based survey was carried out using 125 undergraduates in four faculties namely, Arts, Education, Law and Management & Finance. Factor analysis identified eleven dimensions that explain the pattern of correlation of the usability characteristics in the library website in the study context for user satisfaction. In future the library professionals should consider these factors and the pattern of correlation of features when improving and redesigning the library website of the University of Colombo.

Keywords: *User Satisfaction, Library Websites, Factors*

1.0 Introduction

University libraries facilitate time and place independent services and information to the clientele via the web counterparts. User satisfaction is considered by many researchers as one of the main considerations of the success of an information system (Beven & Macleod 1994). Users are reluctant to use difficult interfaces or websites. In a highly competitive cyberspace, librarians face the challenge to create the web interface to satisfy the end-users.

The Library of the University of Colombo (UoC) moved to cyberspace by creating its web counterpart in 2001. Over the years, the library website has become a platform that provides a wide-spectrum of digital resources and services including Online Public Access Catalogue (OPAC), subscribed e-journals and databases, subject gateways, 'Ask a Librarian' and Inter Library Loan (ILL) services. Patrons can access the website via the URL <http://www.lib.cmb.ac.lk>. None of the previous research has attempted to identify the factors that explain the pattern of correlation of the usability characteristics in the library website with respect to user satisfaction. However, to provide an intuitive, effective, and

efficient interface for library users, a better understanding of the underlying factors that influence the user satisfaction needed to be deployed.

2.0 Review of Literature

Usability of an interface is one of the elements that influence end-user satisfaction (Park & Lim, 1999). However, one of the shortcomings of the definitions of usability is that it does not explicitly specify the criteria to be used for evaluation. Thus, Jeng (2005) in the proposed model to evaluate the usability of a digital library has assessed satisfaction from the user perspectives for some of the content and design features as organization of information, clear labelling, and visual appearance. Furthermore, from the review of literature on library website design studies, it is evident that most of the predecessors have evaluated the websites based on the content and design features (Adams & Cassner 2002; Detlor & Lewis 2006; Mawe 2007). Through the review of literature 53 criteria were identified to evaluate the content and design features of the library websites. Content criteria were categorized to five main categories as; general information, resources, services, current awareness and external links (Gardner, Juricek and Xu 2008; Mawe 2007; Quatab & Mahmood 2009). The design criteria represent ten categories as graphics and layout, navigation, readability and scanability, terminology, authority and currency, download and response time, consistency, accessibility, flexibility and aesthetics (Deltor & Lewis 2006; Gardner, Juricek and Xu 2008; Quatab & Mahmood 2009; Sawetrattanasatian 2008).

3.0 Objective of the Study

To identify the pattern of correlation of the usability characteristics in the library website with respect to user satisfaction.

4.0 Methodology

A quantitative approach was used in this research. In an academic environment the principal user group of the library website is the undergraduates who represent the majority of the community (Sawetrattanasatian 2008). Final year undergraduate students were selected for the study as they extensively use the library website for academic purposes. The target population was 1043 undergraduates from the four faculties of Arts, Education, Law, and Management & Finance. 12% of the target population was considered as the sample. Sample consisted of 125 undergraduates and stratified random sampling technique was incorporated to derive the sample. The Questionnaire which was used as the main data collection tool was developed based on the 53 variables identified through the review of literature. First part of the questionnaire was designed to collect the respondents' demographic information and in the second section, the respondents were requested to indicate their satisfaction to the 53 content and design features in the library website of UOC based on a 5-point Likert scale. Factor analysis was conducted using SPSS version 18.00. Principle Component Extraction

and Promax with Kaiser Normalization rotation methods were employed for the analysis. Bartlett's Test of Sphericity and Kiser-Meyer-Olkin (KMO statistics) measures of sampling adequacy were performed to assess the suitability of the data for the analysis.

5.0 Analysis

The total response rate was 92%. Among the respondents 52.2% were females, while 47.8% were males. The majority (79.1%) of respondents were between 21 to 23 years. 50.4% follows the degree in Sinhala while 44.3% and 5.2% in English and Tamil respectively.

5.1 Factor analysis

Factor analysis was performed using fifty three variables. The KMO test showed 0.606 at a significant level of 0.000 (Table 1). The results of these two tests indicated that the data were appropriate for factor analysis since the KMO value was greater than 0.6 and Bartlett's Test of Sphericity was significant. The initial Eigen value and the scree plot were investigated to determine the number of factors. Seventeen factors with an Eigen value greater than one were extracted (Annexure 1). Due to difficulties of defining a large number of factors (17), the researcher selected the number of factors which gave an extraction with a higher cumulative percentage which was 11 factors.

Table- 1: Results of KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.606
Bartlett's Test of Sphericity	Approx. Chi-Square	3146.872
	df	1378
	Sig.	.000

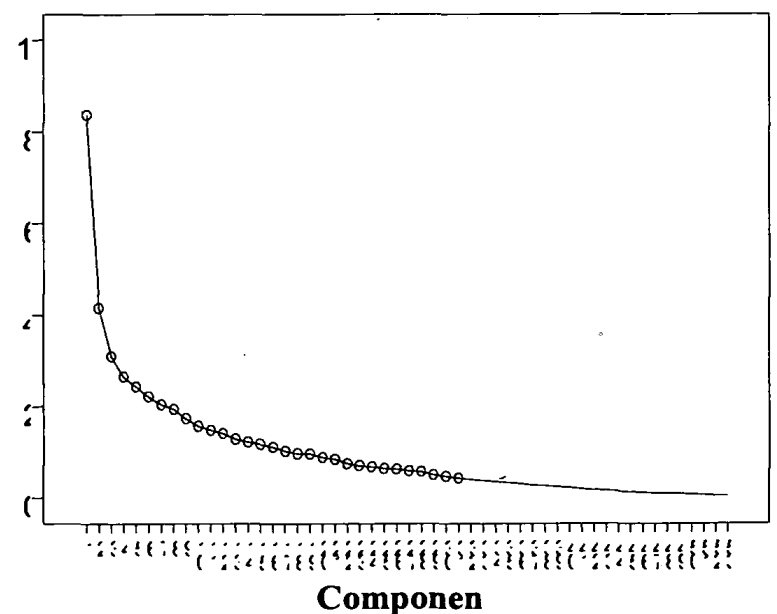


Figure- 1: Scree Plot

The scree plot, study identified 11 factors in the factor extraction with the Eigen value greater than one (Figure 1). Overall, 11 factors explains 59.796% variance of the original variance and the remaining 32 factors together account 40% of the variance. Factor rotation was carried out to find the underling

variables of the 11 factors. In a rotation converged in 22 iterations, 53 variables were loaded into 11 factors as depicted in Table 2.

Table- 2: Factor extraction

Statement	Component										
	1	2	3	4	5	6	7	8	9	10	11
Ask a librarian service	.824	-.141	.048	-.145	.008	-.385	-.211	-.046	-.152	.079	-.147
Information on collection	.759	-.077	-.148	.115	-.011	-.058	.041	-.022	.268	-.213	-.053
Inter Library Loan service	.700	.049	-.024	-.066	.059	.251	.027	-.058	-.075	-.173	.163
Information on library policies	.680	.115	.093	-.069	.109	.049	-.235	-.183	.075	-.229	-.222
Subject gateways	.679	-.024	-.181	.140	.039	-.075	-.071	.055	-.262	-.118	.326
Services for special needs	.606	-.163	-.105	.019	.084	.104	-.141	.071	.026	.069	.168
Library floor plan	.566	.072	.094	.171	.120	.063	.151	-.125	-.128	-.176	.048
User comments	.556	.291	-.017	-.072	.152	-.013	.179	-.130	.023	.207	-.151
Uniform display web browsers	.507	.088	.149	.070	.006	-.196	-.237	.239	-.218	.102	-.165
Description of services	.501	-.326	-.010	-.053	.241	-.002	.074	.145	.395	-.042	.208
Links to search engines	.498	.184	.120	.067	.163	-.082	.236	-.039	.036	.066	.082
National/international records	.447	.208	-.056	-.122	-.127	.115	.292	-.339	-.132	-.255	.139
User training services	.431	.247	.062	-.278	-.022	-.092	.147	.223	.076	.083	-.391
Information on membership	.403	-.116	-.376	.084	-.004	.248	.287	.091	-.068	.206	-.151
Informative headings	-.226	.778	.141	.150	.023	.175	.002	.025	.077	-.033	.003
Readable font type	.236	.746	-.052	-.006	-.077	-.216	.065	-.162	-.117	-.005	.212

Text free from spelling errors	.025	.722	.043	.136	-.069	.106	-.103	-.223	.024	.211	.060
Text alternatives	-.024	.623	-.011	.369	.018	-.146	.236	.177	-.028	-.003	.058
Simple writing	-.023	.502	-.016	-.022	.015	.266	-.399	-.124	.020	.231	.172
Uniformity of navigation	.047	.342	.651	-.024	.154	.146	-.010	-.034	.039	.105	.009
No horizontal scrolling	.162	.115	-.596	-.049	-.105	.071	-.072	.023	-.011	.082	.326
Quick links	.149	.052	.592	-.120	-.044	.060	-.204	.347	.054	.126	.040
Multiple links	.171	.286	.591	.289	-.175	.127	-.209	.136	.145	.039	-.010
Important info. top	.055	.006	.584	-.004	-.074	.413	-.105	-.148	-.163	-.204	-.118
Logical organization	-.189	.027	.556	-.128	.207	.222	-.023	-.083	-.079	.015	.014
Length of homepage	.113	.109	.428	.237	-.054	-.019	.071	-.404	.360	.212	.006
Meaningful labels for links	.246	.026	.406	.388	-.155	-.195	.102	.153	.076	-.049	.123
Navigational tools all pages	.392	-.096	-.031	.727	-.140	-.042	.048	-.175	-.113	.009	-.118
Up and down navigation	-.105	.265	-.183	.720	.221	.051	-.286	-.037	.042	-.083	-.197
Navigation to the homepage	-.105	.236	-.043	.708	.229	-.307	.247	-.129	-.020	.027	.031
Sitemap	-.125	.207	.018	.695	-.060	-.197	.083	.225	.190	-.111	.067
Information on postal address	.027	-.030	.239	.143	.788	-.037	.015	-.054	.188	-.006	-.043
Information on branch library	.259	.004	-.037	-.093	.717	.073	-.013	-.086	.101	.096	-.041
Library opening hours	.284	-.090	.099	.045	.649	.139	.018	.088	.072	.267	.025
Contact information	.403	.029	-.077	-.026	.497	.131	-.157	.001	.184	-.264	.116
Information on library history	.076	.002	.147	.170	.491	-.116	.100	.416	-.356	-.005	.179
Use of familiar	.043	.014	.246	-.167	.014	.856	-.069	.052	.021	-.216	-.169

terms											
Use of uniform terms	-.143	.005	-.004	-.199	.121	.847	.263	-.107	.195	-.150	-.024
Avoiding use of jargon	-.122	-.029	.246	.274	.129	.489	-.088	.047	-.343	.140	-.090
Download time	.011	.118	.237	-.254	-.312	.475	.346	.239	.002	.173	.235
institutional repository	-.073	.108	-.010	.077	.046	.282	.699	.247	.101	-.033	-.215
accurate information	.015	-.116	-.226	-.086	.128	.118	.685	.290	.075	.141	.204
Last date of update	-.067	.090	.137	.136	-.157	-.112	.665	.038	.047	.048	.217
Uncluttered web pages	.121	.107	.161	.084	.024	.077	-.234	-.696	.026	-.117	-.154
Contrasting colours	.069	-.028	.071	.192	-.75	.333	.386	.562	-.023	-.247	-.256
Access to e-databases	-.080	-.005	.029	.159	.146	.169	.176	-.112	.708	-.128	.014
Access to e-article index	.025	-.093	.136	.140	-.25	.006	.007	-.084	.557	-.222	.137
Access to catalogue	.027	.154	-.203	-.168	-.87	.104	.137	.001	.344	.063	-.187
Contact inf. of webmaster	-.307	.222	-.009	-.254	.233	-.282	.084	.079	-.068	.794	.040
Links to university home	.073	.003	.151	-.180	.327	.125	.027	-.154	-.123	.428	.149
Use of university logo	.284	-.161	.289	.139	-.029	.112	.009	-.165	.018	.412	-.096
Use relevant images	.042	.276	.028	-.123	-.088	.100	-.358	.179	.051	.368	.323
Library news	.071	.188	-.091	-.094	.017	-.153	.120	.099	-.013	-.065	.783

Factor 1 gathered fourteen attributes related to services provided by the library website and labeled as "Services" (Table 3). Factor 2 contains attributes related to readability of the website and labeled as "Readability and Scanability". Eight variables relating to "Design and Layout" were loaded into factor 3 and titled accordingly. Four variables relating to "Navigability" of the

website were loaded as the fourth factor. Five variables related to the information about the library of the UoC loaded into factor 5 and labelled as "General information". Factor 6 gathered four variables related to the terms used in the website and on download time and labelled as "Terminology and Download time". Three variables which describe "Scholarly communication" were loaded to factor 7. Factor 8 gathered variables related to the visual impact of the website and labeled as "Aesthetic appeal". Three variables related to electronic resources provided through the library website were loaded for factor 9 and labeled as "Electronic resources. Four variables which described trustworthiness and used graphics of the website were loaded to factor 10 and thus labeled as "Authority and Graphics". Finally, the variable Library news was loaded for factor 11 and named as "Current awareness" (Table 3).

Table- 3: Identified factors and variables

Factors	Variables
<p>Factor 1 Services</p>	<p>Ask a librarian service Information on collection Inter Library Loan service Information on library policies Links to subject gateways Services for users with special needs Library floor plan User comments/suggestions Uniform display with Internet Explorer and Firefox Description of library services Links to search engines Links to national/international records User education/training services Information on library membership</p>
<p>Factor 2 Readability and Scanability</p>	<p>Informative headings Readable font type Text free from spelling and grammatical errors Text alternatives Simple concise writing</p>
<p>Factor 3 Design and Layout</p>	<p>Uniform placement of navigational components Avoid horizontal scrolling Quick links Multiple links Important information placed at the top Logical organization of information Length of the homepage</p>

	Meaningful labels for links
Factor 4 Navigability	Navigational tools on all pages Up and down navigation within a long webpage Navigation back to homepage from all pages Sitemap
Factor 5 General information	Information on postal address Information on branch libraries Library opening hours Contact information of the liaison librarian Information on library history
Factor 6 Terminology and Download time	Use of familiar terms Use of uniform terms Avoid use of jargons Download time of file formats
Factor 7 Scholarly communication	Access to institutional repository Presence of accurate information Last date of update
Factor 8 Aesthetic appeal	Uncluttered web pages Contrasting background and foreground colours
Factor 9 Electronic resources	Access to e-journals/databases Access to electronic article index Access to catalogue (OPAC)
Factor 10 Authority and Graphics	Contact information of webmaster Links to university home Use of University logo Use of relevant images
Factor 11 Current awareness	Library news

6.0 Discussion

Researcher identified fifteen categories of content and design features which the predecessors have used to evaluate library website. However, the results of the factor analysis uncovered new dimensions (11 factors) in the study context for the user satisfaction.

a) Services

Domain "services" consisted of fourteen attributes (Table 3) which related to services, links and information. Links to subject gateways, search engines and

access to national/international records were provided as a service for patrons to facilitate easy access to unique, reliable, scholarly information. Information on collection, membership, floor plan were provided as a service to assist users to locate information easily without the barriers of time and location. In addition, the library provides a service of cross browser compatibility to facilitate patrons to view the website uniformly with web browsers of Internet Explorer and Firefox.

b) Readability and Scanability

This domain consisted of five potential attributes in which, two related to readability and three on scanability. Presence of meaningful alternative text (<alt> tags) for all auditory and visual content which can be read through assistive technologies are essential to make the content readable to people with special needs (Deltor & Lewis 2006; Sawetrattanasatian 2008).

c) Design and Layout

The factor comprised of eight variables which related to design and layout of the website. According to Geczy, Izumi and Hasida (2011) poor design and implementation resulted in low usable product and highlighted the importance of design domain in a website.

d) Navigability

The present study also emphasized that navigability as a critical component which influences use satisfaction. Congruent to Pearson and Pearson (2008)

e) General information

The domain "General information" consisted of five potential attributes related to the library's contact information, opening hours, history and branch libraries. Many researchers ascertain that the library websites should provide basic information for users as contact information and opening hours (Deltor & Lewis 2006; Gardner, Mawe 2007; Quatab & Mahmood 2009).

f) Terminology and Download time

The factor consisted of four variables in which three related to terminology and one on download time. Researchers Adams and Cassner (2002); Gardner, Jane (2005) have highlighted the importance of using user friendly terms which lack library jargon in the library websites.

g) Scholarly communication

The factor consisted of three variables which emphasized characters of scholarly communication (Table 1). The development of computer technology has created great changes in scholarly communication and facilitates global transfer of knowledge. Institutional repository provides access to scholarly communications whereas currency denoted by the date stamp on each webpage is vital to indicate information is up to date.

h) Aesthetic appeal

The domain "Aesthetic" consisted of two variables which related to colour and presentation of the website. Colour of the website act as a strong predictor in the overall appeal of a website.

i) Electronic resources

The factor comprised of three variables (Table 3) pertaining to electronic resources.

j) Authority and Graphics

The factor consisted of four variables in which three related to the authorship (contact information of webmaster, links to university home, use of university logo) and a variable on use of graphics. All three variables related to authority dealt with different aspects of recognizing the organization responsible for the website, which facilitate users to decide whether the information in the website is trustworthy.

k) Current awareness

The factor comprised of a single variable which is on the library news and indicated a high positive value of 0.783 (Table 2). A single variable strongly acts as one factor which provides current events in the library.

7.0 Conclusion & Recommendation

The results of the study revealed new dimensions (11 factors) that explain the pattern of correlation of the usability characteristics in the library website in the study context for user satisfaction. In future the library professional should consider 11 factors and the pattern of correlation of the features when improving and redesigning the library website of the University of Colombo to meet the expectations of patrons.

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