

Full Length Research Paper

Factor analysis of user satisfaction: A special reference to the library, University of Jaffna, Sri Lanka

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Measuring user satisfaction is important in terms of survival of an academic library. The primary aim of this paper is to investigate the factors determining satisfaction of users who use the academic library. This study was carried out at the University of Jaffna, Sri Lanka among the library users. Data was collected by distributing a questionnaire to users of the library, those who visited to the library during a particular period. The study was exploratory in nature and employed factor analysis to identify the important factors of user satisfaction in relation to library facilities and services. Results revealed that nine factors are considered important in determining user satisfaction. Among those, most important factors are printing facilities, periodicals, reading table and chairs, opening hours, library orientation programme. In addition, factors extracted from the analysis accounted for 64.461 % of the total variability.

Keywords: User satisfaction, Academic libraries, Library facilities and services, Factor Analysis

INTRODUCTION

The main role of an academic library is to satisfy the needs of its users. They are indispensable instruments for intellectual development of the researchers and scholars. According to Kotso (2010), libraries assist in research process by collecting, preserving, and making available an array of information resources relevant to their research community. Jubb and Green (2007) observe that academic libraries have played vital roles in supporting research activities in all subjects and disciplines within their host campuses for centuries. Moreover, studies also identified that students are not interested in visiting the library physically nowadays, and they are more comfortable in retrieving information

electronically (Dilevko and Gottlieb, 2002; Moncrieff *et al.*, 2007) as virtual patrons. Cullen (2001) noted that due to the explosion of academic publishing and tertiary education, academic libraries are facing greatest challenge today. The author further argued that the global digital revolution is affecting both the traditional forms of creation, organization, and dissemination of knowledge and the world of tertiary education itself. Thereby, academic libraries are currently engaged in experimenting new ways to combine information resources, technology, and research (Laurie, 2003). Some libraries have reconfigured their physical space and redesigned services to meet the new challenges by adopting the idea of information commons or taking initiatives to provide library services (incorporating computers, information resources in various formats, and staff assistance) at a central location. In contrast, a study carried out on student and faculty use of academic

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libraries in Delta state at Nigeria found that printed books are heavily used than other materials (Okoye, 2000).

Literature review

Satisfaction is generally defined as “fulfillment of one’s wishes, expectations, or needs” (Oxford Dictionary). Studies on *information user* and *information user satisfaction* have a history of 40 years (Shi, 2001). In the late 1990s, Gap theories and LibQual model were widely accepted by research libraries. Since then, library service evaluation and user satisfaction issues have been discussed in a variety of subject literatures. Many researchers have observed that user satisfaction is a central variable in most user-oriented research (Kotler & Andersen, 1996). Researchers have adopted knowledge and models from other disciplines such as marketing, psychology and computer science to discuss the user satisfaction related to libraries. Thereafter, it was found that a series of variables contributing to user satisfaction other than performance alone (Applegate, 1993).

User satisfaction at micro level – concern only one individual service - user satisfaction contributes to the dimensions of service quality (i.e., tangibles, reliability, responsiveness, assurance, and empathy) (Cullen, 2001). User satisfaction at macro level – concern all the services which users interact - user satisfaction is a global or macro view of quality of services and integrates all the above mentioned dimensions of service quality. It contributes to user’s overall satisfaction with the organization (Cullen, 2001). In an early attempt to define *user satisfaction* as a concept, Tessier *et al.* (1977) stated that satisfaction is “ultimately a state experienced inside the user’s head and therefore it is a response that may be both intellectual and emotional”.

In the field of library science, researchers usually approach user satisfaction in traditional way, in which researchers emphasize the investigation of user material needs and fulfillment - what users requested and received from libraries (Fei Yu, 2006). Usually, the physical objects like books and journals are the main focus of these studies. Azzah and Mark (2010) investigated the relationship between user satisfaction and four factors such as system effectiveness, user effectiveness, user effort, and user characteristics. A survey analyzed by Sivathaasan (2013) revealed that 11.1% of user satisfaction is determined by library collections such as reference collections, lending collections, periodicals, archival materials, and electronic resources. Simmonds *et al.* (2001) stated several factors that can influence users’ satisfaction. These factors include responsiveness, competence and assurances, tangibles and resources. The study of Basil and Patience (2012) revealed that information resources, facilities, and services are the factors which influence users’ satisfac-

tion. Daisy (2006) found that most respondents were somewhat or very satisfied with overall library services and staff performance; moderately satisfied with the print collection; and least satisfied with space and ventilation, lack of study areas and the noisy environment. The helpfulness of the staff was rated the best. Chandrasekar and Murugathas (2012) found that text books are the main information source for undergraduates in biological sciences.

Customers are generally considered as king in any services provided by the organization. In a customer satisfaction survey done by Zheng (2004), increasing number of requests showed that users are truly satisfied with inter-library loan services and commented timely usable. Further, user satisfaction in relation to library facilities and services depends on quality of services offered by the library. Velnampy and Sivesan (2013) assessed the service quality of university libraries in Sri Lanka. This study analyzed twenty three variables which measure the service quality of university libraries and finally extracted four factors using factor analysis, namely convenient opening hours, current information, collection comprehensiveness, and convenient access to collection. Velnampy and Sivesan (2012) in their research on determinants of customer relationship marketing of mobile service providers in Sri Lanka extracted three factors namely trust, rapport and accuracy using factor analysis. In another study (Velnampy and Sivesan, 2012) they extract from the analysis that together accounted 84.924% of the total variance. These factors were categorized as payment, achievement and proud to work.

Public libraries also try to satisfy the thirst of knowledge of users. In this context, users’ satisfaction refers to how users judge the services of public libraries. Indeed, it refers to whether users of public libraries get the desired information resources, facilities, and services expected to be provided by the public libraries. Hence, in recent times, evaluating users’ satisfaction with the information resources, facilities, and services of public libraries has become a major concern and an integral part of library and information science practitioners (Ogunsola, 2004).

Various have been done on satisfaction (Velnampy, 2008 and 2006), but studies on user satisfaction in connection with library are very rare especially in Sri Lankan context. In this connection, this paper attempts to describe the results of an exploratory quantitative study that investigates factors which determine the user satisfaction in relation to facilities and services provided by an academic library situated at the University of Jaffna in Sri Lanka.

The study aims to identify the factors influencing user satisfaction regarding library facilities and services. Major objectives of the study are:

- To examine the variables influencing user satisfaction
- To identify the most important factors determining

Table 1. Reliability Coefficient for the factors determining User Satisfaction.

Variables	Cronbach's Alpha (Individual) if Item Deleted
Reference Collections	.874
Lending Collections	.873
Periodicals	.873
Archival Materials	.875
E-Resources	.870
Reading Tables & Chairs	.877
Study Area	.872
Shelf Arrangement	.870
Air Conditioning	.870
Lighting	.870
Temperature/Heat	.874
Photocopying Facilities	.870
Printing Facilities	.874
Audio Visuals Facilities	.874
Quietness	.878
Cleanliness	.871
Security of Personal Belongings	.872
Opening Hours	.875
Staff Approachability	.872
Availability of Staff	.873
Helpfulness of the Staff	.872
Knowledge of Staff	.871
Check in & Out of Library Materials	.871
No of Books allowed for borrowing	.870
Current awareness services	.872
Selective dissemination of information	.874
Inter Library Loan	.876
OPAC facility	.873
Library Orientation Programme	.875
Library Guides, handouts, bibliographies & indexes	.874
Overall Cronbach's Alpha	0.877

user satisfaction

- To propose a conceptual model for user satisfaction based on statistical evidence.

METHODOLOGY

Research design is a conceptual structure within which the research has to be conducted. A well-planned research design will facilitate the collection of relevant evidence and information for the research, efficiently (Kothari, 1990). This study was carried out at the University of Jaffna. In this study, survey instrument is a self-administered questionnaire, which was developed as a tool for data collection. This survey instrument includes thirty variables (30) to measure user satisfaction in relation to library facilities and services (Table 1). Participants of the study were the readers of the library,

who visited the main library on a particular week from 3rd to 5th June 2013. Out of 400 readers visited the library during the above mentioned period, it was decided to collect data from 30 % of the total population. Hence, a total of 120 students were selected randomly with different subject backgrounds and questionnaires were distributed. Questionnaire was personally handed over to each reader and instructions were given for completing the questionnaire. Subsequently, all questionnaires were collected and analyzed. The first five responses were treated as a pilot study. All variables were measured on a five- point Likert scale ranging from *least satisfied* to *most satisfied*. Because, it allowed the researchers to quantify opinion-based items, and a scale with balanced keying (an equal number of positive and negative statements) could obviate the problem of acquiescence bias. Exploratory Factor Analysis (EFA) was employed in examining factors determining user satisfaction relating to

Table 2. KMO Measure and Bartlett's Test.

KMO Measure of Sampling Adequacy		.706
Bartlett's Test of Sphericity	Approx. Chi-Square	678.740
	df	435
	Sig.	.000

(As per KMO measure: a measure of > 0.9 - marvelous, > 0.8 - meritorious, > 0.7 - middling, > 0.6 - mediocre, > 0.5 - miserable, < 0.5 - unacceptable)

library facilities and services and SPSS (Statistical Package for Social Science) version 16.0 has been used to analyze the data.

RESULTS AND DISCUSSION

Exploratory Factor Analysis (EFA) is a complex procedure with a few absolute guidelines and options, and is a widely used and broadly applied statistical technique in the social sciences. Factor analysis was employed in this research to identify the factors determining user satisfaction regarding facilities and services available at the Library of the University of Jaffna, Sri Lanka. In terms of demographic findings, 55 % of the respondents were males, and the remaining 45 % were females.

Testing reliability and validity of the scale are important before applying factor analysis. The internal reliability of the data collected was verified by Cronbach's alpha. This value may vary from 0 to 1. Malhotra (2000) and Cronbach (1951) suggested that satisfactory value of alpha is required to be more than 0.6 for the scale to be reliable. In this present study, overall cronbach's alpha is 0.877. Moreover, the reliability coefficients of individual factors range from 0.8 to 0.9 (Table 1).

Overall and individual Alpha values for all the factors were greater than 0.6. Therefore, variables deemed to have adequate reliability.

The test of validity of data was examined with the help of a Kaiser-Meyer-Ohlin (KMO) measure of sample adequacy and Bartlett's test of sphericity. The results of KMO and Bartlett's test were given in Table 2. These two tests satisfied the validity of data for factor analysis.

Generally, KMO statistics varies from 0 to 1. Kaiser (1974) recommended that values greater than 0.5 are acceptable. In this present study, the value for KMO matrix is 0.706 which falls under the range of middling. Hence, sample taken to carry out factor analysis is statistically significant and data is appropriateness to continue the factor analysis. Bartlett's test of Sphericity assists to verify the appropriateness of the factor analysis. According to the above table, test value of chi-square is 678.740 which is significant ($p < 0.05$) indica-

ting appropriateness of the data.

PCA (principal component analysis) is the default method of extraction in many popular statistical software packages, including SPSS and SAS, which likely contributes to its popularity. In this study, the extraction method was PCA followed varimax rotation. To determine the number of components, only the Eigen values greater than or equal to 1 were considered (Guttman 1954; Kaiser 1960). In addition, the KMO measure and the Bartlett Sphericity's test were effected. The factor analysis resulted in nine factors, whose Eigen values were greater than 1, and hence are significant. The Table 3 shows the actual variables that were extracted and those variables met the cut-off criterion (extraction method). There are only nine factors with Eigen values greater than 1, which accounts for 64.461 % of the variability. The percentage of variance column explains how much of the total variability can be accounted by each of the factors or scales. For parsimony, only factors with loadings above 0.50 were considered significant (Pal, 1986; Pal and Bagi, 1987).

In this study, minimum factor component loadings of 0.534 or higher are considered significant for EFA purposes. User satisfaction variables having highest loadings become the title of each factor component, determining the user satisfaction.

Factor 1: The most important factor determining user satisfaction was found to be printing facilities, since Eigen values and percent of variance explained by this factor were 6.932 and 23.107% respectively. This factor consisted of four variables such as printing facilities, audio visual facilities, air conditioning and temperature or heat. Factor loading range is between 0.776 and 0.534.

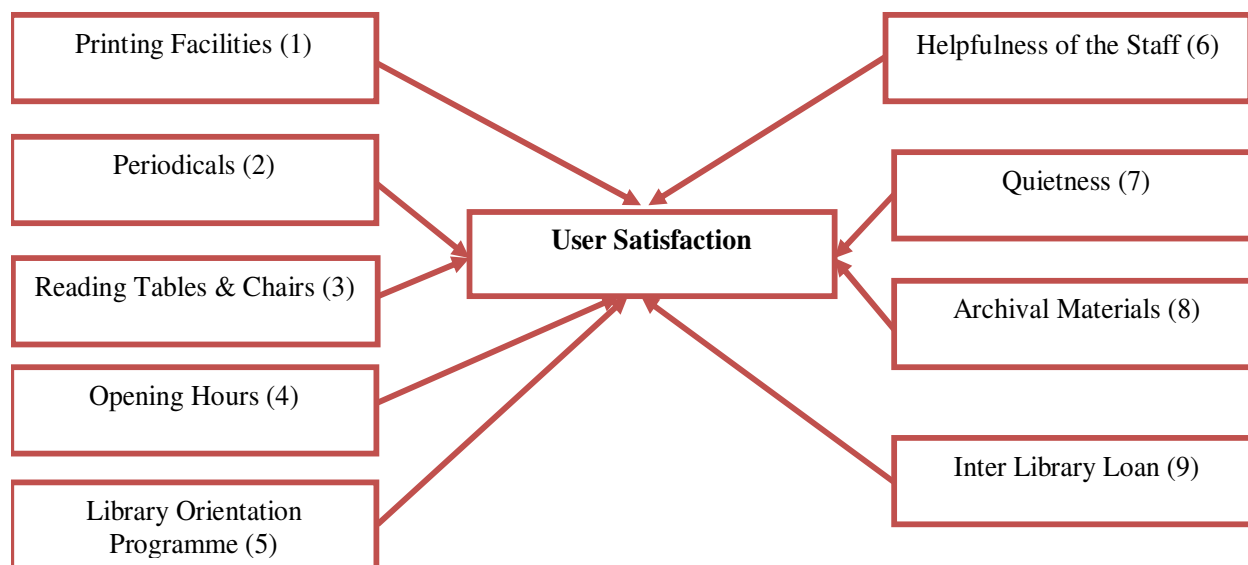
Factor 2: The next factor identified was periodicals which consisted of four variables with loadings ranging from 0.682 to 0.594. The percent variance explained by this factor was 8.021 %.

Factor 3: This factor comprised three variables representing reading table and chair, study area and lighting and has been found to impact user satisfaction. Factor loadings of these variables ranged from 0.761 to 0.565. A variance of 7.089 was explained by this factor.

Factor 4: Two variables such as opening hours and security of personal belongings were included in this

Table 3. Factor Loadings of Variables.

Factor	Variable(s)	Factor Loadings	Eigen Value	Percent of Variation Explained	Cumulative %
Factor 1	Printing Facilities	.776	6.932	23.107	23.107
	Audio Visuals Facilities	.755			
	Air Conditioning	.645			
	Temperature/Heat	.534			
Factor 2	Periodicals	.682	2.406	8.021	31.127
	Reference Collections	.649			
	Number of books allowed for borrowing	.596			
Factor 3	Lending Collections	.594	2.127	7.089	38.216
	Reading Tables & Chairs	.761			
	Study Area	.642			
Factor 4	Lighting	.565	1.682	5.606	43.822
	Opening Hours	.798			
Factor 5	Security of Personal Belongings	.650	1.473	4.908	48.730
	Library Orientation Programme	.766			
Factor 6	OPAC Facility	.670	1.320	4.399	53.129
	Helpfulness of the Staff	.756			
Factor 7	Knowledge of resources	.569	1.218	4.060	57.189
	Quietness	.703			
	Library guides, handouts, bibliographies and indexes	.636			
Factor 8	Cleanliness	.548	1.171	3.905	61.094
	Archival Materials	.737			
Factor 9	E-Resources	.575	1.010	3.367	64.461
	Inter Library Loan	.725			

**Figure 1.** Proposed Model.

indicator. Their factor loadings ranged from 0.798 to 0.650 with 5.606 % of variance.

Factor 5: This indicator comprised two variables, namely library orientation programme and OPAC facility. They carried factor loadings of 0.766 and 0.670 with 4.908 % of variance.

Factor 6: Two variables with loadings ranging from 0.756 to 0.569 included helpfulness of staff and knowledge of

resources. This indicator accounted for 4.399 % of the variability.

Factor 7: Quietness, Library guides, handouts, bibliographies & indexes and Cleanliness were the variables with range from 0.703 to 0.548. 4.060% of variance was explained by this indicator.

Factor 8: This consisted of two variables representing archival materials and e-resources with factor loadings of

Table 4. Ranking of determinants of user satisfaction.

Factors	No of Variables	Mean	Std. Deviation	Rank
Factor 1: Printing Facilities	4	2.2375	0.7780	9
Factor 2: Periodicals	4	2.9025	0.6595	4
Factor 3: Reading Tables and Chairs	3	3.0900	0.6717	2
Factor 4: Opening Hours	2	3.1100	0.6160	1
Factor 5: Library Orientation Programme	2	2.5650	0.8075	6
Factor 6: Helpfulness of the Staff	2	2.8150	0.7045	5
Factor 7: Quietness	3	3.0100	0.7260	3
Factor 8: Archival Materials	2	2.4800	0.7580	7
Factor 9: Inter Library Loan	1	2.3200	0.7770	8

0.737 and 0.575 and accounted for 3.095 % of the variability.

Factor 9: Inter library loan was the least important determinant of user satisfaction with factor loadings of 0.725. The variance explained by this indicator amounts to 3.367 %.

On the basis of factor analysis, a model for factors determining user satisfaction in relation to library facilities and services at the University of Jaffna is proposed (Figure 1). In this model, user satisfaction is dependant variable and nine factors are the independent variable(s). This model has been derived on the basis of statistical evidence; hence, it is validated. It can be further used and developed for similar purposes.

The mean and standard deviation of the nine factors have been shown in Table 4. Ranking of the nine extracted factors according to their importance has been listed with the assistance of averaged mean values.

According to averaged mean values, users highly satisfied with the infrastructure facilities such as, opening hours, security of personal belongings, reading table and chair, study area, lighting and quietness available in the library.

CONCLUSION

Several studies have attempted to identify factors determining overall user satisfaction in libraries. Through an empirical investigation, this study has identified nine variables or indicators which contribute to the user satisfaction of the library, University of Jaffna, Sri Lanka. The contribution of the study is the identification of variables that determine user satisfaction with the facilities available and services provided by the library. Determinants identified are printing facilities, periodicals, reading table and chairs, opening hours, library orientation programme, helpfulness of staff, archival materials and inter library loan. As per averaged mean values, users well satisfied with the infrastructure facilities, whereas library has to more concentrate on

improving archival materials, inter-library loan and printing facilities.

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