Users' Satisfaction with Factors Affecting Research Data Management Systems in Subject-Related Libraries in Colombo District, Sri Lanka

Ranuri Inoka Kuruppu

Librarian, Dangerous Drugs Control Board

Abstract— All academic libraries use research data. The paper is aimed at discussing users' satisfaction with factors affecting research data management systems. The objectives of the study were to identify the factors affecting user satisfaction. To identify the level of user satisfaction. To explore factors affecting user satisfaction. The study already identified three factors related to user's satisfaction with research data management systems: IT infrastructure facilities available in subject-related libraries, library staff's 'technical skills, and IT literacy skills. The study results revealed that the majority of users were satisfied with the available IT infrastructure facilities in subject-related libraries. But study is recommended for the improvement of technical skills and IT literacy skills with modern technology.

Keywords— IT infrastructure facilities, IT literacy skills, Research data management systems, modern technology.

INTRODUCTION

All academic fields collect and use research data, which could be in the form of numbers in a spreadsheet or a variety of other media like videos, photos, artefacts, and diaries (Villagett Willage Library,2021). Research data are the raw materials obtained, prepared, and reviewed while a study is conducted. They act as the substantiating proof for the results of the published study. Analog and digital unprocessed research data can be divided into five kinds: observational, experimental, simulation, derived or compilation, and reference data. (Darby,2022). Research data are facts that must be used to achieve the research study's objectives. They have been gathered using various technologies and scientific procedures. Depending on the nature and forms of analysis, they may be qualitative, quantitative, or a mix of both. Both secondary and primary sources, exams, can provide the necessary data. The handling of data (collection, organization, storage, and documentation) during and after a research activity is called research data management.

Effective data management ensures that researchers share their data in a FAIR manner (findable, accessible, interoperable, and reusable). Research organizations increasingly require their researchers to create a data management plan to guarantee that all factors are considered from the beginning of an activity (Science Europe,2022). New technology advancements make numerous options to produce, store, and evaluate research data possible. The availability of big data and the development of research platforms are various methods. When discussing forms of data storage, it is a long-term process. The repository of Research data can be Physical or Digital. Physical research data and space is also a problem. In the digital revolution, many data storage and modification possibilities are available.

The European Commission and scientific commissions have recently emphasized the significance of developing a research data management system (RDMS) in higher education institutions (HEI) that combines technical and organizational solutions to ensure the sustainable handling of research data (Donnar,2022). RDM has been recognized as a "ground-breaking" area for research libraries and is one of the top long-term trends for academic libraries. Ashiq et al.,2022). Research database management systems are becoming more and more mandated for research institutions. They guarantee research data management systems' potential.

Research data management is utilized as a call for action for conserving all forms and formats of research data or information and other digital assets over the course of their lifetimes and across time for the use of present and future generations of users. claimed that RDM is the upkeep and enhancement of the reliable corpus of research data for present and future usage. The ability to add value to data generated from new sources of information and knowledge is an emerging area in research and academic libraries, which means the processes of research data archiving and preservation in all formats should include all the processes needed for good research data creation and management. Members of the research community require a variety of data collection services.

This subcategory can contain academic libraries with Special Libraries and Subject-Related Special Libraries. Special Collections about the specific particular library in subject-related. Research data management presents various difficulties for staff and librarians. Because a wide range of subject-related organizations consistently provides considerable research data each year. Most of the data come from science. Academic libraries have handled many data with metadata because the environment became available to them via managing research data management systems. (Mulian,2021) refers to the Institution Library Malianstic and abroad that have conducted much research and practice regarding scientific data under the e-science environment and administrative service. User satisfaction refers to how well users perceive a library's offerings or whether they receive the information resources, amenities, and services they need (Kaushamalika & Weerakoon,2020).

The study is focused on factors affecting the use of RDMS in subject-related special Libraries. These factors can be identified as the Technical Skills of Library Staff, IT infrastructure subject-related special Libraries, and IT literacy skills problems among Library staff. The general objective of the study is users' satisfaction with factors affecting research data management systems in subject-related libraries.

1. Specific Objectives of the Study

- To Identify the factors affecting to user satisfaction.
- To identify the level of user satisfaction.
- To explore factors affecting user satisfaction.

2. Research Questions

- How to explore using Research Data Management Systems in subject-related libraries.
- What is the user satisfaction level in using RDMS?
- What are the factors related to users' satisfaction of Research Data Management Systems?

- How to explore factors affecting user satisfaction?

3. Research Hypothesis

- H0: There is no significant relationship between the IT available Infrastructure facilities of the library and users' satisfaction levels with research data management systems.
- H1: There is a significant relationship between the IT available Infrastructure facilities of the library and users' satisfaction levels with research data management systems
- H0: The Technical Skills of the Library Staff have no significant impact on user satisfaction Levels of research data management systems.
- H1: The Technical Skills of the Library Staff significantly impact user satisfaction Levels of research data management systems.

4. Significant of the Study

The findings will show that, overall, research data management systems are satisfied with the facilities, services, and available research data. The study will be focused on Factors affecting RDMS when Users use the library for their research needs. The identified factors will be valuable tools for identifying the user satisfaction level. The identified dependent and independent variables will be measured through the survey. The primary three aspects of the study will be determined. Users' technical skills, IT literacy, and use of the available IT infrastructure are identified. The considerations will Centre on certain defending variables. The landscape of data storage and analytics options is becoming more complicated as research demands. Therefore, It will be essential to identify the typical database management problems that arise when managing research data and learn how to avoid them by choosing a suitable database management approach. The study will identify the challenges of the new database

5. Limitations of the Study

The study has selected Colombo District Subject-Specific Libraries for the Study. Six libraries were used in the research. Because the majority of subject-related libraries have branches outside of the Colombo district, and some libraries have no Research Data Management Systems. Because the study aims to discuss user satisfaction with research data management systems in subject-related libraries, another reason is that they have only physical subject-related books and journal collections. As a result, six subject-related special libraries in the Colombo district have been selected for the study. They have only branched in the Colombo district; hence, all Sri Lankan library users must travel to Colombo for research. Further, the study did not focus on multiple subject areas; it focused on a specific subject site.

LITERATURE REVIEW

When considering Sri Lanka special libraries, Sri Lanka special libraries support institutional research; academic libraries offer a grading service called "Research Support Service." Academic libraries throughout the world offer a variety of services under the research support service. When considering research data support services, the Sanatharooban. (2022) has identified a Model for Research data support for academic libraries. In this research, the home page of the library, brochures, official letters, and student feedback were all analyzed. By planning a

series of sessions in response to student requests, the research support service of the EUSL library concentrated more on educating undergraduates on research-related topics. The library has also expanded its research support services by introducing a new one called individual research consultation, in which scholars can meet with librarians alone or in groups to receive individualized help with their study. The feedback study revealed that the undergrads highly valued the service's utility. Narasappa. & Kumar (2020) have discussed the library research services and resources differently. The Scholars stated how pre-university colleges in Karnataka, India, use library resources and services.

Most developed and developing countries adapt to new web-based technology such as Web 2.0. The environment of libraries has changed due to information and communication technology, and physical libraries have been replaced with virtual ones. In light of the information age, it is an intelligent transformation to provide library customers with a virtual environment to ensure simple access to critical information. Rhaman (2021) has discussed Web 2.0 technology for libraries. The study shows that librarians in academic and special libraries in Pakistan have differing views toward familiarity and knowledge of Web 2.0 technologies. Compared to librarians working at Pakistan's academic libraries, those working in special libraries need to become more familiar with and knowledgeable about Web 2.0 services. User satisfaction and library services are related to research data management services. Users 'satisfaction is a crucial part associated with Research Data Management services. According to Gyau et al. (2021), where library services need to be improved, evaluation of user satisfaction is a primary factor of library success in terms of quality service delivery. The study's primary objective is to assess student opinions on user satisfaction with academic library services to discover the relationship between user happiness and the overall quality of library services. International students who use the Jiangsu University Library were asked to fill out a customer satisfaction questionnaire, which was prepared as part of the study's use of the survey research methodology.

Quality of library services is impacted on the overall library services. According to Gyau et al. (2021), the importance of determining how well a library performs in providing high-quality services is customer satisfaction assessment. According to the study, patrons are satisfied with how the library treats patrons and supports learning and research. Students gave the library's overall service quality a rating of good. Results indicate a correlation between library users' satisfaction and the overall quality of library services that is both positive and substantial.

Faisalabad & Ahmad (2021) have evaluated the current status of resources and services of special libraries in Faisalabad, Pakistan. The findings revealed that the special libraries under investigation held a wide range of information resources, although they were limited in number and type. The state of ICT infrastructure, classification, cataloging, automation, and knowledge management was deplorable in special libraries. Special libraries offered a variety of services but at a low level.

This paper discusses various ICT tools in library operations and how ICT has been used to create library services. The current study examines several ICT-based library operations. This study aims to demonstrate how various ICT tools and strategies can help the user community obtain material more quickly and accurately while managing

the library's systems and services effectively. According to the study, The Gauhati University Library has the most significant annual budget, the most collections, and well-trained staff, so compared to other chosen libraries, it has a good ICT infrastructure facility and services. Many Special Libraries lack a dedicated library budget, making expanding their collections and running effectively tricky. For library organization, the study's libraries all employ library automation software. They structured and organized the library items using ICT to serve patrons better. The Study mentioned IT Infrastructure facilities.

RESEARCH METHODOLOGY

There are 1,500 registered users across all six libraries., According to Krejcie and Morgan Table(1970),the calculation sample was 306 (confidence level, 95%). 20% was added as a margin of error. As a result, the calculation sample was 368. The Table 3-1 describes the Target Population. The study used six libraries. According to the Directory of Libraries (2015), Around 120 Special Libraries are in Sri Lanka. In the Colombo district, approximately 95 libraries were established. However, most subject-specific libraries have branch libraries outside of the Colombo district of Sri Lanka, and most libraries include only subject-related material rather than research collections. As a result, the study has chosen six research-related institute-registered library users as responders. Only six libraries in the Colombo District have Research Data Management systems.

The approach is an Inductive approach. The study has found the User satisfaction level of subject-specific library users when users use available research data management Systems. Realism has defined philosophy. The probability sampling method was applied for the data collection, and the technique was stratified sampling methods. Stratified sampling gives higher population coverage. Therefore, the study is used with some homogeneous groups of registered library users. The registered library users are directors, assistant directors, research officers, lab assistants, medical laboratory technologists, scientific professionals, lecturers, and students.

The studied data was analysed using the Statistical Package for the Social Sciences (SPSS) software for quantitative data analysis. A printed Questionnaire was distributed among 368 subjects in related registered library users in six related Libraries. However, 293 (79%) respondents were answered out of 368. Quantitative: The questionnaire was created with quantitative data and Qualitative data. The Method was the Survey method, and the Methodology was the mixed method. A cross-sectional study was used for the Study.

DATA ANALYSIS

Table 1.1: Gender of Statistics

Statistics		
Gender of respondents		
N	Valid	293
	Missing	0

368 Questionnaires were distributed to the respondents, but 293 were completed. The data was collected from the research questions. The questions were presented and analysed using frequency tables and figures with simple percentages, as explained below.

The mean of the responses, according to Table 4.1, is 0. 492. The frequency of gender anguish is highlighted in Table 4.2. Male answers comprise 40.6% of the total, while females are 59.4%. The total response rate is 79%.

Table 1.2: Gender of respondents

| Gender of respondents		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	119	40.6	40.6	40.6
	Female	174	59.4	59.4	100.0
	Total	293	100.0	100.0	

Descriptive Frequency of Age of Respondents

Table 1.3 shows the Frequency distribution of the age of respondents. Most library users were under 31–44 years old; respondents were 54.6%. Under the age of 45–60, there are 23.9% respondents. Between 20 and 30, there are 21.5%.

Table 1.3 Descriptive Frequency of Age of Respondents

| Age of respondents		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	20-30 years	63	21.5	21.5	21.5
	31-44 years	160	54.6	54.6	76.1
	45-60 years	70	23.9	23.9	100.0
	Total	293	100.0	100.0	

Satisfaction Level of available IT Infrastructure Facilities

According to Figure 1.1, most users have no idea about the availability of desktop computers in subject-related libraries. The results indicate that users are not familiar with the computer facilities of subject-related libraries.
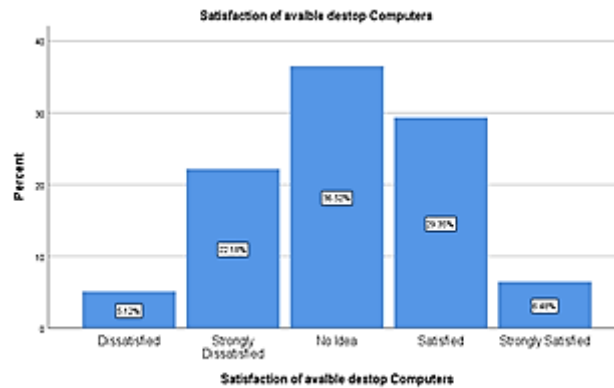
Figure 1.1 Satisfaction of Desktop Computers

Figure 1.2 shows the satisfaction of the LAN network facilities of subject-related libraries. 33.11% were satisfied with the available LAN network facilities of subject-related libraries. But 30.03% were strongly dissatisfied with the LAN network facilities of libraries.
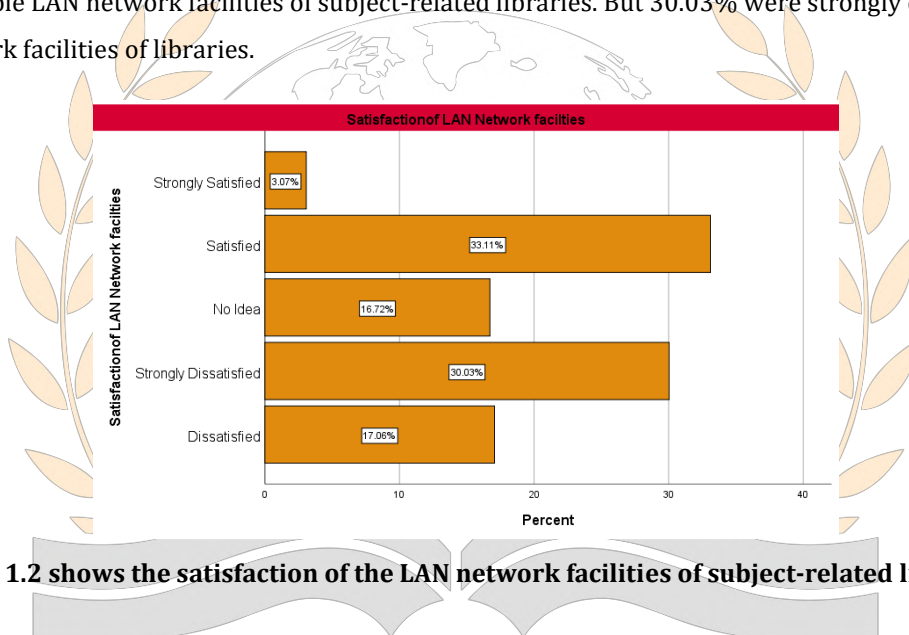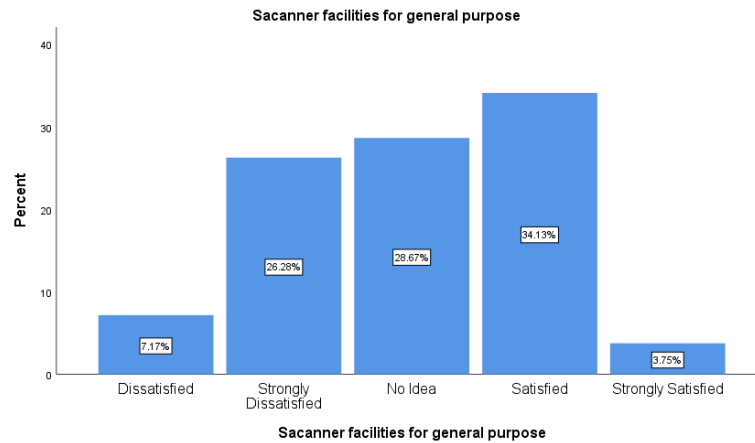

Figure 1.2 shows the satisfaction of the LAN network facilities of subject-related libraries.
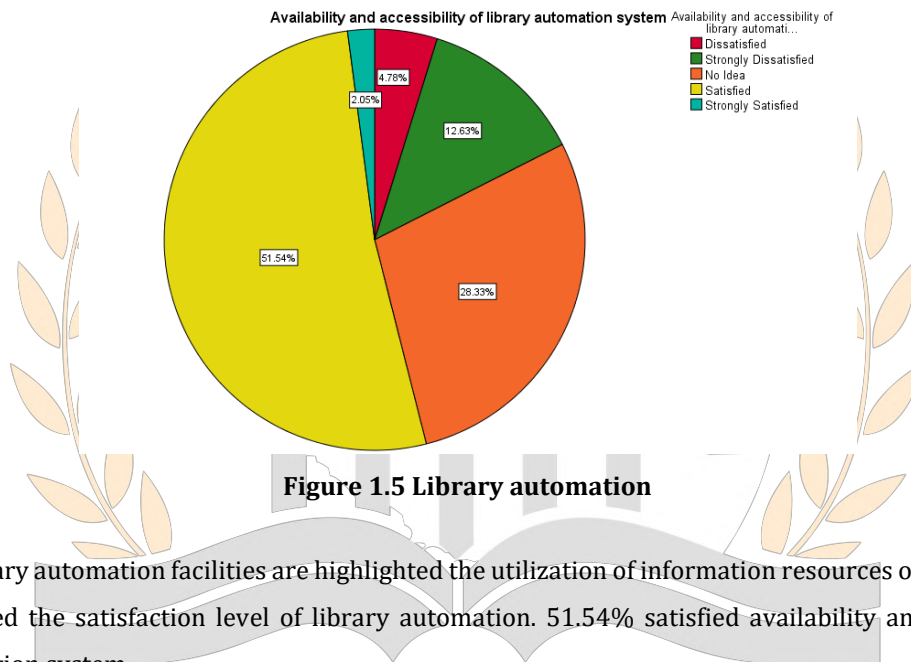
Figure 1.3 shows the satisfaction of the Wi-Fi connection. 32.76% satisfied with the WiFi connection. But the high score of users dissatisfied with the available Wi-Fi connection.

**Figure 1.3 shows the satisfaction of the Wi-Fi connection.**

Figure 1.4 shows satisfaction of scanner facilities of subject related libraries

Figure 1.5 Library automation

Figure 1.5 Library automation facilities are highlighted the utilization of information resources of Users. Figure1.5 results indicated the satisfaction level of library automation. 51.54% satisfied availability and accessibility of library automation system.
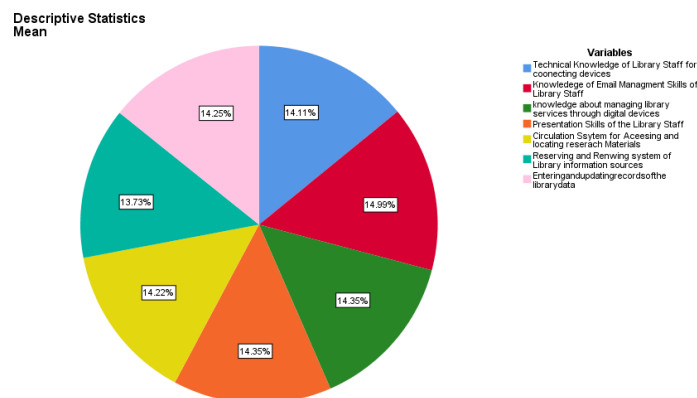

Figure 1.6 Technical Skills of the Library Staff

The availability of technical skills among library staff is supposed to satisfy users. The majority of respondents required email management skills from the library staff. 14.99% satisfied. They know about managing library services through digital devices. 14.35% of respondents expressed satisfaction. 14.22% of respondents were delighted with the Library's Circulation System. Entering updated records essential to current publications, 14.25% of registered library users assist the Library staff in entering and updating records. Overall, registered library users are satisfied with the technological skills of the library staff.

IT literacy skills of library staff are one of the measures that can be used to describe satisfaction with research data management. Figure 4.8 illustrates the responses towards the IT literacy skills of the library staff. It indicates that most library staff know how to use reference materials. 3.631% of users satisfied. 3.549% are happy with the reference tool management system. The above results indicate high ranks of satisfaction with the IT literacy skills of library staff. Overall results further showed that most users gave positive feedback to the IT literacy skills of library staff.
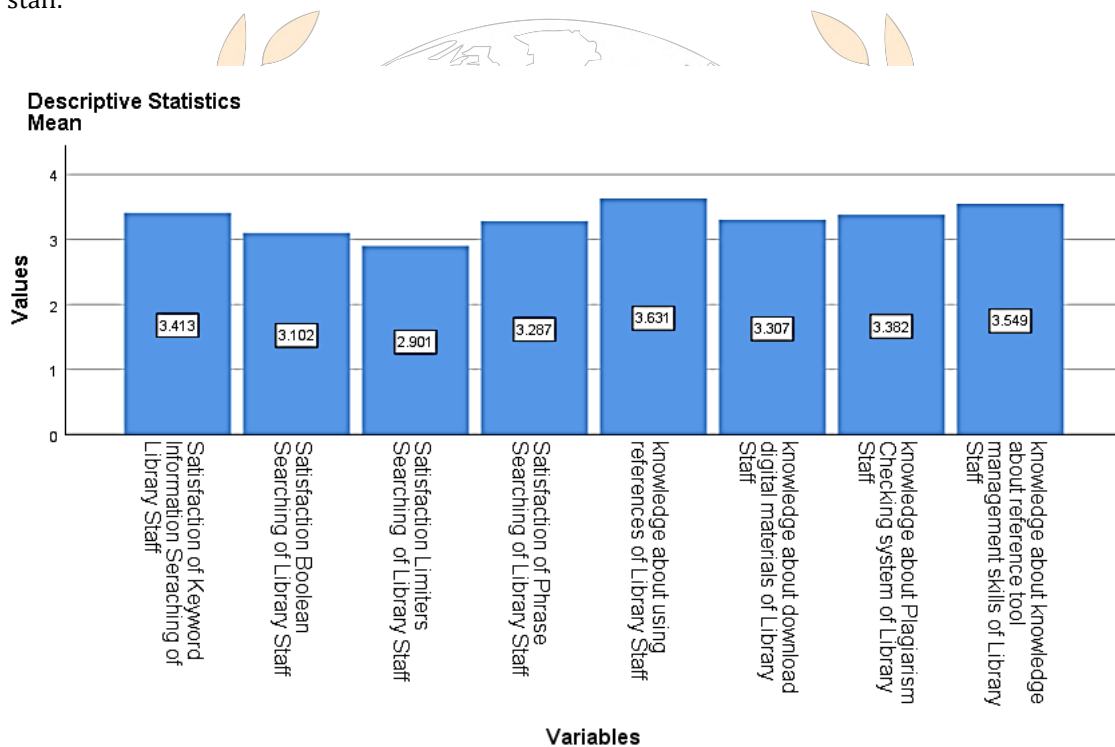
Figure 1.7 IT Literacy Skills of Library Staff

HYPOTHESIS TESTING

Correlations Analysis between User Satisfaction and IT Infrastructure Faculties.

The Table shows the Pearson correlation of the level of User satisfaction (r=1), and there are no observations for User satisfaction (n=293). The correlation between the level of User satisfaction and the gender of respondents is 0.524. Based on the gender of the respondents (n=293), observation with the pair has no missing values. The correlation is r=1. These results show a positive linear relationship between User Satisfaction and IT Infrastructure

Table 1.4 Correlations Analysis between User Satisfaction and IT Infrastructure Faculties.

Correlations		Level of User Satisfaction	IT Infrastructure
Level of User Satisfaction	Pearson Correlation	1	.524**
	Sig. (2-tailed)		.000
	N	293	293
IT Infrastructure	Pearson Correlation	.524**	1
	Sig. (2-tailed)	.000	
	N	293	293

**. Correlation is significant at the 0.01 level (2-tailed).

Regression analysis Linearity technical skills of Library staff and Users' Satisfaction levels

According to the Model Summary, the R Squared and Adjusted R secure value is considered. Both values depicted the variation of the dependent variable and the weather's respective independent variable. The importance of both 0.022 independent variables explains depth-adjusted variables. The adjusted R Secure value is 0.019. That means both values are similar. Therefore, there is a significant relationship between the technical skills of library staff and users' satisfaction levels.

In the Table 1.6 , the survey indicated a Significant Level. According to the Level of Significance, the P value is less than 0.5, which is 0.011. Therefore, there is a significant relationship between the technical skills of library staff and users' satisfaction levels.

Table 1.5 Regression analysis Linearity technical skills of Library staff and Users' Satisfaction levels

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	2.282	1	2.282	6.573	.011b
	Residual	101.014	291	.347		
	Total	103.296	292			

a. Dependent Variable: Level of User Satisfaction

b. Predictors: (Constant). Technical Skills

ANOVA technical skills of library staff and users' satisfaction levels

Regarding the Coefficients Table, Table 1.7 shows the Unstandardized Coefficients of Beta value and Standardized Coefficients of Beta value. The Gender of the respondents in the Unstandardized Coefficients of Beta value is 0.116, and the Standardized Coefficients value is 0.149. The Significant level is 0.011. That means the significant level of P value is less than 0.05. The results are interpreted that the conceptual model is fit for this assumption.

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Table 1.6 Coefficients of technical skills of library staff and users' satisfaction levels

		Coefficients				
Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	2.862	.148		19.361	.000
	Technical Skills	.116	.045	.149	2.564	.011
a. Dependent Variable: Level of User Satisfaction						

RECOMMENDATION

Research data management is a crucial part of subject-related special libraries. With the new technology, academic libraries stored and subscribed to scholarly databases. The present study discussed users' satisfaction with research data management systems in subject-related libraries in the Colombo District. Three hundred sixty-eight (368) respondents were selected as a sample, and printed questionnaires were distributed among respondents, but only 293 (79%) answered the given research questions.

The study is already identified three factors related to satisfaction of research data management systems. According to analysis results most of users satisfied some factors related to satisfaction of research data management system. Such as available IT infrastructure facilities, Technical Skills of Library staff and IT literacy skills of Library staff.

When considering the study's assumptions, the study is based on two hypothesis tests. This study observed a significant relationship between the available IT infrastructure facilities of the library and users' satisfaction levels with research data management systems. Correlation analysis is used to test the hypothesis. When the Pearson correlation between user satisfaction and available IT infrastructure facilities in libraries is examined, it is depicted as a positive relationship between user satisfaction and available infrastructure facilities. A regression line was used in SPSS for testing the second hypothesis.

This study assumes that the library staff's technical skills significantly impact user satisfaction levels of research data management systems. Considering the significant relationship between the technical skills of library staff and users' satisfaction levels, The association is positive. When evaluating the significance level, the P value is 0.011. That is, it is less than 0.05. Finally, the data show a considerable association between library staff technical competence and user satisfaction levels.

The study is recommended to increased IT infrastructure facilities with modern technology like IoT. Librarians should be better decision-makers. Research data preservation systems and such as regular power supplies should

be increased. Online information systems should be improved. Library staff should improve their literacy and Technical Skills with modern technological skills.

CONCLUSION

The study aimed to determine users' satisfaction levels with the research data management systems in subject-related special libraries in Colombo District, Sri Lanka. The study has identified the problem of what factors affect the user's satisfaction level when they use the research data management system. The elements were the availability of IT infrastructure facilities in particular libraries, the IT literacy skills of library staff, and the technical skills of library staff. When considering the factors, most users were satisfied. However, they strongly recommended that research data management systems should be modified with new technology. It can be concluded from the study that the majority of library users are satisfied with some parts of the research services available in subject-specific libraries.

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