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# An Application of TAM on Use of Remotely Accessible E-Resources of Dhanvantri Library, University of Jammu

**Bindu Sharma[1], Reenu Arti Thakur[2]* and Diksha Sharma[3]**

[1]Senior Assistant Librarian, University of Jammu, Baba Saheb Ambedkar Road, Jammu Tawi –180006, Jammu and Kashmir, India
[2]Lecture, DLIS, University of Jammu, Baba Saheb Ambedkar Road, Jammu Tawi –180006, Jammu and Kashmir, India; reenu_thkr@rediffmail.com.com
[3]Research Scholar, DLIS, University of Jammu, Baba Saheb Ambedkar Road, Jammu Tawi –180006, Jammu and Kashmir, India

## Abstract

This study examines how remote users used electronic resources made available by the Dhanvantri Library at the University of Jammu. Quantitative techniques were employed to investigate how effectively e-resources are being used remotely. The study focused on users' assessments of e-resources and the satisfaction level derived from them. The Technology Acceptance Approach (TAM) model is used to explore the level of adoption of e-resources through remote access in two dimensions, i.e., PU and PEU. The results revealed a positive attitude towards e-resources and moderately adopted 2.05 ± .83, the remote access environment of the Dhanvantri library, where the average perceived usefulness is 2.97 ± 1.17, and the perceived ease of use is 2.58 ± 1.99. Consequently, TAM is significantly related to PEU [ $\chi 2(12, 299) = 219.06$, $p<.001$] and PU [$\chi 2(10, 299) = 48.33$, $p<.001$].

**Keywords:** TAM, E-Resources, Remote Access, University of Jammu, Usage Analytics

## 1. Introduction

The University of Jammu is constantly a NAAC ACCREDITED "A+" and achieved 56th rank in NIRF RANKING in 2022 under University Category. The Central Library of the University of Jammu, formally known as the 'Dhanvantri Library', provides on-campus and off-campus access to online resources for registered library users (https://uojelibrary.informaticsglobal.com/ login by using the user name and password issued by the University of Jammu (Figure 1)). The remote access and usage of e-resources are monitored regularly. The remote access facility is used through EZ-proxy software and Fedgate of Informatics to provide uninterrupted services to users.

In the present era, e-resources are regarded as prime sources of information, and libraries have undergone radical changes. E-resources are a boon for students who are looking for supplementary learning material (Parashar and Babel, 2022), and they also help overcome the storage problem and control the flood of information (Thanuskodi, 2011).

The researchers have recognized the role of libraries in supporting the research programs of higher education institutes (Cox and Brewster, 2020) and believed that academic excellence can be determined by studying user satisfaction with library services (Kaur and Kathuria, 2022). A significant role of e-resources endorses the higher education system. The development of e-resources to bestow the services provided in university libraries featured the transition from traditional libraries to modern virtual libraries (Parashar and Babel, 2022).

*Author for correspondence


**Figure 1.** Screenshots of University library remote access to e-resources.

## 2. Literature Review/Theoretical Framework

The libraries in the current era of information technology are adopting advanced applications, nevertheless, when we look at the ground level, we find that even the basic technologies are not used in university libraries. Therefore, tools like TAM, etc., must be used before the adoption of any technology. Further, this study will be of great importance that the librarians must understand the various aspects of the users' needs and behaviors to adopt and implement the new technology. Bhat (2019) reported the positive impact of the adoption of e-resources on the academic and scientific productivity of institutions. It was reported that user satisfaction is significantly correlated with awareness of e-resources (Kaur and Kathuria, 2022). A study highlighted that the level of education, gender, and age affect satisfaction with digital libraries or e-resources (Xu and Du, 2019). It was discussed that ICT skills have a significant effect on the awareness level (Ankamah *et al.*, 2022), and poor ICT infrastructure and lack of skills in accessing the resources are the main barriers in the way of accessing electronic resources (Acheampong, *et al.*, 2020). Brar, Shah, Singh, Ali, and Kwak (Brar *et al.*, 2022) investigated that TAM is more useful in decision-making. Sepasgozar, Ramzani, Ebrahimzadeh, Sargolzae, and Sepasgozar (Sepasgozar *et al.*, 2020) identified the factors having a significant impact on user behavior in adopting the new technologies through TAM. Suresh (Suresh *et al.*, 2016) found the acceptance and use of technology have a direct or indirect effect on each other. The perceived usefulness of any technology has a direct impact on user acceptance (Fred, 1989), and perceived usefulness has more effect on behavior change rather than the perceived ease of use (Elsharif *et al.*, 2017). The adoption of e-resources, their intended use, as well as satisfaction with those resources, have all been important aspects of this study. The Technology Acceptance Model by Davis emphasizes the use of electronic resources and is the foundation for this work (Fred, 1989). The Technology Acceptance Approach is used to explore how users adopt and then use remote access to the Dhanvantri library. And a framework for understanding how technology can be adopted in an organization is given in Figure 2.

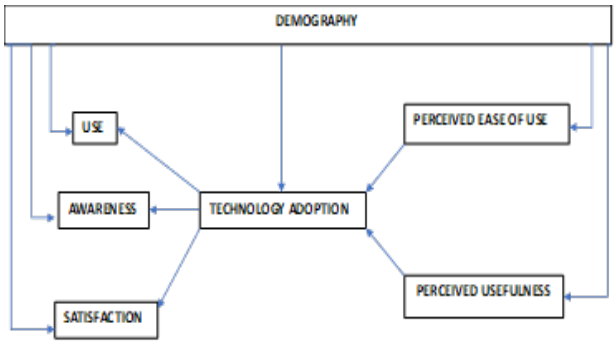


**Figure 2.** The theoretical framework of total technology adoption.

## 3. Research Methodology

The study aims to investigate the usage and adoption of remote services provided by the Dhanvantri Library of the University of Jammu. Hence, the sample study was conducted with 229 students through a survey in Nov 2022. A questionnaire was prepared to ascertain the trends

in off-campus usage of remotely accessible e-resources keeping in view the following objectives to study-

- To ascertain the pattern of accessing e-resources and their Use, Awareness, and Satisfaction level through remote access.
- To find out the level of adoption of remote services, i.e., their Perceived Ease-of-Use (PEU) and Perceived Usefulness (PU).
- To determine the problems encountered while using e-resources and services remotely.

Technology Adoption (TA) was examined at the two dimensions, i.e., PU and PEU which are scaled at two levels. Cronbach's alpha reliability for each dimension was tested and ranged from .7 to .87 for each item and .80 in total. Because all subjects are not generalized to a wider population, the interclass correlation with 229 subjects and twelve raters has been calculated at a 95% confidence interval for an average rating of the fixed set of rates and is good, i.e., 29 [ICC 3, k = 0.650(CI 0.58, 0.714)] (Cicchetti, 1994).

## 4. Respondents' Profile

Figure 3 outlines the demographic characteristics of 229 respondents from the University of Jammu. Of the respondents, a maximum, i.e., 82 (35.8%) were males from three levels of education, i.e., graduation, postgraduate and doctoral Scholars. The largest proportion of respondents, i.e., 46 (20.09%) was from the Department of English, followed by the Department of History (36, 15.72%). The average age of the respondents was 25 ± 4.8.

## 5. Results and Discussions

**The Pattern of Accessing E-Resources**- Preferred types of e-resources, their format, evaluation, and Searching techniques adopted by students during remote access outlay the pattern of use and ease in access of e-resources. (Figure 4).

**Preferred Type of E-Resources** - The most preferred e-resources are e-Journals (138, 60.26%), followed

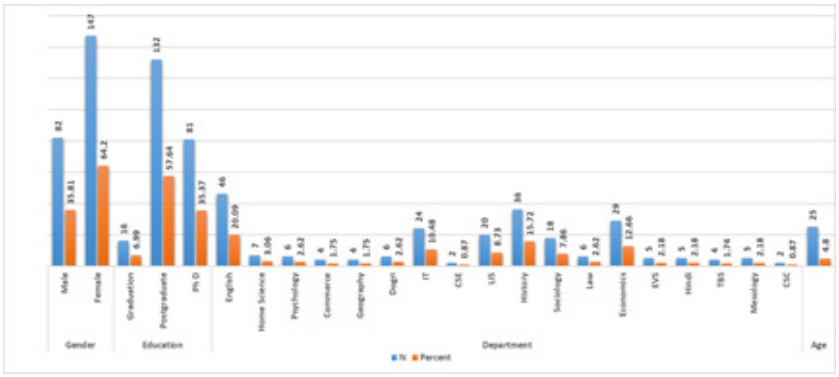


**Figure 3.** Demographic characteristics.


**Figure 4.** Trend of using remote services.

by E-Books (129, 56.33%). The preferred format of e-resources is pdf (197,86.03%), followed by MSWord (122, 53.27%).

**Searching**- Users apply different search techniques while accessing e-resources. Among them, the most preferred is subject searching (119, 51.96%). Searching by the author is another way applied by respondents (113, 49.34%), using one (67, 29.26%) or more (99, 43.23%) keywords for accessing e-resources. Respondents also search directly through URLs (55, 24.02%), and hyperlinks (46, 20.09%), in addition to this Boolean operators (50, 21.83%), and truncation (29, 2.66%). If the search does not return satisfactory results, the respondents modify their search by using other methods, e.g., accessing different information sources (178, 77.73%), using catalogs (122, 53.27%), and using different keywords (117, 51.09%).

**Evaluation** - The majority of respondents (189, 82.53%) revealed that accuracy is the primary parameter in selecting e-resources followed by reliability, relevance, and accessibility.

Out of the total respondents, the majority (163, 71.18%) of students are aware of electronic resources whereas 156 (68.12%) use them and only 49 (21.63%) are

**Table 1.** E-Resources/Services and relation with demography

| **E-Resources/ Services** | | | **N** | **%** | **Gender $\chi^2$ (df)** | **Education $\chi^2$ (df)** | **Department $\chi^2$ (df)** | **Age $\chi^2$ (df)** |
|---|---|---|---|---|---|---|---|---|
| Electronic Resources | Aware | | 163 | 71.18 | 2.94 (1) | 7.0* (2) | 39.22** (18) | 21.46 (20) |
| | Use | | 156 | 68.12 | 1.49(1) | 2.89 (2) | 29.205* (18) | 25.05(20) |
| | Satisfaction | Don't Know | 119 | 51.96 | 0.07(2) | 4.57(4) | 57.46 *(36) | 47.71(40) |
| | | Unsatisfied | 61 | 26.63 | | | | |
| | | Satisfied | 49 | 21.29 | | | | |
| Catalogue | Aware | | 177 | 77.29 | 9.52**(1) | 6.56*(2) | 19.67(18) | 25.323(20) |
| | Use | | 171 | 74.67 | 10.51***(1) | 9.47**(1) | 17.95(18) | 34.73*(20) |
| | Satisfaction | Don't Know | 19 | 8.29 | 2.71(2) | 4.11(9) | 38.56(36) | 35.62(40) |
| | | Unsatisfied | 145 | 63.31 | | | | |
| | | Satisfied | 65 | 28.38 | | | | |
| Online Orientation User and Education | Aware | | 142 | 62.01 | 4.96*(1) | 1.22(2) | 18.2(18) | 25.44(20) |
| | Use | | 123 | 53.71 | 1.9(1) | 1.2(2) | 17.89(18) | 25.62(20) |
| | Satisfaction | Don't Know | 106 | 46.28 | 2.4(1) | 5.44(4) | 32.65(36) | 41.63(40) |
| | | Unsatisfied | 64 | 27.95 | | | | |
| | | Satisfied | 59 | 25.78 | | | | |
| Online Reference Service | Aware | | 198 | 86.46 | 0.19(1) | 10.12**(1) | 41.49**(18) | 39.75**(20) |
| | Use | | 196 | 85.59 | 0.50(1) | 9.23**(1) | 36.84**(18) | 38.09**(20) |
| | Satisfaction | Don't Know | 38 | 16.58 | 2.48(1) | 13.65**(4) | 34.1**(36) | 48.15(40) |
| | | Unsatisfied | 64 | 27.94 | | | | |
| | | Satisfied | 127 | 55.45 | | | | |
| * p < .05, ** p < .01, *** p < .001 | | | | | | | | |

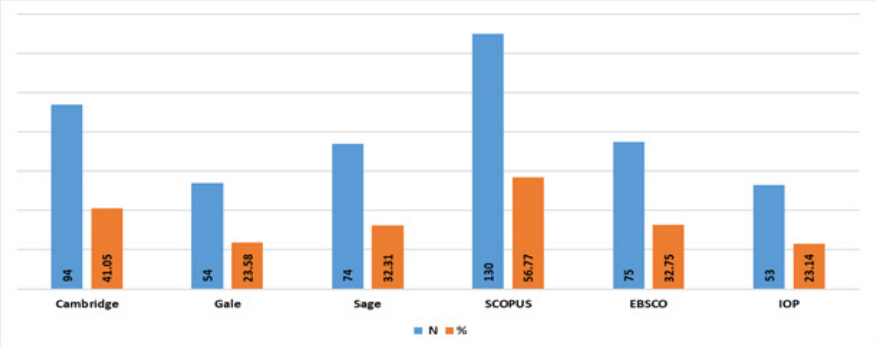


**Figure 5.** E-resources.

**Table 2.** Technology total adoption

| **Perceived Usefulness** | **N** | **Percent** | **Mean** |
|---|---|---|---|
| Using the e-resources for solving queries other than academic e.g., Health, society, politics, etc | 99 | 43.231 | 2.969±1.17 |
| Using e-resources for preparing competitive exams | 127 | 55.459 | |
| Using e-resources for improving the effectiveness of the project/ academics | 138 | 60.262 | |
| Using e-resources for gaining the in-depth- subject knowledge | 44 | 19.214 | |
| Find e-resources useful for preparing daily assignments easily | 145 | 63.319 | |
| Using e-resources for enhancing research productivity | 127 | 55.459 | |
| **Perceived Ease of Usage** | | | |
| Learning to remote access is easy | 127 | 55.459 | 2.581±1.99 |
| Easy to use e-resources with basic knowledge of ICT | 118 | 51.528 | |
| Easy to access the e-resource | 113 | 49.345 | |
| Easy to use the library website | 120 | 52.402 | |
| Easy to understand the search process | 75 | 32.751 | |
| Easy to understand the evaluation of information | 38 | 16.594 | |
| Level of Adoption | | | |
| Low | 74 | 32.314 | 5.550±2.14 |
| Moderate | 69 | 30.131 | |
| High | 86 | 37.555 | |

satisfied with them. There was no significant relationship between e-resource awareness, use, and satisfaction with the respondents' demography except department [satisfaction- $\chi^2(36, 299) = 57.46$, $p < .05$]. There was a significant relationship between most of the demographic characteristics with awareness, use of, and satisfaction

with the catalogue[use-gender- $\chi^2(1, 299) = 10.51$, p<.001; awareness- gender- $\chi^2(1, 299) = 9.52$, $p < .01$; awareness-education- $\chi^2(2, 299) = 6.56$, $p < .05$; use- education- $\chi^2(1, 299) = 9.47$, $p < .05$ and age- use- $\chi^2(20, 299) = 34.73$, $p < .05$], and online orientation [aware- gender- $\chi^2(1, 299) = 4.96$, p<.05]. However, a very smaller number of respondents were satisfied with the online orientation and catalogue service of the Dhanvantri library. Education and the department of students are significantly related to the use, satisfaction, and awareness of online reference services.

In addition, Figure 5 represents that Dhanvantri library provides access to various other types of e-resources like E-Journals, E-Books, Books in Print databases, ETDs, Digital repositories, Staff Publications, etc. The respondents are aware of the e-resources available in the Dhanvantri library. They stated that had awareness regarding the availability of SCOPUS (130, 56.77%), Cambridge (94, 41.08%), Gale (23.58%), IOP (53, 23.14%). EBSCO (75, 32.75%) and SAGE (74, 32.31%).

To study the technology total adoption of remote services i.e., their Perceived Ease-of-Use (PEU) and Perceived Usefulness (PU).

**Perceived Usefulness (PU)** is the extent to which user asserts that implementing a technique will contribute to their better performance. The table outlines the Perceived usefulness and depicts the utility of e-resources in solving queries other than academics, e.g., Health, society, or political information, preparing competitive exams, improving effectiveness in projects or academics, gaining in-depth- subject knowledge, preparing daily assignments, and enhancing research productivity.

**Perceived Ease of Usage (PEU)** is the degree to which an individual perceives the used technique as easy and simple. The results depict that the users easily use the services with their basic knowledge of ICT through the library website. Although they find it hard to understand the search process and the evaluation of e-resources.

**Technology - Total Adoption.** A value less than 4 depicts the low level of the TA, 5-6 depicts the moderate level, and 7 or above depicts the high adaptation. However, the majority of the respondents, i.e., 86, 37.55% were found to adopt the remote access environment of the Dhanvantri library. The mean score of Perceived Usefulness is 2.97 ± 1.17, PEU is 2.58 ± 1.99 and TA is 2.05 ± .83. It represents the moderate level of adoption in remote access of e-resources.

**Analytical Framework**

On the application of statistical procedures, various relationships are depicted to know the possible factors affecting technological acceptance, and an analytical framework is designed. This, however, should be considered a high priority to implement/introduce any new technology in any organization. It was found that there was no significant relationship between demographic characteristics and PEU, except age [ $r_s$ = 0.519, $p < .001$], education [$\chi^2(10, 299) = 67.391$, $p < .001$]

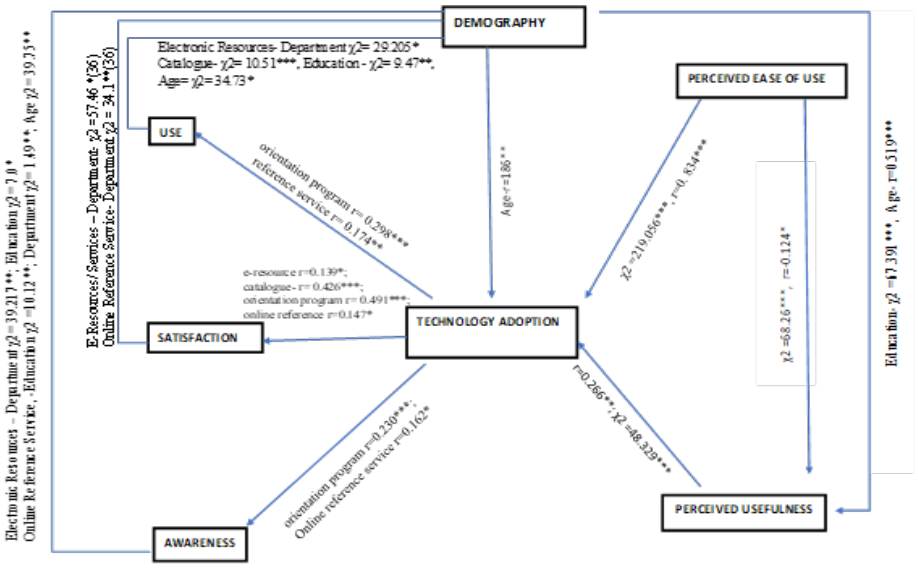


**Figure 6.** Analytical framework.

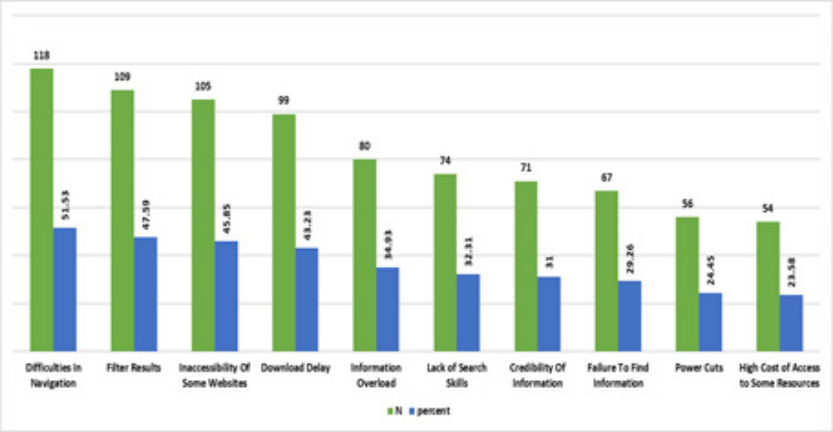


**Figure 7.** Problems encountered while using e-resources and services remotely.

with PU and age [$r_s$ = 0.186, p<.001] significantly related to TA. As far as the interrelationship of PU, PEU, and TA, it was found PU and PEU [ $\chi^2(30, 299) = 68.26$, p<.001; rs = -0.162, p = 0.014] are negatively related, which depicts that the users consider e-resources highly useful even if they are less easy to use. Also, TA is significantly related to PEU [$\chi^2(12, 299) = 219.06$, p <. 001; $r_s$ = 0. 834, p < .001] and PU [$\chi^2(10, 299) = 48.33$, p<.001; $r_s$= 0.27, p<.001]. Hence, the adoption of remote access to the library is directly and significantly related to PEU and PU.

The statistical analysis revealed that the adoption of technology is significantly related to the satisfaction of e-resources available ($r_s$ = 0.139, p < .05) and the catalog ($r_s$ = 0.426, p <.001). The results also indicate that the adoption increases significantly as the awareness regarding the orientation program ($r_s$ = 0.230, p < .001) and online services ($r_s$ = 0.162, p < .05) increases. In addition, the use of orientation programs and orientation services and their satisfaction significantly affect technology adoption. This depicts the TA is related to the behaviour of the user.

**Problems encountered while using e-resources and services remotely**

Students reported organizational, personal, and lack of IT skills problems encountered while using e-resources and services remotely and summarized in Figure 6. The important problems faced by students are difficulty in navigating the library website and e-resources (118, 51.53%), their ability to filter search results (109, 47.59%), and lack of search skills (74, 32.31%). The institutional problem they face is a delays in downloading (99, 43.23%), information overload (80, 34.93%), inaccessibility of some websites (105, 45.85%), power cuts (56, 24.54%), and the high cost of accessing to some unsubscribed resources (54, 23.58%).

However, students stated that the students may adapt well if they are provided with 142 (62.09%) training to use remotely accessed information. The majority of

**Table 5.** Enhancing the adoption of technology

| Training | N | % |
|---|---|---|
| Workshop and seminar on Internet use | 170 | 74.236 |
| remote access training | 142 | 62.009 |
| Search and retrieval course | 65 | 28.384 |
| External training in other institutions or centers | 58 | 25.551 |
| Learned from colleagues | 39 | 17.031 |

students (170, 74.24%) believed that frequent workshops or seminars on internet use and training from external sources (58, 25.55%) may strengthen their skills in using remote services of the library. Whereas, only (39, 17.03%) reported that they can from their colleagues.

## 6. Conclusion

According to the analytical framework shown in Figure 6, there was a significant relationship between total adoption, perceived ease of use, and perceived use of remote services. Hence, organizations are more likely to adopt remote services if they have a positive attitude about their ease of use and perceive them to be beneficial in terms of the service they provided. The significant relationship indicates that the users' demographic characteristics do not affect TA, whereas it is significantly associated with the use of, awareness of, and satisfaction with remote services. Consequently, the University of Jammu should focus on ways to improve its users' perception and attitude towards remote services to make them more likely to adopt them. Hence, the user may accept or reject the technology based on its benefits to job performance and ease of usage. Strategies may include introducing remote services with proper training to create awareness and conducting in-depth surveys to understand users' attitudes toward the technology. To increase knowledge regarding the various e-resources accessible on and off campus, the library should regularly host user education campaigns. Furthermore, such campaigns should also provide users with practical tips on how to effectively use the various e-resources for their research needs.

This would keep them up to date on emerging applications or e-resources that would promote their ability and thus strengthen their academic and non-academic outputs. This approach would ensure that the users are comfortable with the technology and would also provide insights on how to further develop the system in order to increase productivity. While the adoption of such technologies, librarians have an opportunity to remain competitive with other service providers while providing users with up-to-date services with such an analysis, the present study can be used as a reference guide for librarians who are considering the adoption of advanced technologies in their libraries.

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