

# Use of RFID Technology by Students in Indian Institute of Technology, Delhi and Indian Law Institute, Delhi: A Survey

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## Abstract

The paper attempts to investigate the usage behaviour and the related progress of Radio Frequency Identification (RFID) technology as inferred from the opinion of the students from two libraries of academic institutions in New Delhi, viz., Indian Institute of Technology Delhi (IITD) and Indian Law Institute (ILI). It also evaluates users' ability, knowledge, reasons for effective use, as well as problems faced while using the technology vis-à-vis its impact on the academic environment.

Despite being related to two different academic backgrounds and needs, majority of the findings of the different aspects of RFID technology conjure up a similar pattern. The results clearly suggest that majority of respondents are familiar with the RFID components in the libraries under study and have a positive impact on the satisfaction of the users. The major benefits are—fast circulation transactions, multiple documents' self check-in/self check-out, user privacy, reliability, wherein reservation of books is the topmost service. The opinion of respondents clearly indicates that out of seven items, five were rated as good, and the book drop-box facility was rated as excellent. On the other hand, the study also proved that the majority of respondents were not using smart cards. One of the common problems cited was lack of information. Several literary programmes are conducted in libraries. However, the old computers take time for processing. The self-check in and self-check out stations were rated as fair because they were easy to use. The findings from this study suggest that factors such as system quality, use, and user satisfaction positively influence consumer attitudes towards RFID-enabled services. Therefore, this article aims to understand factors affecting the use of RFID systems and the related user satisfaction in a library. The findings of the study will certainly help the library to properly handle the RFID system for effective use by their students.

**Keywords:** RFID technology, User satisfaction, Libraries

## 1. Introduction

In recent years, libraries of different types are striving hard to consider new technologies to save time and cost in the operations and management for the flow of materials, in order to improve their overall efficiency. The term Radio Frequency IDentification (RFID) has tremendously gained attention in the recent decades, particularly the hub of knowledge, i.e., a library, since it reduces the amount of time required to perform circulation operations, as information can be read much faster for a single or for several items in a stack at the same time from RFID tags securely, in ways never conceived before.

Despite the emergence of many such technical advancements, the world is witnessing a preferential upsurge in the implementation of the RFID technology as an important tool to bring an efficient, fast, secure, and user-friendly approach for material transactions. This technology is used in library circulation operations and theft detection systems. RFID-based systems are observed far beyond general security as these can act as tracking systems. This combines security with more efficient tracking of materials throughout the library and faster charge and discharge of inventory and materials handling.

The main priority of any library is to add interpretive, informative, and educational value to its basic resources and highlight its contributions to the institution's well-being and future progress (Madhusudhan 2010). To conceive such objectives, libraries of all kinds have continuously surpassed themselves with every bit of new innovations like barcode to name one.

Many researchers worldwide have already attempted to measure the various impacts of the RFID system on general material transactions, research, and scholarship via survey methods. In India, very few seminal reports have been prepared so far to study the use and the impact of this technology focusing on particular institutes

with its working, functioning, and effects. Keeping these aspects in mind, the present study has been undertaken to know the uses and progress of the RFID technology, its impact on the academic environment, and also the problems faced by the users while using it.

### 1.1 *Indian Institute of Technology, Delhi (IITD)*

The Indian Institute of Technology Delhi (IITD), established in 1961, is one of the premier engineering institutes of India. The Central Library of the institute collectively supports the teaching, research, and extension programmes of the Institute. Thus, quality education, faculty, and staff are some of the features of a good library. The IIT Delhi library system comprises of a Central Library and 18 departmental libraries. The Central Library houses a total collection of over 3,84,835 documents (<http://library.iitd.ac.in/index.php/about-lib/collect>) comprising of books, bound volumes of journal, standards, microfilms, theses, technical reports, video cassettes, and compact discs from the fields of science, engineering, humanities, literature, and management. All in-house operations in the library are fully computerized using the Libsys software package that also provides web-based access to the online catalogue of the Library.

### 1.2 *Indian Law Institute (ILI)*

The Indian Law Institute (ILI) was founded in 1956 primarily with the objective of promoting and conducting legal research. The objectives of the Institute, as laid down in its memorandum of associations, are to cultivate the science of law, promote advanced studies and research in law so as to meet the social, and economic needs of the people, promote systematization of law, encourage and conduct investigation in legal and allied fields, improve legal education, impart instruction in law, and publish studies, books, periodicals, etc.

The Institute Library is one of the best libraries in the country. It subscribes to 270

current legal periodicals. *Journal of Indian Law Institute* (JILI) is one of the leading law journals. The *American Society of International Law* (ASIL) contains surveys written by academicians and practitioners. The library of the institute is one of the leading law libraries in Asia and attracts scholars from all over the world for legal research leading to a doctoral degree in law and political science. The ILI Library collections aim to compile the complete primary law resources of India to assist the country's policy-making process. The library currently houses a unique title collection of 75,000 books and periodicals and 25 CD-ROM titles. Thus, quality education, faculty, and staff cannot be separated from a good library.

## 2. Review of Related Literature

The RFID technology is primarily intended to reveal a current change in the library user service from semi-automated to fully-automated mode (Chan and Ying 2005). The library manages to transform and modernize their services in a way that meets the needs of their 21st Century customers—not just as a replacement for barcodes but allowing greater access, more staff time for assisting readers, freeing up space, better stock control, etc., with the help of RFID technology (Palmer 2009) and basic and optional components (Chavan 2012).

RFID is used in libraries primarily to automate the book handling process which includes check-out, inventory control, check-in, and anti-theft (Mamdapur and Rajgoli 2011) for faster and better services to their users (Madhusudhan 2010); to improve the efficiency of operations (Kumar 2008); and as a roadmap approach for implementing RFID (Castro and Wamba 2007).

The implementation of RFID technology certainly improves service efficiency for libraries and enables more diversified applications and service modes (Kapoor *et al.* 2011; Madhusudhan 2010). However, according to Yu (2008), there

is a need for regulating necessary standards, processes, and interfaces to fit in with current information systems and extending automatic library operations requires continuous effort, with user satisfaction in a library context (Dwivedi *et al.* 2013); satisfy library users from time to time (Ramesh 2008); information-seeking behaviour of library users to track travelling paths using the RFID system (Sugie 2013 and 2012); promote a user-friendly experience (Lin 2009 and Lin and Yuan 2009).

The components and technical features of a modern RFID library system provide guidelines for the evaluation of different systems (Kumar and Kaur 2010; Kern 2004); an RFID application with advantages and disadvantages (Simona 2011; Mehrjerdi 2009; Spekman and Sweeney II 2006); privacy concerns regarding the use of RFID (Blansit 2010; Chao 2007; Chia-Chen 2007); barriers faced and changes that have been experienced after the implementation of the technology due to lack of availability of technology experts in the library for the RFID system (Bansode and Desale 2009); positive identification and tracking of materials, and in turn, facilitating and improving some back and front-office activities (Ghezzi 2009); execution of test cases to examine the operational efficiencies of the inventory reader and the self-check station (Golding and Tennant 2008); economize on the expense (Yu 2007); need to transform library in a 21st Century institution, which meets its customer needs (Palmer 2006).

## 3. Objectives of the Study

The main objective of the study is to find out the various uses of the RFID technology in selected libraries of Delhi. The specific objectives of the study are to:

- explore the awareness of the RFID technology
- ascertain the purpose of using RFID
- examine the efficiency of check-in/check-out of library circulation services after implementation of RFID

- spread awareness about different components of RFID
- identify benefits and problems encountered by users while using RFID
- gauge the satisfaction aspect of users towards the existing RFID technology

The scope of the present study is confined to the users of ILI, Delhi. The selection of the libraries is based on the existence of the RFID technology as a potential library service used by the students. The present study is conducted on a sample size of 100 users; 50 each from the ILI and the IITD libraries. Users from all domains of subjects were considered for the study. In the first phase, a pilot study was conducted during the month of April 2013 on 20 students each in ILI and IITD in order to improve the quality and efficiency of the designed questionnaire. In the second phase, the finalized structured questionnaire comprising 13 questions was administered to the users during July 8–10, 2013.

#### 4. Data Analysis and Interpretation

A survey was conducted through a structured questionnaire circulated personally among 100 students. All filled-in questionnaires were personally collected, eliciting a response rate of 100 per cent. All questionnaires were selected for the analysis and interpretation of data. The responses to 13 questions were analysed in the form of tables and figures.

##### 4.1 Gender-wise Analysis

The various facets of the qualitative part of the questionnaire consisted of questions based on demographic features. Perceptions about the use of RFID system varied from individual to individual and among the male and female respondents. The representation of respondents was sought on the basis of gender. Thus, the male respondents were 76 (43 in IITD and 33 in ILI) and female respondents were 24 (7 in IITD and 17 in ILI). Consequently, the data clearly indicates a dominance of male respondents

(76 per cent) as compared to female respondents (24 per cent).

##### 4.2 Frequency of Visit

This is the essential and basic aspect related to the appraisal of the intrigue of RFID-based services in the library. The findings (Figure 1) showed that most of the respondents visited the library frequently—73 per cent of them use it daily, followed by 11 per cent who visit weekly; 7 per cent of them monthly, and 9 per cent of them used it occasionally. This reflects that the frequency of visit depends upon the nature of library's e-collections, organization, maintenance and services; improved facility of the RFID-based library services including—self check-in and self check-out, and availability of free Internet services for searching current literature in their relevant field.

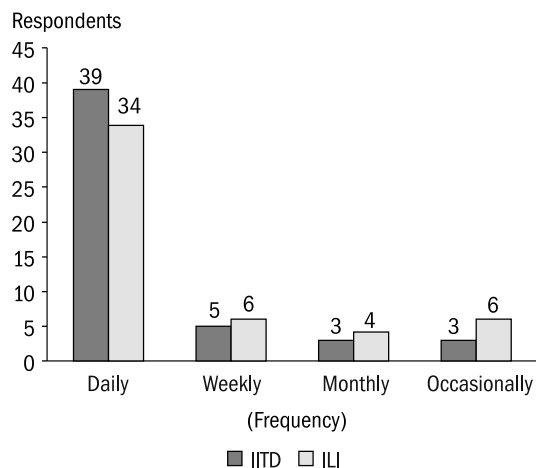


Figure 1: Frequency of visit (n=100)

##### 4.3 Awareness of RFID

An attempt was made to overview the increasing awareness of the technology among users of the libraries. As Figure 2 demonstrates, 34 per cent respondents had a fair knowledge about the RFID technology, 27 per cent had only heard about it, and 17 per cent knew everything. However, 22 per cent of them were not aware of

the RFID system. The data clearly indicates there is a need to increase the technology awareness among the respondents.

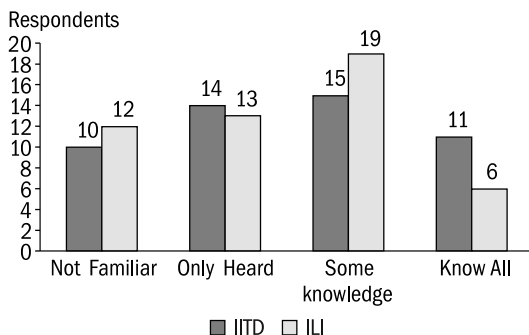


Figure 2: Awareness of RFID (n=100)

#### 4.4 Use of Smart Cards by Users

The respondents were asked about RFID-related smart card usage for transaction of materials in the libraries. As Figure 3 shows, 78 per cent respondents were not using smart cards and the remaining 22 per cent were using it; hence, it was clearly inferred from the data that higher percentage of respondents of IITD prefer RFID smart cards than ILI. The data also indicated a preferential inclination of the IITD library users towards the RFID technology and related RFID smart card.

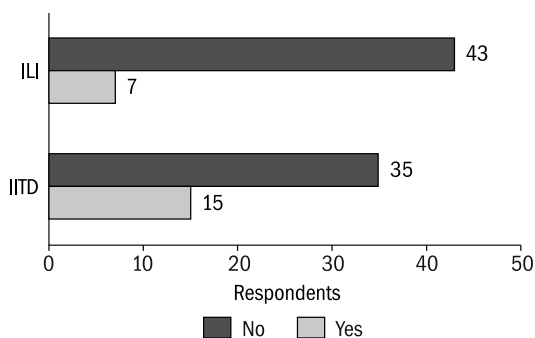


Figure 3: Use of smart cards (n=100)

#### 4.5 Check-in and Check-out Times

Check-in and check-out times are important in relation to the appraisal of the usefulness of the RFID technology in libraries (Madhusudhan 2010). The respondents were asked to assess the status of the check-in time of material with the help of the RFID technology. As Figure 4 reveals, 54 per cent respondents found the check-in time 50 second per item using RFID system, followed by 20 per cent of them found the time up to 40 second per item; 19 per cent found the time decreasing up to 30 second per item; and 4 per cent found the time 20 second per item. Surprisingly, 3 per cent respondents found the time reduced even less than the given categories.

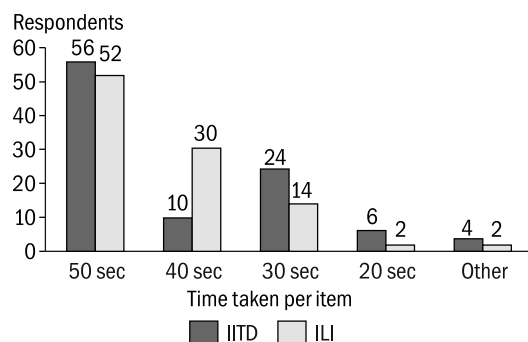


Figure 4: Check-in time per item (n=100)

The respondents were further asked a question to assess the status of check-out time of material per item using the RFID (Figure 5). It showed that 46 per cent of respondents found the check-out time 50 second per item using the RFID system, followed by 25 per cent of them found the time up to 40 second per item; 15 per cent found the time decreasing up to 30 second per item, and 10 per cent found the time 20 second per item. Surprisingly, 4 per cent of respondents found the time reduced even less than the given categories. This finding clearly indicates that the use of RFID reduces the amount of time required to perform circulation operations.

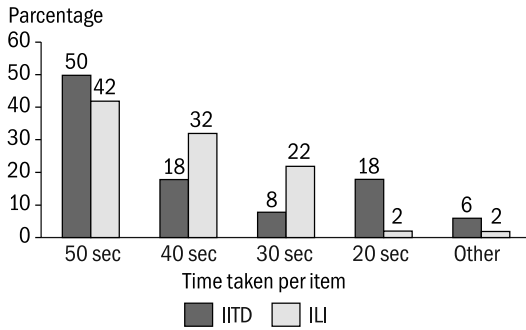
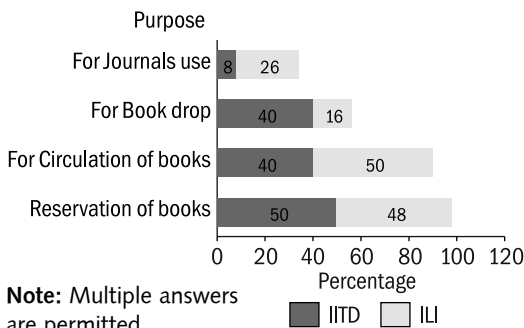


Figure 5: Check-out time per item (n=100)

#### 4.6 Purpose of Using RFID

The use of RFID reduces the amount of time required to perform circulation operations. The most significant time savings are attributed to the fact that information can be read from RFID tags much faster than from bar codes and also several items in a stack can be read at the same time. Responses to the question regarding the purpose of using the RFID technology in libraries were varied. The questionnaire provided four options and purposes, such as circulation books, book drop facility, reservation of books, and use of journals. The responses received have been presented in Figure 6. It shows the explicit view of the different purposes for which the RFID technology is utilized in libraries. Reservation of books was the topmost service used by respondents with 49 per cent, followed by circulation of books (45 per cent), and book drop facility (28 per cent). Only 12 per cent of respondents had used the RFID technology for journals use purpose.



Note: Multiple answers are permitted.

Figure 6: Purpose of using RFID (n=100)

#### 4.7 Knowledge of Various Components of RFID

The respondents were questioned on their awareness of the components of the RFID system. It was observed (data in Figure 7) that 89 per cent of them were aware of the different elements involved in the RFID technology; whereas, 11 per cent are unaware of the components involved.

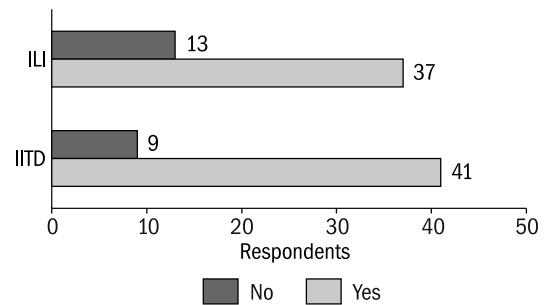
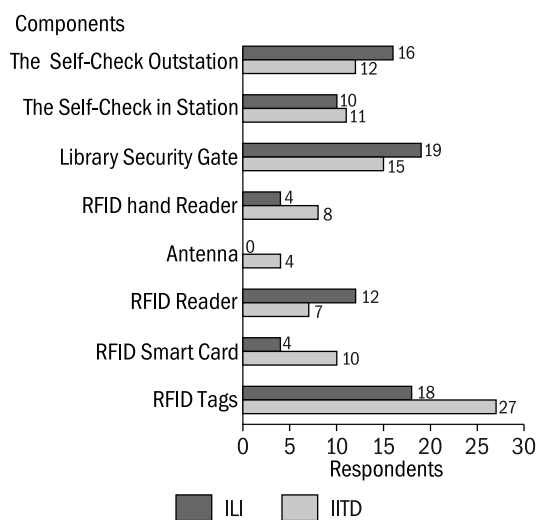


Figure 7: Knowledge of the components of RFID (n=100)

The heart of the system is the RFID tag, which can be fixed inside a book's back cover or directly onto CDs and videos. This tag is equipped with a programmable chip and an antenna. RFID readers or receivers are composed of a radio frequency module, a control unit, and an antenna to interrogate electronic tags via Radio Frequency (RF) communication. The antenna produces radio signals to activate the tag and read and write data to it. Antennas are the channels between the tag and the reader, which controls the system's data acquisitions and communication. It is worth mentioning the study by Kumar (2008), which examines the role of the RFID technology in academic libraries and the implementation of such a type of technology in these libraries in order to save manpower, energy, time, duplication, and efforts. The study also mentions that these saved resources can be utilized for betterment of the libraries and emphasizes the role of the RFID in different types of functions, such as check-in and check-out, security checking, shelf management, etc.

In this context, a multiple choice question was asked about respondents' awareness of different individual components of the RFID technology. A blend of different RFID components such as—RFID tags, RFID smart card, RFID reader, antenna, RFID hand reader, library security gate, self-check in station, and self-check outstation—have been examined for the evaluation of their RFID technology competency. Figure 8 indicates that 45 per cent of respondents are aware of RFID tags as a major component of the RFID technology, followed by library security gates (34 per cent); self-check outstation (28 per cent); self-check in station (21 per cent); RFID reader (19 per cent) are the top five known components of the RFID technology. Interestingly, only 4 per cent respondents are aware of antenna. Thus, it can be inferred that among the different components involved in the RFID technology, users are mostly aware of RFID tags as the concerned component.

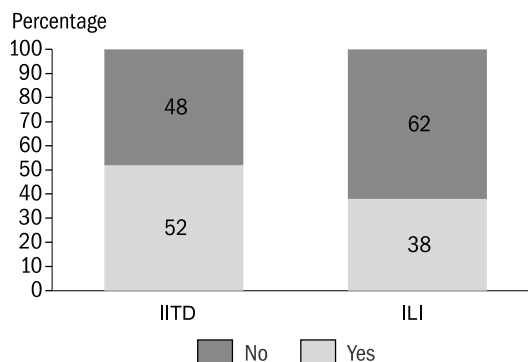


**Note:** Multiple answers are permitted.  
**Figure 8:** Knowing different components of RFID (n=100)

#### 4.8 Additional Features of RFID

The respondents were asked whether they wished to include additional features of the RFID system

to make the library services more efficient. Figure 9 reveals that 45 per cent respondents agreed to include the additional features in the current RFID technology; whereas, majority of respondents (55 per cent) were satisfied with the current status of the different features involved in the RFID technology and did not push for further improvements.



**Figure 9:** Additional features of RFID system (n=100)

#### 4.9 Benefits of Using RFID

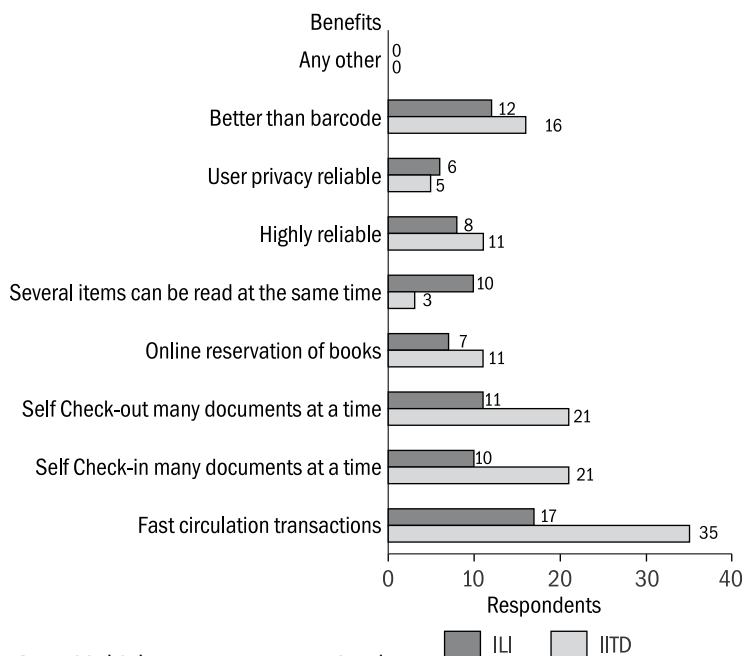
The RFID technology is primarily intended to reveal a current change in the library user service from semi-automated to fully-automated mode (Chan and Ying 2005). It is a fast-growing technology used in libraries for enhanced circulation capabilities, better inventory control, reliability (Ayre 2006), minimizing theft of documents (Golding and Tennant 2008; Sumi and Kumar 2007; Makhdumi and Verma 2007), and provides batch access and storage of mass data.

The RFID-based systems move beyond security to tracking systems. It combines security with more efficient tracking of materials throughout the library, including easier and faster charge and discharge, inventory, and material handling. The information contained in microchips in the tags affixed to library materials is read using radio frequency technology, regardless of the item orientation or alignment (i.e., the technology does not require

line-of-sight or a fixed plane to read tags as do traditional theft detection systems). The RFID gates at the library exit(s) can be as wide as four feet because the tags can be read at a distance of up to two feet by each of the two parallel exit gate sensors. Further, the respondent users were asked about how they benefitted from the RFID system in their library. There are several benefits of using the RFID system, and the major nine have been provided in the questionnaire. Figure 10 revealed that 52 respondents benefitted with the fast circulation transactions of RFID, followed by those who found it better than barcode (28 per cent); self check-in of many documents at a time (22 per cent); self check-out of many documents at a time (21 per cent); highly reliable (19 per cent); online reservation of books (18 per cent); several items could be read simultaneously (13 per cent); and user privacy reliable (11 per cent). Surprisingly, none of the respondents pointed out any other benefits out of the given categories.

#### 4.10 Problems Faced by Users while Using RFID

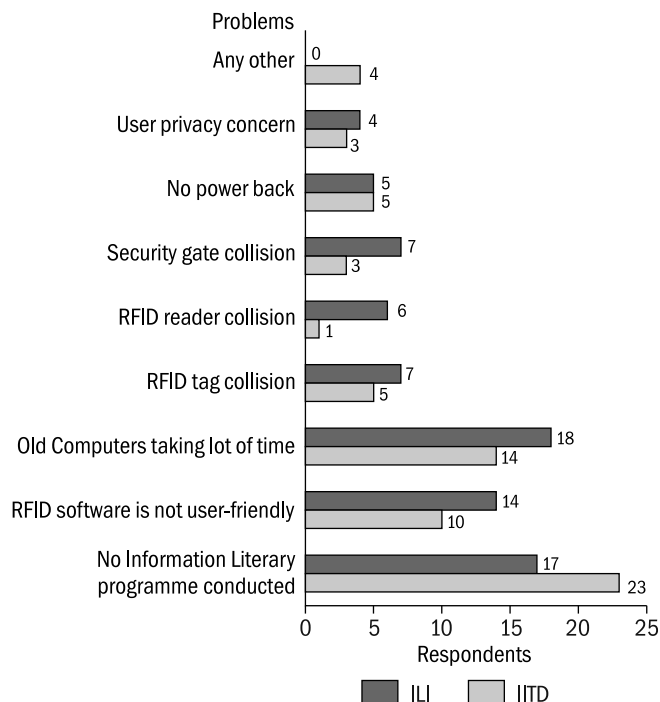
There are a number of obstacles in using the RFID system in libraries. The respondents were asked about the problems faced by them. The problems generally include lack of proper information literary programme, software not being user-friendly, old computers taking lot of time, tag collision, etc., (Figure 11). Out of the nine choices provided in the questionnaire, the most common problem cited was lack of information literary programme conducted in study libraries with regard to the RFID technology (40 per cent), followed by old computers taking a lot of time (32 per cent); RFID software not being user-friendly (24 per cent); RFID tag collision (12 per cent); RFID reader collision (7 per cent); security gate collision and no power backup (10 per cent each); and user privacy concern (7 per cent). Interestingly, 4 per cent of the respondents consider other problems that require attention.



**Note:** Multiple answers are permitted.

**Figure 10:** Benefits of using RFID (n=100)





Note: Multiple answers are permitted.

Figure 11: Problems faced by users while using the RFID technology (n=100)

#### 4.11 Opinion about RFID

To improve the present RFID-based library services, a five-point rating question was prepared to rate the services rendered by their libraries from excellent to poor (Table 1). It was observed from the data that a majority of the IITD and the ILI users considered the “RFID Services provided by the library” as good (28 per cent); “Ease of use self check-in and self check-out station” as fair (2 per cent for IITD and 18 per cent for ILI), and very few found the relative service to be poor (11 per cent); “Speed of self check-out items” as good (19 per cent); “Speed of self check-in items” as good (16 per cent); “Book drop box facility” as excellent (12 per cent); “Response time of the self-issue/return terminals is acceptable” as good (16 per cent); and “Library staff are generally available to solve problems that one may have

encountered while using self-issue/return terminals” as good (19 per cent). Out of the seven items, five of them were rated as good and of the remaining two, one was rated as excellent and the other as fair. These responses clearly indicated that the respondents appreciate the RFID-based library services in their libraries.

#### 4.12 Suggestions to Strengthen RFID

The respondents were asked an open-ended question to suggest ways and means for improving/strengthening the RFID-based library services. The following were the major suggestions collected from the respondents:

- The acquisition range of receiver for tags should be improved.
- More computers for the RFID-based library services should be employed.

**Table 1:** Opinion about the RFID technology

S. no.	Particulars	Excellent		Good		Very Good		Fair		Poor	
		IITD	ILI	IITD	ILI	IITD	ILI	IITD	ILI	IITD	ILI
1.	RFID services provided by the library	04	03	17	11	06	05	04	01	01	00
2.	Ease of use self check-in and self check-out stations	03	01	01	09	06	04	02	09	01	00
3.	Speed of self check-out items	06	01	13	06	04	04	04	12	01	03
4.	Speed of self check-in items	05	01	12	04	04	04	04	09	03	01
5.	Book drop box facility	10	02	04	04	03	05	03	08	02	01
6.	The response time of the self-issue/return terminals is acceptable	04	00	13	03	07	03	06	06	01	03
7.	Library staff are generally available to resolve problems that I may have encountered while using self-issue/return terminals	02	04	12	07	08	04	03	06	03	00
<b>Total</b>		<b>34</b>	<b>12</b>	<b>86</b>	<b>44</b>	<b>38</b>	<b>29</b>	<b>26</b>	<b>51</b>	<b>12</b>	<b>08</b>

- Older computers should be replaced for speedy use of the RFID technology.
- Technology should be upgraded.
- More book drop boxes should be installed in the campus and outside the library.

## 5. Conclusion

It has been observed that those services offered efficiently to the users form the heart and soul of any kind of library. RFID is one of the automatic identification and data capture technologies to enhance the total library experience through value added services and advance information-seeking behaviour of library users. The library is one among the many institutions facing changes due to technological advancements. With its fast and secure transaction capability, the RFID is seen as a natural complement or replacement of the traditional library services.

The results of the study show that a majority of respondents are familiar with the RFID

components in libraries under study and have profound positive impact on the satisfaction of users. The major benefits were fast circulation of transactions, self check-in/self check-out of multiple documents, user privacy, and reliability, of which reservation of books was the topmost service. The opinion of the respondents clearly indicates that out of the seven items, five of them were rated as good and the book drop box facility was found to be excellent. On the other hand, it also proved that a majority of them were not using smart cards; the most common problem cited was lack of information literary programmes conducted in study libraries, and also old computers were taking a lot of time for processing the data. Ease of use in self check-in and self check-out station was rated as fair. It is quite clear from the above discussion that the RFID system may be a comprehensive system that addresses both the security and materials tracking needs of a library. The technology saves money too, and quickly gives a return on investment.

To conclude, the future of libraries lies in the RFID technology and the usage is exponentially increasing among the user community. Therefore, despite its limitations, it has become imperative for students to use it and save their valuable time, but considerable efforts should be taken by the study libraries to improve the use of RFID smart cards, replacement of older computers for speedy uses of the RFID technology, and technology upgradation. It is also observed that the respondents are quite

unaware of the various components of the RFID and their concerned use; therefore, constant training for proper handling of the RFID system is essential for users as well as library personnel. As Mossop (2008) rightly said, “there is never a ‘best time’ to adopt any new technology—today’s facilities are always better, cheaper, and faster than yesterday’s, but whatever you buy today is almost guaranteed to have been superseded by something even more ideal by the time tomorrow comes.”

## References

- Ayre LB. 2006. **RFID Background for Library Workers**. Available at [www.galecia.com/included/docs/rfid\\_backgrounder.pdf](http://www.galecia.com/included/docs/rfid_backgrounder.pdf). (last accessed on May 5, 2014).
- Blansit DB. 2010. **RFID Terminology and Technology: Preparing to Evaluate RFID for your Library**. *Journal of Electronic Resources in Medical Libraries* 7(4): 344–354.
- Bansode SY and Desale KS. 2009. **Implementation of RFID Technology, University of Pune Library**. *Program: Electronic Library and Information Systems* 43(2): 202–214.
- Chan PY and Ying Z. 2005. **Application of RFID Technology with the Establishment of Book Drop in Library**. *Bulletin of Library and Information Science* 55(6): 101–108.
- Chavan PS. 2012. **Use of RFID Technology in Libraries**. *Online International Interdisciplinary Research Journal* 2(4): 235–241.
- Castro L and Wamba FS. 2007. **An Inside Look at RFID technology**. *Journal of Technology Management and Innovation* 2(1): 128–141.
- Chao CC, Yang JM, and Jen W. 2007. **Determining Technology Trends and Forecasts of RFID by A Historical Review and Bibliometric Analysis from 1991 to 2005**. *Technovation* 27(5): 268–279.
- Dwivedi YK. 2013. **RFID Systems in Libraries: An Empirical Examination of Factors Affecting System Use and User Satisfaction**. *International Journal of Information Management* 33(2): 367–377.
- Ghezzi B. 2009. **The Use of Radio Frequency Technology in Libraries**. *Bollettino AIB* 49(4): 533–543.
- Golding P and Tennant V. 2008. **Evaluation of a RFID Library System: Preliminary Results**. *International Journal of Multimedia and Ubiquitous Engineering* 3(1): 1–18.
- Indian Institute of Delhi Library. Available at <http://library.iitd.ac.in/index.php/about-lib/collect>.
- Kapoor K *et al.* 2011. **What Drives a Successful Technology Implementation: Exploring Drivers and Challenges of RFID Systems Implementation in a Public Sector Organization**. *International Journal of Electronic Government Research* 7(4): 46–63.
- Kumar A and Kaur P. 2010. **RFID Technology in Libraries**. *Information Studies* 16(4): 229–242.

- Kumar R. 2008. **Role of RFID in Academic Libraries.** *Proceedings of the International CALIBER 2008:* 120–126.
- Kern C. 2004. **Radio-Frequency Identification for Security and Media Circulation in Libraries.** *The Electronic Library* 22(4): 317–324.
- Lin HT, Lin CF, and Yuan SM. 2009. **Using RFID Guiding Systems to Enhance User Experience.** *The Electronic Library* 27(2): 319–330.
- Makhdumi G and Verma VK. 2007. **RFID Implementation in Libraries: A Survey of Some Select Libraries in India.** *Proceedings of the 26<sup>th</sup> IASLIC All India Conference, December 26–29, 2007, Dr Zakir Husain Library, Jamia Millia Islamia, New Delhi.* pp 65–74.
- Madhusudhan M. 2010. **RFID Technology Implementation in Two Libraries in New Delhi.** *Program: Electronic Library and Information Systems* 44(2): 149–157.
- Mehrjerdi YZ. 2009. **RFID: The Big Player in the Libraries of the Future.** *The Electronic Library* 29(1): 36–51.
- Mamdapur GMN and Iqbalahmad UR. 2011. **Implementing Technology in Libraries: Advantages and Disadvantages.** *International Journal of Library and Information Science* 3(3): 46–57.
- Mossop S. 2008. **RFID at the University of Central Lancashire.** *Book Industry Communications.* Available at [www.bic.org.uk/e4librariesfiles/pdfs/081202%20rfid%20 case% 20study%20 UCLAN%20by%20stephen%20Mossop.pdf](http://www.bic.org.uk/e4librariesfiles/pdfs/081202%20rfid%20case%20study%20UCLAN%20by%20stephen%20Mossop.pdf) (last accessed on June 29, 2014).
- Palmer M. 2009. **Making the most of RFID in Libraries.** London: *Facet.*
- Palmer M. 2006. **Using RFID to Transform Essex Libraries.** *Library Hi Tech News* 23(10): 21–22.
- Ramesh LSRCV. 2008. **New Generation of Libraries Using Emerging Technologies: Focus and Action Plans Towards Users' Satisfaction.** *SRELS Journal of Information Management* 45(3): 279–286.
- Spekman RE and Patrick JS. 2006. **RFID: From Concept to Implementation.** *International Journal of Physical Distribution & Logistics Management* 36(10): 736–754.
- Sugie N. 2013. **Application of Radio Frequency Identification Technology to Study Library Users' Information-Seeking Behaviour.** *Library & Information Science Research* 35: 69–77.
- Sugie N. 2012. **Application of Radio Frequency Identification Technology for the Study of Information-Seeking Behaviour of Public Library Users: Preliminary Analysis.** *ASIST* 28–31.
- Sumi S and Kumar J. 2007. **Application of RFID Technology in Libraries.** *Proceedings of the 5th International CALIBER Conference, February 8–10, 2007, Punjab University, Chandigarh* pp 459–467.
- Yu SC. 2007. **RFID Implementation and Benefits in Libraries.** *Electronic Library* 25(1): 54–64.