
Library Management : A Study on the Applications of RFID

Pranab Kumar Bhattacharya

Senior Professor (Management Studies), Kardan International University, Kabul, Afghanistan

Abstract

By applying Radio Frequency Identification (RFID) technology and automating some of the cumbersome library transactions processes, the library staffs can be retrained to be more productive for the library cause by acting as an initial 'search engine'. This will greatly help the users of any library, especially in the education sectors.

This paper argues that RFID technology can be effectively used in the library system while making it obviously easier for both the users as well as the library staff to issue and receive library-materials by just tagging it. It also identifies important issues in the implementation of the RFID systems. Some of the issues that need to be addressed in the implementation stages of the RFID include:

- ♦ *Health Issues concerning frequent exposures to radio frequencies.*
- ♦ *Return-on-Investment in case the library goes in for RFID systems.*
- ♦ *Changing the mindset of the library staff to become potential search engines.*

Keywords: RFID, Inventory, Change management.

1. Introduction

The technology revolution in the late nineties has had profound impact in the way we think and work today. The trend is that technology is being developed for a particular application and the same technology is being rechanneled in other areas to improve the efficiency of several other fields as well. Library management systems are no exception to this trend. RFID as an important technological concept was first developed during World War II as a means of identifying enemy warplanes. Later on, it was applied in several fields like hospitals for patient identification, inventory management in commercial establishments, agriculture, etc.

The application of RFID in library system will have profound impact in the way the library and librarians are functioning at present. Librarians will find it easy and more flexible to issue and receive library assets, have better control over library functioning and the staff resources can be used for more productive purposes like research, cataloguing and other official work.

This paper identifies some of the major issues presently confronting the library environment in our country. The issues are :

- ♦ Declining interest in reading across the users.
- ♦ Changing role of the qualified and professional library staffs.
- ♦ Inventory control in library transactions.
- ♦ Issues and receivables management in the library.
- ♦ Return on Investments.

Use of RFID technology makes it much easier for the users and the library staff to issue and receive library materials by just tagging it. This will ensure that users will have the flexibility to return the materials at a time of their convenience and also library materials issues can be processed quickly and at the same time avoid repetitive transactional disorders.

Proper inventory control of library assets is essential to ensure that the materials are available to the users without hassles. There have been instances when the materials are misplaced and then getting lost permanently, though the concerned staffs are physically present in their work premises.

Library as we are aware is the place where the knowledge repository is created in the form of print medias like books, journals, magazines etc. and also other electronic medias like tapes, DVDs and CDs which are stored and made available for access on demand. The library management is increasingly getting complicated due to variety of factors including general lack of time for library users, the exponential surge in books, CDs and journals etc. To cap it all, the growing internet explosion has relegated library to the bottom of the investment scale with fund managers looking at the return on investment in libraries.

In order to get back the lost glory of the library patronage, one of the critical factors is to modernise the access and storage of reading materials for quick availability of the same to the readers. One of the ways to do this is to accommodate the leverages of technological arms. And

the latest one in this category which can be applied widely in libraries is the Radio Frequency Identification (RFID) systems.

The role of professional library staff is slowly but steadily changing. From being simply the custodians of books, journals etc. they are now also expected to act as guides for accessing required materials by those library users. There was a time when the library staffs were instrumental in only maintaining silence in the library and help in locating books. For instance, a researcher may be interested in a particular topic about which some materials could have been published in some journal. The library staff should be in a position to help out the researcher with the information about the availability of materials containing in that particular journal. This can be done not only by having a separate research department in the library but also by ensuring that the library staff are adequately trained in cataloguing the treasures of knowledge base accessible from various journals and books. This requires a professional mind-set in library staffs while freeing up their invaluable time to do more productive works.

A library primarily is to issue and collect the books. The issue of books, journals and materials to patrons have to be properly recorded and the records have to be preserved. This, in most of the cases, presently requires manual interventions in the libraries. Matching of working time between library staff and the borrower is fast becoming a major point of contention between these two entities. There has to be some way by which each, with their individual commitments, can carry on with the transactions of the library as also their other activities. The only way this can be done is to use appropriate technology that also ensures an overall lower cost of operations. Of course there is the other way of recruiting more people to do the same job, which is a costly affair.

Library staffs like in any other department of an organization are expected to be productive in their respective jobs. That clearly means that they should not be just be content with simply issuing and receiving books but also get engaged in multi tasking activities. They can also be efficiently utilized for several other productive official works there by reducing the overall cost of the organization.

This paper attempts to discuss briefly the technological aspects of RFID in section 2, the potential applications of RFID in the area of Library Management in section 3 and possible issues in the implementation of RFID systems in section 4.

2. RFID: The Technological Aspects

RFID is essentially a microchip in which information about particular aspects are stored. These chips are affixed to movable assets which make it easy for the concerned person to track, secure and also maintain the trajectory of the movable assets require transactions. RFID is 'a beyond visual range' technology in that, it does not require line of sight to read the information present in the tag.

RFID system basically has three components:

- (i) RFID tags with electronic programming embedded in it,
- (ii) Sensors to identify movements, and
- (iii) A server operating the software that acts as an interface between users and the technology.

Though there are several types of tags available in the market for use, but the one which are usually taken into services are of 'Write-Once-Read-Many' type. This type of tags can be programmed in such a way that the required information is written only once in it. The information after being written cannot be changed or reversed. For instance, if the particulars about the accession number, author, acquisition date, price etc. are written once, it remains permanently on the chip. The tags can be procured locally and be affixed on books, journals, magazines and also on digital media.

All RFID systems include inbuilt sensors. Sensors are basically electronic devices meant for reading and interpretation of information stored in the tags. These sensors react differently when the tags are charged (authorized) or discharged (unauthorized). These sensors can be installed at several exit points to prevent misappropriation of library assets and also can be used to differentiate between 'to be issued' and 'reference material' i.e. those are specifically meant for the use inside the library only. These can also be used for checking in when the library materials are returned back to the library in ascertaining if they are returned within the due date, penalty if any, or overdue etc.

The software for the whole operation resides in the server. The server has to be a 24x7 operational for the library function to be effective. This will help the users of the library assets to borrow and return at their convenience ensuring hassle-free transactions.

3. Library and RFID: In Combo

RFID systems can be used in several ways to help the library staff in protecting the assets of the library from the dangers of pilferages and is also found to be user friendly. The most important application of RFID would be from the point of view of the library staff. As already mentioned in Section 1, the productivity of the library staff needs to be substantially improved by changing their age-old conventional role. In most of the library staffs in various academic institutions are now engaged in the role of custodians of library assets. More specifically their role (at least as perceived) is confined to:

- ♦ Issuing and receiving library materials
- ♦ Keeping stocks of the library assets
- ♦ Procuring and maintaining books / periodicals / digital media.

The present scenario in any organisation demands that every employee contributes more than his or her traditional role. Library staffs are no exception to this. If traditional role which is presently being performed can be automated, then this would free up the time of the

library staffs as well and they in turn can engage themselves in value added activities.

Library staffs can be of real help especially to researchers and other users of the library by becoming more informed in various subjects. This can only be achieved by keep reading the journals and making a note of the various articles being written by those subject matter experts. This can go a long way in helping the researcher to access materials as per his or her requirements.

How RFID technology can be used to issue and receive the books automatically? It is very convenient to put into use. All the users of the library can be issued an identification card (ID). Just before issuing the books, the ID card need to be swiped and the RFID tag affixed to the book passed through the sensor. This will activate (charge) the tag and also record the particulars like book number, date and time of issue, the person to whom it is being issued etc. Similarly when the books or other materials are being returned, they can simply be dropped in specified box. This can be done at the convenience of the borrower. Since the server works 24x7, the information can be stored at any point of time. When the books are being dropped, the information of return is recorded and the tags are automatically discharged. All the information pertaining to the issue and return is stored in the server and can be retrieved by the concerned library staffs as and when it is desired. This way, issue and return of materials does not require the manual intervention of the library personnel except in exceptional cases like the issue of no dues certificates, deposit refunds etc.

The next traditional role of the library staffs is inventory management. The library staffs make a note of the inventory in the library at periodic intervals. This is a time consuming process as it is a labour intensive activity. Though bar coding can help to some extent but the problem with bar coding technology is that only one piece at a time can be managed. However, in the case of RFID, several books and other materials which are present in the library can be read by the sensor simultaneously. All that is advantageous in this is even an unskilled person can simply carry the sensor and just walk around the library shelves. The sensor automatically reads the information present in the tags of the library materials. The sensor is then connected to the server and we can have full information about all the materials which are stocked in the library at that point of time. All these can be done in a matter of few minutes saving the time of the library staffs disposals.

The other aspect of inventory management is the problem of misappropriations or pilferages of library materials by unscrupulous elements. Here again, if the sensors are fixed at exit gate of the library, any unauthorized exit will immediately raise an alarm. Hence, installations of RFID systems can essentially reduce the security expenses substantially.

With the implementation of RFID system, all the above mentioned activities will eventually not only reduce the conventional work load of the library staffs but also substantially free up their working time for other productive use. And when these happen, the library staff

will have more time to do value added work. They can be used as research assistants for specific projects depending upon their suitability. This way library can be turned into a revenue generating centre instead of mere a centre for recurring expenditure that does not give any tangible returns.

4. Issues and Challenges

With many important advantages at its kitty, the use of RFID systems will no doubt bring great benefits to library managements in general and library personnel in particular. But as in any other cases, RFID too has its own share of issues and challenges as well. Some of these issues and challenges that can surface while taking a decision on implementation of RFID system in libraries are:

4.1 Issues relating to Return-on-Investment

Implementing RFID solutions are cost intensive and require upfront investments. The exact cost of the RFID system varies depending on specific requirements and its envisaged spread. More important than the cost is the return associated with RFID solutions. These solutions should not be looked upon as a mere trade off between cost of implementing RFID and the cost of employees. RFID solutions are sure to provide better overall returns in the long run, though a thorough study is required for analyzing its implications before a final stamp of approval is made. The moot point though is the actual definition of return which could be in terms of

- ♦ Reduction in the overall operational cost,
- ♦ More library usage due to user friendly features,
- ♦ Scope of revenue generation through assistance fee for research projects.

4.2 Change management challenges

The mindset of a traditional library staffs is to acquire books, issue and receive the books back from the borrowers. Periodic stock taking is a part of the job responsibility of the library staffs. With the implementation of RFID system, the role of the librarian will change from being a manager of the library to being a proactive researcher. This calls for a substantial change of the mindset which could be the single largest challenge in the implementation of RFID. Organizations need to chalk out a clear cut road map for the effective utilization of human resources in the library.

4.3 Health concerns

The author is not fully aware of any detailed long term study on the usage of RFID and its professional hazards that may creep in while coming in touch with the system. The tags which emit electro-magnetic radiations may in due course pose health issues especially to those who are continuously exposed to radiations. This could be an area for a possible future research.

4.4 Failure Mode Effect Analysis

Since most of the RFID system operations are being automated, there is an immense need for considering any disaster management issue. A thorough study in

this area also needs to be done to ensure that the operations of the library are not overly affected in case of any failure of the system. In the case of any disruption in the system, the possible adverse effect on the entire library operations also needs to be assessed.

5. Conclusion

The overall analysis lead us to conclude that implementing RFID system solutions would lead to substantial reduction of fixed costs in long term library operations, besides becoming more user-friendly. It can turn the library eventually into profit centre once its research-assistance potential is substantially exploited. Inventory control of library assets is extremely essential to ensure that the materials are available to the users at beck and call. There have been many instances where the materials face pilferages despite taking sufficient security measures at the library premises. By using, however, the RFID system, while automating some of the present day cumbersome library processes, the library stuffs can be retained to be used more productively through transforming them as initial "search engines". This will greatly help the vast users of the library. While considering implementation of the RFID systems, some of the issues need to be taken care of are:

- ♦ Growing challenges of encountering change management,
- ♦ Health issues concerning frequent exposures to radio-active waves,
- ♦ Return-on-Investment in case the library goes for RFID systems, and disasters mitigation issues.

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