Awaking Stock taking practice in academic libraries; The Radio Frequency Identification (RFID) technology

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Abstract
The services of the traditional library is declining in western countries; much emphasis is being laid on the use of information technology as a means of providing easy access to information resources and ensuring improved library services. To empower library users and to maximise use of library resources, libraries currently have implemented self-service systems available to users 24 hours in 7 days (24/7). Due to this, books are frequently lost or misplaced when they are returned. Stocktaking is an important library operation that helps to manage the collections and keep track of the library resources. If stocktaking is not done frequently, it results in user's complaints & frustration due to unavailability of resources they desperately need. However, due to inadequate staffing or the tasking nature of the work, stocktaking appears to take the least priority. With the implementation of RFID technology, it not only make their users self-sufficient but can also do stock verification within a few hours with the help of Digital Library Assistant, commonly known as DLA. The DLA allows libraries to keep track of missing books, books on loan, etc. It also helps in proper arrangement of books in the stack area to ensure that users can easily locate books. The article is written to provide an overview of RFID technology, its various components, advantages and disadvantages of using RFID technology in the libraries. It also aims at discussing the role of DLA in inventory control and stock taking in libraries. The study will be very useful for the libraries that have either implemented or are planning to implement automated stock inventory system with the use of Digital Library Assistant.

Introduction

With the current technological scenario and the changing perception about information and the information system, it is important for libraries to understand current change, accept the current trend and work proactively to handle current situations. Time has come for the traditional libraries to automate their services and try to disseminate information using new technologies. New technologies have always been of interest to the library professionals both for the potential of increasing the quality of service and for improving the efficiency of operations. Technology which provides the right information to the right user at the right time and in the right place through a personalised service is necessary for effective and efficient library service.

Many of the important library services such as stock inventory can be accelerated through the use of RFID technology.

Radio Frequency Identification (RFID) is a new generation of Auto Identification and data collection technology, which helps to automate business processes and allows identification of large number of tagged objects like books, using radio waves. Chachra (2003) describes RFID as:

> Radio Frequency Identification (RFID) is the technology which is slated to replace barcodes in library applications. The technology, though new to libraries, has been in use in other sectors for more than 20 years. The RFID tags are placed in books and generally covered with a property sticker. Antennas of different sizes, based on application, are used to read the tags and manage the various library functions. The RFID Solution is a revolutionary application of automatic identification and data capture (AIDC) technology. In a library environment, RFID technology resembles a traditional barcode system in that it provides a means of assigning an ID to an item and reading that ID to perform circulation transactions or to take inventory

RFID based Library Management system would allow fast transaction flow for the library and will provide immediate and long term benefits to library in traceability and security. Radio frequency identification (RFID) was initially used in the 1940s within laboratories for communication; later in 1980s business organizations adopted it to manage their commercial items Sumi and Kumar (2007). Libraries have recently begun to adopt the RFID as a data acquisition and storage system that provides accurate data without human intervention. This paper therefore, gives a brief idea about RFID, its importance in the library system, how it works and describes difference components of RFID technology in stock taking.

Importance of Stock taking in Libraries

Library collections such as books, audio-visual materials, periodicals, maps, and other electronic resources, are the cornerstone of any library service and needs to be secured. Stock management is essential for any library development, and aims to ensure that the records in the library cards corresponds with the holdings in the library, to alert the library of missing items in the library, and to provide statistics on the usage rates of library books. Swart (2006) stated that the big advantage of stock taking is that one has a record of what is available in the library without spending time looking for books that are missing. He further highlighted that people see it as a tedious mechanical task to be completed as soon as possible. But with recent advances in technology, such as the introduction of Radio Frequency Identification (RFID) technology, menial tasks such as stocktaking can now be completed much faster than normal. Books are shelved backed to their appropriate positions, without disrupting the activities of the library. Stocktaking is an essential library function that helps to keep track of library collection. The essence of any Library is to maximize access to resources; in order to achieve this goal, proper implementation of stocktaking procedures is crucial

Stocktaking management policy

Stock management policy is an important part of library operation. It's usually a laid out procedure or guide in a document that contains guidelines for selection, acquisition, management and withdrawal of library materials (2012). It is necessary to have a documented guide that will specify when and how stocktaking should be done, and whose responsibility it is to carry out the operation.

Within the United Kingdom each institution tends to define its own stock management policy; at University of East London it is a yearly exercise, they have a stock management policy which specify why, what and how about their library collection. This guides them to select materials for the students' use, based on the reading list submitted by the departments annually, and determine the number of copies to acquire for a particular title. In addition to that a book that is heavily used by students more copies of the title can be added to the available ones since the statistics of the collections are available. For withdrawal, titles that have not been used for the past five year are withdrawn from the shelf to provide space for new arrivals. This is a clear and specified policy for managing the library collections.

In Dumgal and Galloway libraries, their stock development policy explains why they stock particular materials and in what formats, how the stock is selected, how the stock is maintained and promoted, why they decide to keep some items and throw away some, their position on censorship and how they measure the performance of stock. This are clearly spelt out in their policy and is usually reviewed yearly. The case is similar at University of Salford library they have collection management policy and their stocktaking is usually done during the summer vacation period, at the end of every academic session when students must have returned the books borrowed.

In Nigerian situation, most libraries carry out stock taking based on their initiatives. Stock taking is done based on their discretion or when they feel that there are old books to weed from the shelf. Some libraries collaborate with the academics for reading list of materials they need for teaching and research.

Other countries like India, has a documented stock management policy, which provides a guide to libraries on what to acquire, and in what format. They collaborate with the academics to provide reading list of titles they need for their teaching and research. Also their stock taking practice is done regularly to ensure that they keep track of their collections to identify heavily used collections.

This should not be the case; there should be a policy on what time of the year stock taking should be done in each library. Library professionals should not neglect this core library practice, if there is a time table or guide as when it should be done even if there is change in leadership it will not disrupt the activities. The resultant effect will be that most libraries cannot give proper account of their collection, in terms of size, type of materials and preference in usage.

The RFID technology and stock management

RFID is a combination of radio frequency based technology and microchip technology, the information contained on microchips in the tags affixed to the books are read with radio

frequency technology. RFID is stated by Sumi and Kumar (2007) as the latest and fast growing technology used in library theft detection systems and as a tracking system or access control system. Hollway (2006) highlighted RFID as a major technology enabler for identifying and tracking goods and assets around the world. This can help hospitals locate expensive equipment more quickly to improve patient care. RFID can track, manage and secure library resources. It is not just to tag books, but it provides comprehensive route to enhance all library services.

RFID4U (2005) highlighted that RFID tags contain a memory chip and RF antenna that send and receive several bits of data. Such RFID tags are known as smart labels or digital identification tags. These tags provide benefits of Electronic Article Surveillance (EAS) as well as barcodes.

Components of RFID

RFID has four component parts, the tag, the reader, the antenna, and the server. The tag is the part affixed to the library material; it contains microchips that are programmed with unique information and the size of the tag depends on the antenna, which increases with range of tag and decreases with frequency (Rafiq 2005). Tag is the data carrier of RFID, it contains unique ID number that is programmed into the item The tag consist of small integrated circuit (or silicon chip) which allows for the unique identification of the tag, and an antenna that can send and receive radio waves (Ward and van Kranenburg, 2006).

The antenna connected to the reader emits power and signals to and from the RFID tags. The reader/coupler is a link between the RFID tags and the server, while the server is the heart of comprehensive RFID system; it receives information from the antenna and exchanges information with the circulation database. Many libraries use barcodes and the library Management system identifies the books by reading the barcode using the scanner, barcodes also allows self-service but the major difference between barcode and RFID is that RFID allows multiple borrowing of books simultaneously and items can be read without opening the books to scan the barcodes. RFID also enables sorting of returned books using the sorting bin. Pandey and Mahajan, (nd.) highlighted some important points on RFID Library management System as follows:

1. RFID tags replace both the EM security strips and Barcode.

2. Simplify patron self-check-out/check-in.

3. Ability to handle material without exception for video and audio tapes.
4. Radio Frequency anti-theft detection is innovative and safe.

5. High-speed inventory and identify items which are out of proper order.

6. Long-term development guarantee when using Open Standard

Components of RFID
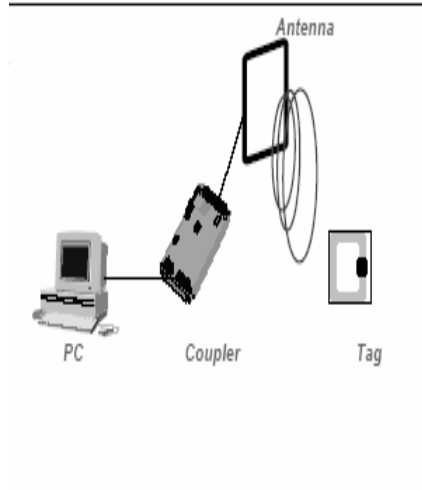
Culled From Rafiq (2005)

Operation of RFID

As part of the technology implementation, RFID is affixed in every library book and reading materials, the information is entered into the software installed in server. Whenever a book is issued or returned, the RFID reader from tag reads the information relating to that item and transmits the data into the software and the book is issued out or returned to the library within few seconds. As the user takes the book outside the library the antenna mounted at the gate automatically reads the information contained in the RFID tag to know if the book was properly borrowed. If it is not properly borrowed it triggers an alarm to indicate that library material is being taken out unofficially. It has helped to minimize book theft from libraries.

Another important use of RFID technology is in stocktaking. As stated earlier, stocktaking was previously neglected due to the highly repetitive nature. But with this technology library personnel can easily carry out stocktaking in a fast and efficient manner. This is done by placing the scanner on the books, which results in the transmission of the scanned information to the database, based on the report already generated from the database, missing items or miss-shelved books can be identified.

At The University of East London 3M - Digital Library Assistant (DLA) is used to read RFID tags placed on books, the handheld software is installed on the computer with the system software, whenever data is exported to the memory card the handheld software is automatically exported to the memory card. To carry out stocktaking using the 3M DLA a report is generated from the library system based on the records in the database, the report is saved in the memory card which is inserted into the handheld device and the battery is inserted. The device can then be used for stock taking inventory, any queried book that is found on the shelf triggers the DLA to beep.

DLA Components
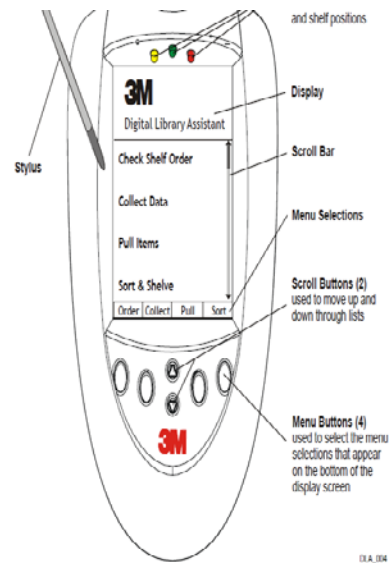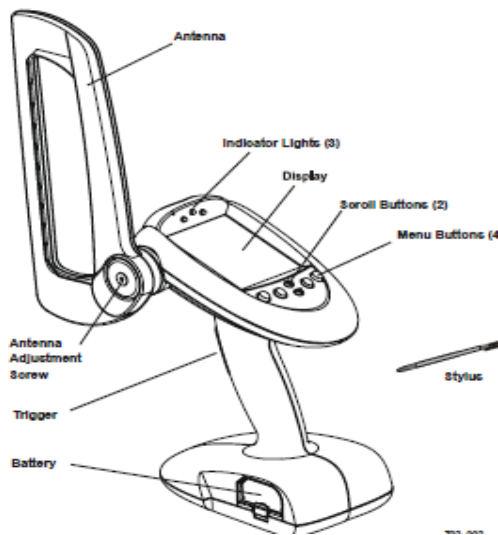
Benefits and Uses of RFID Technology in the library

➢ RFID reduces the time spend in circulation process, since information can be read from the tag much faster and several items can be read at the same time, it gives staff more opportunity to do other works.

➢ RFID empowers students to issue, return library material without having to wait or queue. It enables users to borrow library material even when library desk is not staffed. This also enables libraries to open libraries for library services for longer hours without having to invest in additional staffing.

➢ Since RFID can be read from the book without actually opening the books to scan it like in barcode it makes borrowing of library materials easy and students can borrow more than one item at a time.

➢ RFID also helps to minimize theft of library property. Some RFID systems has an interface between the exit sensor and the circulation to identify items moving out of the library (Sumi and Kumar)

➢ RFID can also be used to identify books and automatically sort books into different bins as it is being programmed in the system; this reduces the work of library staff and makes shelving of books easier. As book sorter reduces considerable time to return items to shelves, it increases library materials' availability, hence, increasing user's satisfaction with library resources.

➢ High speed and accuracy in stocktaking; This is a very unique feature of RFID over the barcode, with the scanner it is easy to scan through volumes of books on the shelves without pulling them out, the Handheld reader is moved over the books rapidly, any item that has been queried to be missing can be dictated through this process.

How to place the 3M during stock taking   Fig 4 a screen showing the a queried book discovered during
                                                         stock taking
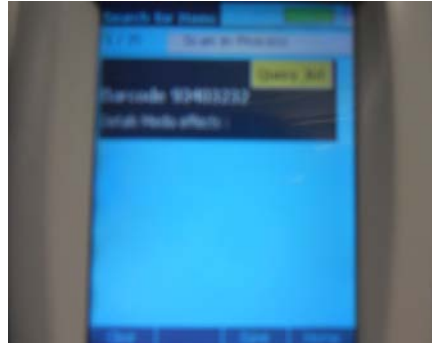
Using this DLA speeds up the inventory taking process; the library may not be closed for a
longer period unlike in a manual situation where the library closes for weeks, thereby depriving
students' access to the materials. The RFID technology has contributed tremendous to the
improvement and development of library services. The tags in the book can be read from any
orientation, it does not require sighting the tags. To ensure proper use, libraries can develop best
practices as highlighted by Shadhid (2005) that the Library should be open about its use of RFID
technology including providing publicly available documents stating the rational for using RFID,
objectives of its use and associated policies and procedures.

Disadvantages

- Despite the advantages there are some shortcomings of RFID such as mutilating the tags,
  the tags containing the microchips is always affixed at the back of the book without any
  covering, this can be pulled out by users who want to remove the book from the stock, in
  such situation it becomes difficult to dictate stolen materials, while taking it out. Though
  it is a rear case
- Cost is the major disadvantage of RFID it is expensive to fully implement; the readers
  and the sensors are very expensive. As a result of this many libraries with little fund tends
  to avoid it.
- The RFID system can be easily deceived by wrapping the protected materials in an
  ordinary foil to block the radio signals. With the knowledge of the technology one can
  easily place two items against each other so that one tag overlays the other and cancels
  the signal.
- The sensor at the exit gate reads tags twice the distance of other readers, there might
  create problem at the exit gate if a smaller antenna is installed at the check point it
  becomes difficult to check every patron properly, but with a larger antenna on the tag the
  performance is high.

Implication for Libraries in Developing Countries

Many Libraries in the developed world has adopted this technology and it has been proved to be helpful and also provide the relevant services, it will be encouraging that other libraries automate their system and adopt these technologies. Since the profession has transited from the manual system to a technological driven system, it is important that libraries in developing countries especially Nigeria, adopt this technology since it enhances the security of the library and facilitates inventory.

Guiding policies: Adjudged by the fact that Nigerian Library Association has reached 50years, many of the library operations should be transformed to reflect the age of the profession. There should be policies guiding the library services and operations, which should streamline what, should be done and how it should be done. Though there are some policies in some areas, but some others just carry out their services in the manner they deemed fit. This does not encourage continuity or give a guide to subsequent managers in the establishment.

Accessibility of Information Materials: The operations of any library is geared towards the creation of access and retrieval of the resources with ease, but judging from what is obtainable in most libraries it is observed that many of the processed materials are always misplaced by users. When they could not be traced, such materials are classified as being lost without knowing that they were wrongly place. But with regular stocktaking such situation can be controlled or checked.

Statistics of library collection

Stock taking provides a reliable statistics on the status and volume of the collection in the library. There is an adage that an unexamined life is not worth living; this is also applicable to our resources because if there is no check on the status of our collection it may amount to spending our meager resources on acquisition of resources that are already available in the library. But if there is constant and up to date record concerning the resources in the library, it will give a clear picture of what is available and what should be replaced.

Theft and Mutilations of library resources
The rate of theft and mutilation of library resources has been observed to be so alarming; most students are so selfish that they reap off pages of library materials for their personal use. In such situation a greater number of the population are deprived of the opportunity to use the material. But with the RFID some of these menace will be checked, since the materials are not deactivated it will be difficult for the person to take such material outside the library without the machine raising alarm.

Speeds up Library services
With the use of RFID technology it makes charging and discharging of library materials easy, the students on their own can serve themselves any time they need library materials. This gives the library staff the opportunity to provide other services like Strategic Dissemination of Information to most of our busy library users. This is a very important approach towards marketing the library and attracting more users to the library.

Shelving and Shelf Reading
Stock taking enhances shelving and shelf reading of library materials which speeds the retrieval of these materials from the shelf.

It will be worthwhile if many libraries in Nigeria can adopt the RFID technology to help improve their library services, both in terms of providing 24 hours services, stock taking practice. The ability of the RFID to identify items is very encouraging for the library and should be adopted in this dispensation to ensure user satisfaction and reduce the task of library staff to enable them face other issues in the library.

There is still bright future for Library services with the introduction of these technologies that tend to speed out the library processes with accuracy. Discoveries can be made to overcome these challenges. Radha (2011) gave a checklist for deploying RFID as follows;

1. Budget (check the budget allotted for library)

2. Collection and usage of materials

3. Orientation to the user

4. Training to the librarians

5. Privacy policy, standards of RFID tags

6. Frequency and life of the tags

7. Time bound to implement the new technology

8. Measure the benefits of new technology

9. Maintenance and service from the vendor for the RFID components

10. Best practice sharing about the RFID from various users

Conclusion

The advantages and benefits RFID are quite enormous, it yields excellent result, enhance search and identification processes in the library, it helps to streamline various major library operations like stocktaking and book search, it should be made popular in developing countries and libraries are encouraged to adopt it. Though the RFID technology is expensive it is believed that with time and as many libraries use it the cost may come down so that there will be mass adoption of this technology in Nigeria and globally. Again the library profession is facing competition from commercial cyber café, most of their services are tailored towards providing proactive services to their clients. Therefore any technology that will facilitate this services is encouraged, library administrators should plan ahead to equip our libraries with the necessary facilities that will enable it perform its services.

References

Boss, R.W (2007), RFID Technology for Libraries. Accessed on 10/4/2012 from http://www.ala.org/ala//pla/plapubs/technotes/RFID-2007.pdf
Chachra, V. (2003). Experiences in implementing RFID solutions in a multi-vendor environment. *IFLA Conference, Berlin, August, 2003.* Accessed on 10/4/2012, from http://www.ifla.org/IV/ifla69/paper/132e-chachra.pdf

Edwards, S. and Fortune M (2008) A guide to RFID in Libraries. *BIC e4libraries project. Accessed on 10/4/2012 from http://www.bic.org.uk/files/pdfs/090109%20library%20guide%20final%20rev.pdf*

Gurdish Sandhu (2005) Stock management policy. *Information services Division.* University of Salford

Hollway, S. (2006) RFID: An Introduction. Accessed on 10/04/2012 from http://msdn.microsoft.com/en-us/library/aa479355.aspx

Pandey, P. and Mahajan, K.D (nd) Application of RFID Technology in Libraries and Role of Librarian. Accessed online on 10/04/2012 from **http://eprints.rclis.org/bitstream/10760/15253/3/RFID.pdf**

Rafiq, M. (2005) Radio Frequency Identification (RFID): Its Usage and Libraries. Accessed online on 10/04/2012 from http://eprints.rclis.org/bitstream/10760/6179/1/RFID.pdf

Rahda L. (2011) Deployment of RFID (Radio Frequency Identification) at Indian academic libraries: Issues and best practice 3(2). Available online http://www.academicjournals.org/ijli .

RFID4U (2005). Library Automation Using RFID *The global Hub for RFID training.* Accessed online from http://www.rfid4u.com/downloads/Library%20Automation%20Using%20RFID.pdf

Shahid S. Med. (2005) Use of RFID Technology in Libraries: a New Approach to Circulation, Tracking, Inventorying, and Security of Library Materials. Library Philosophy practice. 8(4) http://www.webpages.uidaho.edu/~mbolin/shahid.htm.

Sumi and Kumar (2007). Application of RFID technology in Libraries. *5thInternational CALIBER.* http://ir.inflibnet.ac.in/dxml/bitstream/handle/1944/575/459-467(cal%2007).pdf?sequence=1

Swart,I. (2006). The art of stock taking. *Cape Libr.,*Jan/Feb.

Ward, M. and van Kranenburg, R. (2006), "RFID: frequency, standards, adoption and Innovation", in JISC Technology and Standards Watch, available at: www.jisc.ac.uk