

Research

Application of Radio Frequency Identification at Federal University of Technology Library Owerri, Imo State

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The general purpose of the study is to determine the application of radio frequency identification (RFID) at Federal University of Technology Library, Owerri (FUTO) Imo State. The survey research design was used for the study using questionnaire as the instrument for data collection. Three research questions were frame for the study. The study covered the entire population of 35 librarians at FUTO Library. The findings showed that application of the RFID in libraries will enhance library workflow, staff productivity, easy charging and discharging of books and among others. The result also showed that high cost of technology, tag collusion, chances of removal of exposed tag are the challenges of the RFID in libraries. The study recommended that it is important to educate library staff and library users about the RFID technology before implementing a programme.

Keywords: Radio Frequency Identification, Information Technology, Bar Code and Radio Frequency Technology

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INTRODUCTION

The Radio frequency identification (RFID) is a technology that uses radio waves to automatically identify people or object. According Syed (2005) RFID is one of the most technologies being adopted by both industry and academic world. The author further states that RFID allows an item such as library book to be tracked and communicated with by radio waves. This technology is similar in concept to a cell phone. According to FAQ

(2004), there are several methods of identification of RFID but the most common is to store a serial number that identifies a person or object and perhaps other information on a microchip that is attached to an antenna (the chip and the antenna together are called RFID transponder or RFID tag). The antenna enables the chip to transmit the identified information to a reader. The reader converts the radio waves reflected back from the RFID tag into digital information that can then be passed on to computers that can make use of it.

Revolution of information technologies like the Internet, e-commerce, bar code system and smart chip have changed the shape of traditional library and their day-to-day operations to computerize library. Many libraries in the world use various technologies to improve quality and efficiency of their services. The RFID is the latest technology that is helping the libraries in various areas to streamline operations by enabling faster self-checking out and self-return automation activity, security, improving shelf management, inventory control and providing better theft protection. The RFID is not only able to the theft of books but also reduces the work force due to its self-check-in and check-out facility (Boss, 2003). In the light of the above background, the study seeks to determine the application of radio frequency identification at Federal University of Technology (FUTO) Library Owerri, Imo state.

Research Questions

The following research questions were posed to guide the study.

- (i) What are the benefits of the RFID in libraries?
- (ii) What are the roles of librarians in adopting the RFID in libraries?
- (iii) What are the challenges of the RFID in libraries?

Literature Review

The RFID can be simplified to that of an electronic barcode and can be used to identify, track sort or detect library holdings at the circulation desk and in the daily stock maintenance. The system consists of smart RFID labels hardware and software, provides libraries with more effective way of managing their collections while providing greater customer service to their patrons (Klaus, 2003). The RFID technology helps librarians reduce valuable staff time spent scanning barcodes while charging and discharging items. It is a combination of radio frequency-based technology and microchip technology. The information contained on microchips in the tags affixed to library materials is read using radio frequency technology, regardless of item orientation or alignment (ie 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 exist(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 two parallel exit gate sensors (Syed, 2005).

Brich (2005), states that the RFID chips are of particular interest because they have become smaller and smarter to the point where they can be added every kind of document and can be read and updated from a distance. Using the RFID tags, library is easy and convenient. The RFID library system consists of books, each attached with the RFID tag, the RFID reader,

computer network and software. Library staff handle lending, returning, sorting, and tagging of books using the RFID tags in the library system. A staff can locate RFID library books marked with the RFID tags using the RFID reader which identifies and locates the books when the books are carried to the counter, the library staff can either activate or deactivate the electronic article surveillance bit in the book's tag. If a book is borrowed then the surveillance bit is deactivated (Pandey and Mehajan, 2015).

Ranawella (2006), using the RFID in libraries saves library staff time by automating their tasks. The RFID library management saves book readers precious time that they would have spent, waiting for their turn in a queue for borrowing or returning a book. Taking care of books and making them available to users are important tasks. Most of the library staff spent time in recording information of incoming and outgoing books. Klaus (2003) states that RFID package for library consists of eight components. The RFID tags a self-check-out station, a self-return book drop with an automatic check-in feature, a tagging station, a set of security gates, a shelf scanner for inventory and an administrative station. The author further states that the self-check-out station allows patrons to borrow books without assistance from the library staff.

The staff check-out station is used when patrons prefer staff assistance. The book drop allows returned books to be processed instantly by updating the database the moment the items passed through the chute. The shelving station speeds the process of sorting the returned books for re-shelving. The shelf scanner allows library staff to take inventory and find wrongly shelved books without having to pull the books off the stacks. According to Syed (2005), the key aim for today's libraries in adopting RFID is the need to increase efficiency and reduce cost, self-charging and discharging, reliability high speed inventorying, long tag life, fast track circulation operation and automated materials handling. Syed(2005) further states that the challenges of the RFID in libraries include, high cost, accessibility to compromise, removal of exposed tags, exit gate sensor (Reader) problems, user privacy concerns, reader collection, tag collision and lack of standard.

Research Method

The descriptive survey design was adopted using the questionnaire as the instrument for data collection. The population of the study is 35 librarians from Federal University of Technology (FUTO), Imo State. Therefore, the researchers used census method to ensure that all the librarians were captured for the study since the population of study is small and accessible.

Table 1: Benefits of the RFID in Libraries

		N=35	
	Options	Frequency	%
a	Improves library workflow	28	80
b	Improves staff productivity	30	35.7
c	Assists inventory check with ease	26	74.3
d	Easy book identification	25	74.2
e	Shelf-charging and discharging	33	94.3
f	Theft detection and tracking	33	94.3
g	Self-check-in/out system	33	94.3
h	Improves customer service	24	68.6

Analysis and Findings

Out of 35 copies of the questionnaire distributed, all were duly returned for analysis giving a response rate of 100%.

Research Question 1

What are the benefits of the RFID in the libraries?

Evidence from Table 1, shows that the number of responses is more than the number of respondents because some respondents ticked more than one choice of options provided from the table. 28(80%) of the respondents stated that application of the RFID in libraries will improve library workflow as 30(85.7%) stated that it will improve staff productivity. 26(74.3%) of the respondents indicated that it will assist inventory check with ease while 33(94.3%) of the respondents stated that it will help self-charging and discharging of books. For 33(94.3%) of the respondents, it will enhance theft detection and tracking even as 33(94.3%) of the respondents stated that it will enhance self-check-in/out system. 24(68.8%) of the respondents were of the opinion that application of the RFID in libraries will improve customer service. Evidence from the analysis showed that application of the RFID in libraries has a lot of benefits in the libraries.

Research Question 2

What are the roles of librarians in adopting the RFID in libraries?

Table 2: Role of Librarians in Adopting the RFID in Libraries
N= 35

	Options	Frequency	%
a	Be outspoken in the public education effort related to RFID	27	77.2
b	Ensure that certain use of RFID is prohibited	15	42.8
c	Ensure that no personal information is stored on the RFID tag	35	100
d	Ensure that all communication between tag and reader are encrypted via a unique encryption key	31	88.6
e	Ensure that all RFID readers in the library are clearly marked	32	91
f	Ensure that no static information is contained on the tag (bar code, manufacturer number) that can be read by unauthorized readers	35	100
g	Ensure that only authorized personnel have access to the RFID system	35	100

It is seen from Table 2 that the number of responses is more than the number of respondents because some respondents ticked more than one choice of options provided from the table. As indicated on Table 2, those who stated that librarians should be outspoken in the public education effort related to the RFID had a total of 27(77.2%) as against 15(42.8%) who stated that librarians should ensure that certain use of the RFID is prohibited. For those who stated that librarians should ensure that no personal information is stored on the RFID tag had a total of 35(100%) while 31(88.6%) of the respondents indicated that librarians should ensure that all communication between tag and reader are encrypted via a unique encryption key. Table 2 also shows the respondents who indicated that librarians should ensure that all the RFID readers in the library are clearly marked had 32(91%) as 35(100%) of the respondents stated that librarians should ensure that no static information is contained on the tag (bar-code manufacturer number) that can be read by

Table 3: The challenges of the RFID in Libraries
N= 35

	Options	Frequency	%
a	High cost	35	100
b	Tag collision	19	53.3
c	Chances of removal of exposed tag	32	91.4
d	Lack of standard	17	48.6
e	Exist gate sensor/reader problems	23	65.7
f	User privacy concerns	22	62.8
G	Reader collision	25	71.4

unauthorized readers. For those who stated that librarians should ensure that only authorized personnel have access to the RFID system had a total score of 35(100%). Evidence from the table indicates that the roles of librarians are very significant which may be the best practice for the library RFID use.

Research Question 3

What are the challenges of the RFID in Libraries?

It is observed from the Table 3 that the number of respondents is more than the number of respondents because some respondents ticked more than one choice of options provided from the table. 35(100%) of the respondents indicated that the major challenges of the RFID technology is cost as 19(53.3%) indicated tag collision. (91.4%) stated chances of removal of exposed tag while 17(48.6%) stated lack of standard. For 23(65.7%) and 22(62.8%) of respondents, they stated exist gate sensor/reader problems and user privacy concerns respectively. 25(71.4%) indicated reader collision. Therefore, it can be seen from the table that high cost of technology and chances of removal of exposed tag were the major challenges of the RFID in libraries.

Findings

In relation to research question one, the benefits of application of the RFID in Libraries include, improvement of library workflow, staff productivity, inventory check, book identification charging and discharging of books, theft detection and tracking, self-check-in/out system and improvement of customer service. This may be that the use of the RFID reduces the amount of time required to perform circulation operations, have an interface between the exit sensors and the circulation system to identify the items moving out of the library. This finding conforms that Klaus (2003) who stated that the RFID tags last longer than barcodes because nothing comes into contact with them.

In view of research question two, Table 2, highlighted

the roles of Librarians in adopting the RFID in Libraries. The study revealed that Librarians should be outspoken in the public education effort related to the RFID, ensure that certain use of The RFID is prohibited, ensure that no personal information is stored on the RFID tag, ensure that all communication between tag and reader are encrypted via a unique encryption key, ensure that all the RFID readers in the library are clearly marked, ensure that no static information is contained on the tag (bar code, manufacturer number) that can be read by an unauthorized readers and also ensure that only authorized personnel have access to the RFID system. This finding conforms that of Syed (2005) who stated that as libraries are implementing the RFID systems, it is important to develop best practices/ guidelines to utilize the technology in best way and to keep the privacy concern away.

In relation to research question three, Table 3 ascertained that the challenges of the RFID in libraries were high cost, tag collision, chances of removal of exposed tag, lack of standard, exist gate sensor/ reader problems, user privacy concerns and reader collision. These are in line with Syed (2005) that cost of the RFID technology, reading a lot of chips in the field, pattern of encoding information and software that process the signal from one reader can also interface with the signal from another where coverage overlaps and when users become more familiar with the problems of the RFID in libraries.

Conclusion

In the light of the above findings and discussions, the RFID system is not emerging but also more effective convenient and cost efficient technology in library security. Although, the unique benefits and flexibility of RFID is the good news, the technology is still not widely understood or installed in the library environment. Its adoption is still relatively new and there are many features of the technology that are not well understood by the general public. Developments in the RFID system continue to yield larger memory capacities, wider reading ranges and faster processing. The interest in the RFID as

a solution to optimize further the automation and tracking of documents are gathering momentum at an increasing pace with more Libraries joining the trails

Recommendations

1. It is important to educate library staff and library users about the RFID technology before implementing a programme.
2. The cost of the RFID technology is cost,

therefore government should act fast in other to reduce the cost since the application of the RFID technology helps in both security and materials tracking need of a library.

3. There should also be a standard for the RFID system.

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