# IMPEDIMENTS TO THE UTILIZATION OF RADIO FREQUENCY IDENTIFICATION IN AKWA IBOM STATE UNIVERSITY LIBRARY

By

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#### Abstract

**Purpose:** This study examined the impediments toward utilisation of Radio Frequency Identification in Akwa Ibom State University Library.

**Design/Methodology/Approach:** A descriptive survey design was used and the population was made up of all the library staff in AKSU Library, Ikot Akpaden Campus totalling up to 33, and this constituted the sample of the study. Questionnaire was the instrument for data collection and data obtained were organized and analysed using simple descriptive statistics which includes percentages, means scores, and frequency tables.

**Findings:** The results of the study showed that the only service which RFID automates in AKSU library is alarming whenever library resources are taken out from the library without discharging. The problems associated with RFID utilisation include delay by RFID vendors to fix reported problems, lack of appropriate backup facilities, wrong installation of drop box not to enhance book return even when the library is closed, lack of ICTs training for library staff, issues relating to server and failure in other RFID components, and lack of feasibility study on the RFID project before adoption.

**Recommendations:** the researcher recommends that there should be a feasibility study on the proposed RFID project before adoption, there should also be series of training for library staff before any project is handed over for effective management, the library should make provision for backup facilities, check better replacement for RFID components including server and finally engage the services of a vendor who resides close by.

**Keywords:** Radio Frequency Identification (RFID), Information and Communication Technology (ICT), Akwa Ibom State University Library,

### Introduction

Radio Frequency Identification Device is one of the latest technological developments

in libraries which make use of wireless technology through radio waves to automatically detect, identify, and manage various objects like books and other library materials. The technology according to Akwang & Usoro (2021), Vasishta (2009) and Singh & Mahajan (2014) works through RFID tag which is placed on the page of every book in the library. Its numerous advantages towards library management attract patronage from most academic

libraries in the 21 century. With the bid to ensure efficiency and effectiveness towards library management in aspects like resource security, online circulation, stock verification/ inventory among others, the Akwa Ibom State University Library was encouraged to adopt the Radio Frequency Identification (RFID) in 2015.

The Akwa Ibom State University is one of the various universities located in the South-South geo-political zone of Nigeria with a multi campus structure. Its main campus is located at Ikot Akpaden, Mkpat Enin LGA while the second campus is located at Obio Akpa, in Oruk Anam LGA, both in Akwa Ibom State. However, academic libraries are attached to each of these campuses in the institution with the aim of acquiring information resources that will satisfy the teaching, learning and research needs in the institution. According to Umoren (2022), the Akwa Ibom State University Library was established in 2010 with a vision to foster reading culture for the pursuit of knowledge, academic excellence and the spirit of enquiry ina serene academic environment. The Obio Akpa Campus Library acquire resources that supports the teaching, learning and research needs of the faculty of Arts, Management Science, Agricultural Science and Social Sciences while the Ikot Akpaden campus library supports the teaching, learning and research needs of the faculty of Engineering, Education, Biological Sciences and Physical Sciences.

With the numerous benefits of using RFID in libraries according to Bhukya & Chakravarthy (2021) and Yu (2007) which includes tracking of library books, stock verification, check-in and check-out of patrons, loan management among others, the Akwa Ibom State University main campus library decided to adopt the RFID in this Information and Communication Technology (ICT) era to make information resources and services timely accessible to users especially in this present century. The Radio Frequency Identification, if properly managed delivers a great deal in academic libraries, but if it is not properly managed, may pose some

difficulties in the system. On these grounds, Kumar (2008) identifies some challenges towards successful operation of RFID to include high cost of RFID and its components, lack of feasibility study on the project, erratic power supply, and lack of appropriate backup facilities among others.

### **Statement of the Problem**

From close observation, the application of RFID in Akwa Ibom State University library was with little or no maintenance support and the backup facilities were not effective and compatible, coupled with the vendors inability to respond to reported problems, hence Solanke (2021), Umoren (2012) & Bansode and Desale (2009) pointed out some strategies towards successful implementation Information and Communication Technology (ICTs) projects in the academic library to include undertaking appropriate feasibility study on the project to be adopted, provision of adequate power supply, training and vendors reaction to reported problems, among others.

Although the RFID is well known for self-charging and discharging of books in the library, inventory control, returning of books even when the library is closed among others, the extent at which it serves the main campus library is not certain hence this research aims at examining the impediments towards utilising RFID in Akwa Ibom State University Library, Ikot Akpaden Campus.

#### **Research Questions**

For the purpose of this research, some research questions were formulated to include:

- 1. What are the benefits of RFID in AKSU Library?
- 2. What are the services which RFID automates in AKSU Library?
- 3. What are the problems associated with RFID utilisation in AKSU library?
- 4. What are the strategies for enhancing successful utilisation of RFID in AKSU library?

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### **Literature Review**

The acronym RFID means Radio Frequency Identification. It is one of the latest technologies in libraries that use radio waves to automatically identify and track objects. This technology has been in use since 1970s. It is an innovative and automated library system for automatic identification and tracking of library resources. RFID application ranges from book tracking, stock management, and theft detection to automatic book sorting. It is a dynamic link between people, object and process which plays a prime role in data collection and identification as well as analysis necessary for specific library operation (Sharma.& Pal, 2017). RFID is an integrated library system which has a self-service station that demands least intervention by the library personnel. It is used in libraries primarily to automate the book handling process which includes check-in and check-out, inventory control, antitheft etc. Sharma.& Pal (2017) outlines the main components of RFID to include:

**RFID Tag**: This is one of the most important components of RFID. It looks like an inch square paper with an engraved antenna and a programmable microchip with a capacity of at least 64 bits. The tags are always fixed on a page of each book in the library.

**RFID Reader:** This consists of decoder, antenna, transmitter, and a receiver. The receiver helps in the process of identification of tagged items through radio waves. It activates and deactivates the tag antitheft functions. It interrogates tags and offer optimum reading performance which enables instant data capture when passed.

**Server:** The server is the brain box of the system. It is an essential part of the system which the software that interfaces with the integrated library is loaded. It is the communication gateway between the various components. All information in the database is stored in the server. It receives information from the reader and verifies it with those in the database. It software includes APIs, LIB BEST etc.

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**RFID Label Printer**: This is used in printing the labels with an individual barcode, library loco etc. It also programs data into the chip after which it is taken from the printer and applied on the book.

**Sensor Gate:** This is designed for the detection and reading of information from RFID label and tags which are carried through the door. It alarms whenever unauthorised book is taken out from the library and it also supplies the media number that shows which book was stolen.

**Staff Work Station:** This is for charging and discharging of library materials. It can be connected to a work station PC. It is used at the circulation desk in the library.

**Self-Check in and Check-out Station**: This component enables users to charge and discharge library material without the interference of any library staff. To enable check in and out, users must be identified with an RFID ID Card.

**External Book Return/Book Drop Station:** This is a station where library users can return borrowed books even when the library is closed. It is a machine with a slot, reader and a chip integrated into the wall. Users identify themselves when they put borrowed books into the slot, and it reads it. Upon completion of its few commands, user gets a receipt showing how many and which book is returned.

**Library Programming Station**: This is where tagging is done. Information about the resources are programmed into both the tags the reader, and the label printer.

Hand Held Scanner or Inventory Wan: When this component is waved on the shelves without touching those books, it will read data from those books and also communicate same with the server for prompt identification through a wireless technology. It is used for inventory purpose.

### **How RFID Works**

The RFID Technology works through RFID tags which is programmed on a page of every book in the library. Also, a complete bibliographic detail of each book is entered into software installed in the server. During check out or charging, the user drops the book on the RFID charging desk, before entering his/her password and user name so that the reader can read the data on the book tag, compare it with what is obtainable in the database before it deactivates the tag for security reasons. This is done within a few seconds.

Nevertheless, as the user takes the book outside the library, the antenna placed at the exit gate automatically reads the information contained on the RFID tag to verify whether the book was properly issued or not. If the book was not properly issued to the user or stolen from the library, the antenna reads it and gives an instant alert. The technology according to Kern (2004) results in successful book reduction in the library.

### Methodology

The design used in this research was descriptive survey research design because it is the best design to assess opinion and trends. It gathers data from members of a population with respect to one or more variables.

However, the main campus library constituted the area of study and the population of the study constitute all the library staff in the main campus library which was 33. The sample consists of the whole population (33) since it was small and manageable. Also, the study is limited to information relating to RFID in Akwa Ibom State University Library and it covers from the year 2015 to 2023. Moreover, a well-structured questionnaire titled IMPLURAL was designed to elicit information from the respondents. Data was analysed using percentages, mean scores, and frequency tables. A four point likert scale type was used to determine the mean score of respondent's perception in the study. The values assigned to different scaling statement are as follows: SA-Strongly Agreed - 4, A-Agreed- 3,D-Disagreed- 2, SD-Strongly Disagreed-1.MA-Most Appropriate-4,A- Appropriate-3,FA-Fairly Appropriate- 2, NA- Not Appropriate-1.ME-Most Effective-4, E-Effective-3,LE-Less Effective-2, NE-Not Effective-1. VHE-Very High Extent-4, HE-High Extent-3, LE- Low

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Extent-2, **NE**- No Extent-1. However, any item that has a mean score of 2.5 will be accepted and any item with a means score less than 2.5 will be rejected.

Table 1: Benefits of RFID in Akwa Ibom State University Library

s/n	Items	SA	Α	D	SD	X	D
1	RFID helps in tracking library books taken out of the library without discharging.	6	3	9	13	2.0	R
2	RFID helps in stock verification (inventory).	0	5	8	18	1.6	R
3	RFID helps in checking in and checking out of library patrons.	2	6	8	15	1.8	R
4	RFID helps in monitoring library staff.	0	2	12	17	1.5	R
5	It helps users to return library books even when the library is closed.	0	2	8	21	1.4	R
6	It helps in interlibrary loan management.	1	2	5	23	1.3	R
7	It helps in tracking overdue books and sending overdue notices to erring users.	0	1	3	27	1.1	R

From the analysis on table 1 concerning the benefits of RFID in AKSU library, the result showed that RFID helps in tracking library books taken out of the library without discharging with mean score of 2,RFID helps in checking in and checking out of library patrons with a mean score of 1.8, RFID helps in stock verification (inventory) and RFID helps in monitoring staff with a mean score of 1.6 respectively, it helps users to return library books even when the library is closed with a mean score of 1.4, it helps in interlibrary loan management with a mean score of 1.3 and it helps in tracking overdue books and sending overdue notices to erring users in AKSU Library with a means score of 1.1.The mean score of all the items were so low and this creates the impression that the project was not benefiting to the library at all. Since the benefits of using RFID have not been achieved, it means that the aim of installing it has been defeated.

### Table 2: Services Which RFID Automates in Akwa Ibom State University Library

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s/n	Items	VHE	HE	LE	NE	X	D
1	RFID is used in Charging and Discharging of library resources in AKSU Library.	2	2	11	16	1.7	R
2	RFID helps in inventory control in AKSU Library.	0	5	12	14	1.7	R
3	RFID is used in checking in and checking out of library patrons in AKSU Library.	0	7	11	13	1.8	R
4	RFID alarms whenever library resources are taken out from the library without discharging.	9	11	7	4	2.8	Α
5	RFID facilitates interlibrary loan management.	0	0	2	29	1	R
6	RFID helps users to return library books even when the library is closed.	0	0	0	31	1	R
7	It helps in tracking overdue books and sending of overdue notices to erring users in AKSU Library.	0	3	6	22	1.9	R

The result of the analysis in table 2 showed that RFID alarms whenever tagged books are taken out of the library without discharging with a mean score of 2.8. This is possible because of the presence of tag on the book. The tags will communicate with the RFID readers anytime even when the server is shutdown. It helps in tracking overdue books and sending of overdue notices to erring users in AKSU Library with a mean score of 1.9, RFID is used in checking in and checking out of library patrons in AKSU Library with a mean score of 1.8, RFID is used in Charging and Discharging of library resources in AKSU Library and it helps in inventory control in AKSU Library with a means score of 1.7 respectively. RFID facilitates interlibrary loan management and RFID helps users to return library books even when the library is closed with a means score of 1. From the analysis, it reveals that the project did not achieve the goals it was meant to achieve. The mean score of those items were so low that it revealed that the project was either not functioning at all or broke down shortly after installation.

# Table 3: Problems Associated with RFID Utilization in AKSU Library

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S/N	Items	SA	Α	D	SD	X	D
1	Lack of feasibility study on the RFID project before adoption.	6	12	7	6	2.6	A
2	Erratic power supply.	2	7	11	11	2	R
3	Lack of appropriate Backup facilities	9	13	5	4	2.9	Α
4	Wrong installation of drop, box which doesn't enhance book return even when the library is closed	8	16	4	3	2.9	Α
5	Delay by RFID vendors to fix reported problem	13	12	4	2	3.1	Α
6	Lack of ICTs training for library staff.	11	9	8	23	2.9	A
7	Issues relating to server and failure in other RFID components.	12	7	8	4	2.9	A

The analysis in table 3 shows that Delay by RFID vendors to fix reported problem was rated highest by the respondents with a means score of 3.1, Lack of appropriate Backup facilities, Wrong installation of drop box not to enhanced book return even when the library is closed, Lack of ICTs training for library staff, Issues relating to server and failure in other RFID components with a means score 2.9 respectively. Erratic power supply has a means score of 2. It is obvious that if there is any delay by RFID vendors to fix reported problem, the whole system will pack up, awaiting the day the vendor will arrive to fix reported problems, and hence the respondents rated it very high as an impediment towards utilising RFID. Again, if staff members are not trained on how to operate the system, and there are no backup facilities, no feasibility study on the project, such project does not last, hence Umoren (2010) listed the strategies towards ICT utilisation in academic libraries to include provision of good power supply, conducting a good feasibility on the project to be adopted among others. Issues relating to server were a challenge which requires urgent attention since it is the brain behind the project. Wrong installation of drop box which does not enhance book return even when the library is closed posed a greater challenge because if the drop box is installed

where users could not have access even when the library is closed, the aim of it installation is highly defeated. Also, erratic power supply was not a challenge since there has been a steady power supply in the campus.

Table 4:	<b>Strategies</b>	for Er	hancing <b>S</b>	Successful	Utilization	of RFID in	<b>AKSU Library</b>
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S/N	Items	VA	A	LA	NA	Х	D
1	Undertaking appropriate feasibility study on the proposed RFID project before adoption.	18	9	4	0	3.4	A
2	Provision of adequate power supply.	8	11	7	5	2.7	Α
3	Provision of a good maintenance support.	13	12	4	2	3.1	Α
4	Installation of drop box where it can enhance book return even when the library is closed	16	8	7	1	3.3	Α
5	provision of appropriate backup facilities	5	12	11	3	2.6	Α
6	Provision of ICTs training for library staff	8	9	9	5	2.6	A
7	Provision of a good and trusted server, and replacement of other non-functional components.	13	13	5	0	3.2	Α

The analysis from table 4 indicated that undertaking appropriate feasibility study on the project to be adopted was rated high with a means score of 3.4, Installation of drop box where it can enhance book return even when the library is closed with a mean score of 3.3, Provision of a good and trusted server and replacement of other non-functional components 3.2, Provision of a good maintenance support with a means score of 3.1, Provision of adequate power supply with a means score of 2.7, Provision of good backup facilities and Provision of ICTs training for library staff with a means score of 2.6 respectively. To embrace sustainable development in the library, there should be a feasibility study on projects to be adopted, library staff should be trained on it, backup facilities should be made available for use, and drop box should be installed where users can have access at anytime because all these will ensure effective utilisation of RFID for sustainable development.

#### **Conclusion and Recommendations**

The use of RFID technology in libraries, especially in the developed countries, has grown dramatically and its benefits are enormous including the possibility of taking inventory of hundreds of thousands of items in the library within a very short time; allowing patrons to check out and return library collection without getting into the library; alleviating repetitive stress among librarians; controlling book theft, non-returns, and misfiling of library's assets and a lot more. Notwithstanding, most libraries in Nigeria are still not adopting RFID technology in its entirety. Hence, the purpose of this study was to examine the adoption of RFID technology in AKSU library and identify the impediments to the utilization of the technology in the library. Based on the findings, the researchers concluded that there is no benefit of RFID to the AKSU library; RFID does not automate any service in the AKSU library; problems associated with RFID utilisation are very high; strategies towards enhancing RFID utilisation in AKSU library are also very high. The findings reveal that AKSU library is still in the initial stages of RFID implementation since 2015. However, the researcher recommended among others that:

- 1. There should be a feasibility study on the propose RFID project before adoption.
- 2. There should also be series of training for library staff before any project is handed over for effective management.
- The library should make provision for backup facilities, and check better replacement for RFID components including the server.
- 4. The library should engage the services of a vendor who resides close by.

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