

# LIBRARY DIGITAL SECURITY SYSTEMS AS CORRELATE OF EFFECTIVE SERVICE DELIVERY IN NIGERIAN UNIVERSITY LIBRARIES

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## Abstract

This research is focused on library security management systems and service delivery in university libraries in Nigeria. Literature was reviewed on the effect of library security systems, such as radio frequency identification devices (RFID) and Closed-Circuit television (CCTV), on effective service delivery by library staff to clientele, and how to curb theft and destruction of valuable library resources. The study had 2 objectives, 2 research questions, and 2 hypotheses. A survey research design was used for the study, while a questionnaire was used to collect data electronically from 448 paraprofessionals and Librarians from across Nigeria. Mean and standard deviation were used to answer the research question, while Pearson product-moment correlation was used to test the hypothesis at .05 level of significance. Findings show that there is a highly significant relationship between CCTV and effective service delivery, and there exists a relationship between RFID and effective service delivery in Nigerian Libraries. It was recommended that

information and communication technology should be used to improve the security architecture of libraries in Nigeria, all libraries should imbibe the use of CCTV and RFID, as it helps to curb stealing and damages on the library resources and sustains effective service delivery.

## Introduction

Security of library resources is paramount in the provision of efficient library service delivery. Where there is insecurity of library collections, the resources are exposed to dangers such as theft, mutilation, and vandalism, among others, which have adverse effects on library service delivery. Bashorun *et al.*, (2024) looked at “security” as the condition of being protected physically, emotionally, psychologically, as well as from other harms, attacks, and terror, which could be considered undesirable. Security, therefore, refers to a process designed to protect something or somebody against danger and crime. In the case of library resources, it prevents unauthorized removal or loss of materials. Teaching and learning cannot take place appropriately in a university whose library collections and resources are not only inadequate but also limited, as they are pilfered, stolen, destroyed, or mishandled by students, staff, and other users.

Although this is no longer obtainable in some Nigerian libraries, as several security systems and measures, such as detective barcode machines, closed-circuit television (CCTV), library inventory control, workable security policy, library Surveillance and Radio frequency identification (RFID) for the Academic libraries, are put in place to check theft and vandalism. This is more relevant as chaining or locking the materials with keys may likely prevent users' easy access to these resources.

Closed-circuit television (CCTV) is a camera that serves as an eye in the library environment. It serves the dual purpose of safety and security of the library collection and library staff, while enforcing discipline among users. This technology is sparking interest in the library community because of its use in various multipurpose tasks, which promise an increase in security and productivity, the use of cost-effective devices in enforcing safety, and maintaining discipline in the library.

Radio frequency identification (RFID) is a technology that facilitates the identification of items, in this case, physical library resources. Radio frequency identification (RFID) is the latest technology used to manage automated library systems and for theft detection. Implementing an RFID system in libraries will

aid tasks such as circulation, re-shelving, and theft detection. According to Riskhan and Hussain (2024), Radio frequency identification (RFID) saves time in service delivery; users can be checked out and checked in with RFID systems. RFID also helps to simplify the duties of the library circulation system. Stock management, like Quick stock inventory, book searching, and shelf order checking, is possible with the RFID technology. Improved Patron Services in that library staff spend minimal time on circulation operations, which helps them to assist patrons. RFID helps with theft detection of unissued library materials, and helps with Library inventory control, which involves managing and organizing a library's collection of materials efficiently to ensure easy access for patrons and accurate tracking of resources.

These systems are put in place to ensure effective service delivery to library users; hence, libraries have to ensure that the systems are installed and used. Service delivery is the effort a librarian puts in place within and outside available resources to facilitate results for every user's query and meet the overall information needs of users (Oden and Owolabi, 2024). Service delivery can be referred to as the ability of an Academic library to provide the information needed by users at the time of request to satisfy the expectations of

users and improve their experience. Therefore, service delivery within the academic library ensures the provision of total services in life-cycle activities offered within the library to its users

This study, therefore, investigates library digital security systems and effective service delivery in Nigerian university libraries.

### **Statement of the Problem**

Security problems vary from one Academic library to another. Mishandling and vandalism of facilities and resources occur frequently, and this results in the loss of useful information resources. Consequently, the delivery of efficient information services is impossible because of the mishandling and loss. Apart from this, theft of books, journals, CD-ROMs, and other library information materials can go a long way to impair the effective delivery of services in the library. As noted by Fagbola and Egbebi (2025), poor security management is one of the factors that affect service delivery in academic libraries. On this note, the researchers seek to establish the relationship between library security systems and effective service delivery in Nigerian university libraries.

## Research Question

The study answered the following questions;

1. What is the relationship between Closed-Circuit Television (CCTV) and effective service delivery in Nigerian university libraries?
2. What is the relationship between library Inventory Control and effective service delivery in Nigerian university libraries?

## Research Hypotheses

1. There is no significant relationship between Closed-Circuit Television (CCTV) and effective service delivery in Nigerian university libraries.
2. There is no significant relationship between Radio Frequency Identification (RFID) and effective service delivery in Nigerian university libraries.

## Literature Review

### Library Digital Security System

Academic libraries are usually established and stocked with relevant and expensive information resources for better service delivery to the academic community. Therefore, adequate security for the library collections is a prerequisite for effective service delivery to library users. Akor *et al.*, (2024)

defined Security as the condition of being protected physically, emotionally, psychologically, as well as from other harm, attack, or terror, which could be considered undesirable. On the other hand, Bashorun *et al.*, (2024) defined security as assurance of the future well-being and freedom from threat. Library security sometimes is the practice of defending information and information-bearing materials from unauthorized access, use, disclosure, disruption, modification, perusal, inspection, recording, or destruction. It is a general term that can be used for collection security regardless of format (electronic, physical, etc.).

Collection security maintenance and safety of the library collections to ensure longevity, accessibility, and effective provision of services to users. Ceccato *et al.*, (2024) observed that to achieve this noble objective, however, libraries need an effective strategy to assess the degree of security breaches they are facing and establish an acceptable level of collection security implementation.

The library security system uses security devices to protect library materials from theft, mutilation, and destruction. It is an important issue in 21<sup>st</sup> century library design. Sasikaladevi *et al.*, (2026) observed that security

weaknesses in 21st-century libraries, coupled with attacks or other types of failures, can lead to loss and damage of very important and costly information resources and loss of integrity of the information resources. These, in turn, can have a damaging effect on the trust of the library and its services, and thereby disappoint the users

The library security system is designed to prevent crime and unauthorized removal or loss of library materials, mostly from intruders or thieves (Sasikaladevi *et al*, 2026; Adigun *et al*, 2024; and Farid *et al*, 2023). Conceptually, it means the overall way policies, programs, procedures, or measures are deployed to stop a crime, in this case, to stop library resources theft, mutilation, and destruction. (Singh, 2024)

### **Service Delivery in University Libraries**

Service delivery to students and staff in university libraries is useful in their academic pursuits. Essien *et al*, (2022) defined library services as all intangible provisions by a library to its clientele to ensure the full exploitation of library resources in meeting their information needs. Library service delivery is also defined as any facility provided by a library to enhance the use of library resources and the dissemination of information (Sasikaladevi *et al*, 2026).

Library service delivery relates to any assistance or help offered to library users to enable them to use the university library resources and facilities. The entire human and material resources in a library are put in place at considerable expense for the overall purpose of providing effective service delivery to the library users. Oden and Owolabi (2021) noted that the effectiveness and efficiency of service delivery would largely represent what the patrons perceive of the library.

Service delivery involves the transmission of ideas, feelings, attitudes, and beliefs between the sender and receiver. Information delivery has both audio and audio-visual dimensions; one can communicate without visualizing. On the other hand, one can visualize without talking and still communicate with classes of human beings. Information services can be delivered to the visually impaired, such as the deaf, dumb, and visually impaired (Alabi and Onekut, 2021). To bridge the gap between the information source and the information seeker, it is necessary to use a variety of delivery strategies to take the information to the users.

### **Closed-Circuit Television (CCTV) and Effective Service Delivery**

The integration of Closed-Circuit Television (CCTV) systems in libraries plays a pivotal role in enhancing service delivery. CCTV serves as a security measure, deterring potential incidents such as theft and vandalism. According to Pal (2024), the presence of CCTV instills a sense of safety among library patrons, contributing to a conducive learning environment. Moreover, a study by Mahilang (2025), highlights that CCTV surveillance aids in monitoring library resources, ensuring their proper usage and preventing misuse. This not only safeguards the collection but also contributes to the efficient management of library materials, ultimately enhancing service quality. The implementation of CCTV aligns with the Information Service Quality (ISQ) framework proposed by Owusu-Ansah *et al.*, (2025). The framework emphasizes the importance of security as a fundamental aspect of service quality, demonstrating how CCTV directly contributes to creating a secure and reliable library environment. CCTV aids in optimizing library operations by allowing staff to monitor the flow of patrons and identify peak usage times. This information enables libraries to allocate resources efficiently, ensuring that services, such as assistance at reference desks or access to computer terminals, are readily available when needed. (Brown, 2019). Use of library security ensures the protection of the

library collection, that is digital library collection (DLS) and the physical library collection (PLC).

According to Gupta and Margam (2020), the following are functions of CCTV in libraries.

- (1) **Security and Theft Prevention:** CCTV cameras act as a deterrent to potential thieves or vandals. The mere presence of visible cameras can discourage unauthorized individuals from attempting theft or causing damage to library property.
- (2) **Training and Professional Development:** Recorded footage can be used for staff training and professional development. It serves as a tool for assessing security protocols, identifying areas for improvement, and enhancing overall staff preparedness (Shuo et al, 2024).
- (3) **Behavioral Analysis:** CCTV footage can be reviewed for behavioral analysis, helping library administrators identify patterns of behavior that may require intervention or adjustments in library policies (Shantanu et al, 2024).
- (4) **Access Control Integration:** CCTV systems can be integrated with access control systems, allowing for the monitoring of key access points.

This integration enhances control over who enters sensitive areas within the library.

- (5) Emergency Response Coordination:** In emergencies, such as fires or medical incidents, CCTV cameras assist in coordinating emergency responses. Library staff can use real-time footage to assess situations and guide emergency response effectively.
- (6) Collection Security:** CCTV contributes to the overall security of the library's collection. It ensures that library resources are protected not only from theft but also from any intentional or unintentional damage.
- (7) Addressing Shelving and Inventory Concerns:** CCTV footage can be reviewed to address issues related to shelving accuracy and inventory management. Any discrepancies in the placement or organization of resources can be identified and rectified promptly.
- (8) Reducing Losses and Damage:** The presence of CCTV cameras acts as a deterrent to potential vandals, reducing the risk of damage to library resources. In the event of incidents, recorded footage helps to identify individuals responsible for any losses or destruction.

- (9) **Tracking Material Movement:** CCTV systems strategically placed in various sections of the library assist in tracking the movement of library resources. This is particularly useful in large libraries with extensive collections.
- (10) **Preventing Unauthorized Borrowing:** By monitoring areas like self-checkout stations or exit points, CCTV helps prevent the unauthorized borrowing of library materials. It ensures that patrons follow proper check-out procedures.

### **Radio Frequency Identification Device (RFID) and Effective Service Delivery**

Radio Frequency Identification Device (RFID) is a term used for a radio-enabled device that communicates with or interrogates a tag or smart label, which is embedded with a single microchip processor and an antenna. According to Xiaoyu (2024), Radio Frequency Identification Devices (RFID) have emerged as transformative tools in various sectors, including libraries, enhancing service delivery through improved inventory management, patron services, and overall operational efficiency. Radio Frequency Identification

Device (RFID) technology revolutionizes library inventory management by allowing for swift and accurate tracking of books and other resources.

The American Library Association (ALA) (2018) highlights RFID's contribution to reducing manual handling, minimizing errors, and optimizing inventory processes in libraries. Atte (2025) opined that RFID systems enhance patron services by expediting the borrowing and returning of materials, reducing waiting times, and improving overall user satisfaction. Pacheco *et al.*, (2025) emphasize RFID's role in streamlining self-checkout processes, empowering patrons, and freeing up staff for more personalized assistance. The impact of the Radio Frequency Identification Device (RFID) brings about Automated Check-in and Check-out. According to Garcia and Patel (2022), Radio Frequency Identification Device (RFID) enables automated check-in and check-out processes, allowing patrons to quickly and independently manage their borrowed materials. This not only saves time but also promotes a seamless and user-friendly experience.

A Radio Frequency Identification Device also helps in Queue Management. According to Riskhan *et al.*, (2024), Radio Frequency Identification Device (RFID) contributes to efficient queue management,

especially during peak hours, by facilitating faster transactions. This ensures that patrons spend less time waiting in lines, leading to improved satisfaction and service delivery. Hamdani (2026) observed that RFID technology is recognized for its role in enhancing interlibrary loan processes and ensuring the return of the same. The quick and accurate tracking of materials across libraries streamlines resource sharing, ultimately benefiting patrons through expanded access to materials. Saetia *et al.*, (2025) discuss how RFID systems can integrate with mobile devices, enabling patrons to access library services and information seamlessly. Mobile integration fosters innovation and aligns library services with modern technological expectations. Radio Frequency Identification Device (RFID) on effective service delivery extends beyond traditional library functions. From automated transactions and improved queue management to enhanced accessibility services and mobile integration, RFID continues to evolve and shape the modern library experience. As libraries navigate the digital era, RFID remains a cornerstone technology for meeting patrons' dynamic needs and ensuring efficient, user-centric service delivery. (Najmusher, 2024)

As posited by Tanti *et al.* (2024), there are various types of RFID devices used in libraries worldwide, and they provide a high level of security for resources.

Some of such devices include, but are not limited to;

- 1. Active tags:** Active tags transmit a stronger signal, and readers can access them from a distance because they have their own power source. The on-board power source makes them larger and more expensive, so active RFID systems typically work best on large items tracked over long distances. Low-power active tags are usually slightly larger than a deck of playing cards. Active tags can remain dormant until they come within range of a receiver that can constantly broadcast a signal. Because of their on-board power source, active tags operate at higher.
- 2. Passive tags:** Passive tags, on the other hand, are very inexpensive, and new technologies are constantly making them cheaper to integrate into common materials and products. In addition to their low cost, passive tags can also be quite small. Current antenna technology limits the smallest useful passive tag to about the size of a quarter. The larger the tag, the larger the read range. Currently, passive RFID tags contain a small amount of memory. This is too small to hold much more complex information than identification and

historical information. The technology behind RFID is constantly improving, so the amount of information and capabilities of RFID tags will increase over time, allowing RFID tags to eventually contain and transmit more information. In libraries, entry is restricted to registered members only. Members should be provided with bar-coded identity cards, which makes the check very easy. A barcode scanner is installed at the gate of the library, and every person entering the library must place his/her identity card on the scanner. If the person is not a member of the library, the computer will give an alarm and thus restrict the entry, and the identification of unauthorized entry will be identified. (Arfam, 2024)

Radio Frequency Identification Device (RFID), as opined by Yaman *et al.*, (2021), helps in the following.

**(a) Checking System at the Gate:** This is the checking system when a user leaves the library with the issued document. For this purpose, barcode technology can be effectively used, and a terminal can be installed on the gate. Since charging/discharging is done online, the whole database is automatically updated. When the borrower leaves the library, the accession number of the document carried by the user will again be scanned at the

gate. In case of an issued document, the computer will approve the exit. However, if someone is taking out a library material illegally, the system will sound an alarm and issue a message to that effect.

**(b) Identification of Membership:** Library, entry is restricted to registered members only. Thus, a barcode scanner is installed at the entrance, and every person entering the library must place his/her identity card on the scanner. If the person is not a registered member, the system will sound an alarm and restrict entry.

**(c) User Statistics:** Under the manual system, most of the libraries maintain a gate register wherein members are requested to enter his/her details and mark their signature as proof of their visit to the library. It is time-consuming, and users show indifference towards entering their particulars. With the help of this registered time series, classified statistics cannot be given instantly. When users are provided with bar-coded identity cards, all these challenges and difficulties are managed. Thus, user statistics are useful for various purposes, particularly for improvement in library services and control.

**(d) Charging and Discharging of Books:** Due to the normal distribution system, the charging and discharging of books is a time-consuming process, as stamping of due dates and other data entry work must be carried out. But in a bar-coded environment, when a user goes to the circulation counter, the counter staff scans his/her identity card and activates the borrowing status. If the system permits the borrowing facility, the document is scanned to obtain the accession number, and the material is issued to the user without any delay.

**(e) Issue of No Dues Certificate:** No dues certificate is issued when any member leaves the organization/institution, and his/her membership is cancelled, and the library issues a no dues certificate. This process is time-consuming and error-prone in a manual system. In an automated system using barcode technology, the member surrenders his/her identity card, and the counter staff scans it. The automation package will search the database for any document issued in his/her name. If nothing is due, no dues certificate will be printed. Otherwise, the related list of documents is issued to the member.

**(f) Stock Verification & Cross-checking:** Stock verification and cross-checking are very tedious and time-consuming jobs in libraries. During stock verification & cross-checking, the users are restricted from using the library facility. Here, barcode Radio Frequency Identification (RFID) plays a crucial role in modern libraries by enhancing efficiency, security, and user experience. Here's an extensive explanation of its functions according to Krishnamoorthy et al. (2026)

**(g) Book Check-in/Check-out**

RFID tags are embedded in library materials, such as books, DVDs, or other items.

During the check-out process, the RFID reader scans the items, updating the library system with the borrower's information. During check-in, the system registers the returned items, updating their status in the database.

**(h) Security and Anti-theft**

RFID tags have security features that can trigger alarms if a book or item has not been properly checked out. This helps prevent theft and ensures that borrowed items are properly accounted for.

**(i) Multi-Item Processing**

RFID allows for the simultaneous scanning of multiple items. This is particularly useful in libraries where patrons may borrow several items at once, saving time for both users and library staff.

**(j) Inventory Management**

RFID allows for quick and accurate inventory management. Librarians can use handheld or fixed RFID readers to perform regular inventories more efficiently than traditional barcode methods.

**(k) Self-Service Kiosks**

RFID technology enables self-service kiosks where library patrons can check out and return items without the assistance of a librarian. This enhances user convenience and reduces waiting times.

**(l) Data Security and Privacy**

RFID technology in libraries adheres to data security and privacy standards. Personal information is encrypted and protected, ensuring the confidentiality of borrower data.

**(m) Accessibility Services**

RFID can be used to enhance accessibility services. For instance, visually impaired users can benefit from RFID-enabled audio labels, helping them identify and locate items in the library. Radio Frequency Identification Device (RFID) technology in libraries streamlines operations, enhances security, and improves the overall user experience, making it a valuable tool for modern library management. (Dasari and Mojada 2025)

All these can be used in one way or another to secure library resources and deliver efficient services to users.

**Research Methodology**

This study adopted a correlational research design. The area of the study is universities in Nigeria. On collection of the filled instruments, which were shared and filled electronically through emails and WhatsApp platforms of various Nigerian Library association chapters across Nigeria. The entries collected constituted 171 para-professional library staff and 277 Librarians

across various universities in Nigeria, totaling 448 respondents. The instrument for data collection was a researcher-designed questionnaire titled "Security management and effective service delivery questionnaire" (SMESA). The questionnaire received was analyzed using mean and standard deviation to answer research questions and Pearson Product-Moment Correlation (PPMC) to analyze the hypothesis at a .05 significance level.

**Results and Discussion**

***Answering Research Questions and Testing Hypotheses***

What is the relationship between CCTV and effective service delivery in Nigerian university libraries?

**Table 1: Mean, standard deviation, and PPMC scores answering the research question and testing the hypothesis on the relationship between CCTV and effective Library service delivery. n= 448**

| Variables            | X     | SD   | r   | Decision    |
|----------------------|-------|------|-----|-------------|
| CCTV                 | 11.77 | 6.47 |     |             |
|                      |       |      | .84 | Significant |
| Strong relationship  |       |      |     |             |
| Effective serv. Del. | 38.00 | 7.28 |     |             |

**Significant at .05 alpha level, df=446, crit. = .21**

The result presented in Table 1 above shows a mean of 11.77 and a standard deviation of 6.47 for CCTV, a mean score of 38.00 and a standard deviation of 7.28 for effective service delivery, which is higher than the cut-off points of 2.50, revealing a strong, significant relationship of .84 between CCTV and effective service delivery in Nigerian University Libraries.

The results showed a significant relationship between CCTV and effective service delivery in Nigerian university libraries. The conclusion is drawn from the fact that the staff members work and use the device to curb security threats in the library. This finding is in tandem with the work of Singh (2024), who noted that CCTV instills a sense of safety among staff as it ensures that the environment is safe and work is carried out effectively. It is also in tandem with the assertion of Brown (2019), who noted that CCTV ensures surveillance and aids in monitoring the movement of library resources and library users in all their activities in the library. As such, it saves library resources and thereby aids effective service delivery in university libraries.

### **Research Question Two**

What is the relationship between Radio Frequency Identification Device (RFID) and effective service delivery in Nigerian university libraries?

**Table 2: Mean, standard deviation, and PPMC scores on answering the research question and testing the hypothesis of the relationship between RFID and effective service delivery. n= 448**

| Variables            | X     | SD   | r   | Decision    |
|----------------------|-------|------|-----|-------------|
| RFID                 | 11.10 | 6.47 |     |             |
|                      |       |      | .53 | Significant |
| Effective serv. Del. | 38.00 | 7.28 |     |             |

**Significant at .05 alpha level, df=446, crit. = .21**

The result presented in Table 2 above shows a mean of 11.10, and a standard deviation of 6.47 for RFID, a mean score of 38.00, and a standard deviation of 7.28 for effective service delivery; these are higher than the 2.50 mark, which shows a strong, significant relationship of .53 between RFID and effective service delivery in Nigerian University Libraries.

The results revealed a significant relationship between RFID and service delivery in Nigerian university libraries. The conclusion is drawn from the fact that the libraries have installed the device in the resources and buildings, which helps prevent missing information resources in the library. Some staff members work and use the device to curb security threats in the library. This finding is in tandem with the work of Xiaoyu (2024), who noted that RFID ensures that information resources are safe and not taken out of the library indiscriminately

and without permission. Also, Akhtar et al (2025) support the findings of the study by noting that RFID enables effective check-in and check-out of users, thereby helping in service delivery.

### **Recommendations**

1. CCTV should be installed in all libraries and at strategic points in the libraries
2. Certain Library staff should be trained on the usage and interpretation of the CCTV footages
3. RFID should be installed at library doors, windows, and all exits; it should equally be inserted in library resources like books, systems, etc.
4. Entry and exit of users and staff of the library should be regulated with the use of Card readers and an automatic turnstile gate

### **Conclusions**

The research underscores the critical role of security management systems in effective service delivery in Nigerian university libraries, serving as a roadmap for improving library operations and promoting academic excellence. From the results, the study therefore concluded that there is a significant relationship between Closed Circuit Television (CCTV) and Radio Frequency

Identification Device (RFID) on Effective Service Delivery in Nigerian university libraries

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