SciencePG
Science Publishing Group

Research Article

Overcoming Challenges in Implementing Electronic Security Systems at Mzumbe University Library: Strategic Pathways for Improvement

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Abstract

The study surveyed the challenges facing Mzumbe University Library in using ESSs with three specific objectives: to analyze the types of ESSs used at MU, to evaluate the effectiveness of ESSs, and identify challenges facing MU Library in using ESSs. The study adopted qualitative and quantitative data collection approaches, and the questionnaire guide was disseminated to 41 respondents who were library staff members. Purposive sampling technique was used to select respondents. Data were analyzed using Statistical Package for Social Sciences (SPSS) 22 program version 20 and Microsoft Excel. The results of the study found that there are three types of ESSs used at MU Library: Theft detection, smoke detection, and closed-circuit television (CCTV) cameras. Also, the study found the challenges facing MU Library in operating ESSs which are personal, technical, management, and financial factors. The study recommended that the university management should consider the allocation of enough funds for the systems maintenance, repair, and facilitating training programs for library staff concerning ESSs. In addition, the study also recommended the enforcement of policies showing a clear penalty for anyone found guilty of theft or damage of any library material even if he/she is a library staff.

1. Introduction

Mzumbe University Library acts as the heroic center of academic and research activities, supplying different information needs of students, faculty and researchers. MU was established with the idea of fostering intellectual growth and scholarly pursuits. The library houses a vast collection of print and electronic resources covering various disciplines. However, as the repository of invaluable knowledge continues to expand, so do the challenges associated with its protection and accessibility. Traditionally, libraries have relied on physical security measures such as surveillance cameras, security guards and access control systems to safeguard their collections. While these measures offer a degree of protection against theft and vandalism, they often fall short in addressing the evolving threats posed by the digital age. The proliferation of digital resources, coupled with the rise of cybercrime and information breaches, underscores the imperative for a more sophisticated security paradigm. In response to these challenges, many academic institutions, including Mzumbe Uni-

versity, are turning to electronic security systems as a proactive solution to fortify their defenses.

Electronic security systems encompass a diverse array of technologies, including Radio Frequency Identification (RFID), Closed-Circuit Television (CCTV), biometric authentication, and intrusion detection systems, among others. These systems offer several advantages over traditional security measures, including real-time monitoring, rapid response capabilities, and the ability to track and trace assets seamlessly. Despite the potential benefits, the adoption of electronic security systems poses a myriad of challenges for libraries, including technical complexities, financial constraints, and user acceptance issues. Integrating these systems within the existing infrastructure requires careful planning, resource allocation, and stakeholder engagement to ensure successful implementation. Against this backdrop, this study explores the application of electronic security systems at Mzumbe University Library, examining the challenges encountered in this endeavour and proposing strategies to overcome them. The study aims to facilitate informed decision-making and foster a safer and more secure environment for knowledge dissemination and scholarly pursuits by delving into the intricacies of integrating these systems within the library's operations.

2. Background of the Study

Library is reflected as the backbone of any higher learning institution where all activities like learning, teaching, research and consultancy depend on the available materials. In any higher learning institution, library is important because it helps users to get information resources for reading, and report writing and enhances the academic performance of students [1]. To meet this significant task in the academic environment, the security of the information resources should be prioritized as theft and vandalism have been worldwide problems since ancient times [2].

Security systems in libraries began to be used in ancient times, immediately after the discovery of libraries in the world in the 7th Century B.C. to avoid the loss and damage of information resources [3]. During that time World security was not stable due to the occurrences of wars and other destructive issues like fire, and the reference is the burning of the Library of Alexandria in 1876 and the Library of Congress in 1812 [4]. Because of these mutilations, libraries were using different measures including stopping users from entering the library with bags and heavy coats and using security guards and library staff to search users when entering the library building [5]. However, it was found that securing library materials from theft and mutilation could not be achieved effectively by using security guards, library staff, and other manual methods due to the increased number of library users and more services that are being offered in the library [6]. Throughout history, libraries have grappled with the challenge of safeguarding their precious information resources, dating back to their

inception in the 7th Century B.C. Amidst a backdrop of global instability, including periods of war and catastrophic events such as the burning of the libraries, security concerns became paramount. Early measures included restricting entry with bags and heavy coats and relying on security guards and library staff for manual searches upon entry.

As library services expanded and user numbers grew, the inadequacies of manual security measures became increasingly apparent. Relying solely on guards and staff proved insufficient to combat the rising threats of theft and damage. Consequently, libraries began exploring alternative solutions to bolster security and safeguard their invaluable collections. With the advent of technology, Information and Communication Technologies (ICTs) emerged as a viable alternative for addressing these challenges.

To fortify the security of library resources, libraries turned to ICT electronic systems, such as building and security gates like "3M," access control systems, electronic surveillance cameras (CCTV), Radio Frequency Identification (RFID), smoke detection systems, and movement detectors. This transition marked a significant evolution in library security practices, leveraging advanced technological solutions to enhance protection. The utilization of ICT security systems in libraries dates back to ancient times across various regions worldwide, reflecting a longstanding commitment to ensuring the safety of information resources. This historical perspective underscores the enduring importance of innovation and adaptation in the pursuit of library security and preservation.

In response to escalating incidents of theft and damage of information resources, the adoption of ICT security systems in African libraries gained momentum. Early initiatives in Tanzania were hampered by limited technological infrastructures, necessitating reliance on manual security measures. These included traditional lock and key systems, security guards, employee patrols, installation of grill windows, and distinct entry and exit doors. However, as technology advanced and became more accessible in Tanzania, libraries increasingly turned to electronic security systems to bolster protection. In Tanzania, this transition was the integration of CCTV cameras, radio frequency identification (RFID), alarm systems, theft detection machines, and smoke detectors into library security frameworks [7] (Vennam *et al.*, 2021). Such technological advancements signify a shift towards more robust and sophisticated security solutions, reflecting the evolving landscape of library security practices in Africa.

Integration of ESSs at Mzumbe University Library commenced in 2001, marking a pivotal transition from manual security protocols. Before this, the library relied on traditional security measures including lock and key systems, security guards, employee patrols, grill windows, and distinct entry and exit doors to safeguard its materials from theft and damage. However, with a growing user base, these manual security systems proved inadequate in effectively protecting the library's resources. Consequently, Mzumbe University Library made the strategic decision to implement electronic

security systems. These included the installation of theft detection machines, smoke detector machines and CCTV cameras, reflecting a proactive approach to addressing evolving security challenges and ensuring the preservation of its valuable collections.,

Despite Mzumbe University's utilization of Electronic Security Systems (ESSs) for library material security, the implementation process faces a myriad of undisclosed challenges originating from diverse sources. This study aims to uncover and analyze the obstacles hindering the effective use of ESSs at Mzumbe University Library. By addressing these challenges, the study holds significant value in assisting library staff at MU in navigating the complexities associated with ESSs application. The insights garnere from this study will not only inform MU Library authorities in devising tailored solutions to mitigate the identified challenges but will also lay the groundwork for future research endeavours on a broader scale. Additionally, the recommendations stemming from this study will provide a solid foundation for comparative studies and contribute to the existing body of literature on library security services. Given the dearth of documented empirical evidence in this area, the imperative to conduct this study at Mzumbe University becomes apparent. By investigating the extent of security threats to the library's collection, this research seeks to develop strategies aimed at enhancing the efficacy of ESSs application within the library, thereby fortifying the protection of its valuable materials.

Mzumbe University Library decided to use ESSs to protect library material after the increasing number of users whereby library staff could no longer manage to monitor them through traditional security ways. However, the option seems to be ineffective due to several factors that disturb the application of ESSs. To understand factors that make application of ESSs ineffective at Mzumbe University Library the study was guided by the following objectives:

1) To identify ESSSs used by Mzumbe University Library to protect materials in their collections;
2) To evaluate the effectiveness of ESSs used by Mzumbe University Library to protect their library materials;
3) To analyze challenges hindering Mzumbe University while using ESSs to protect library materials and electronic security systems.
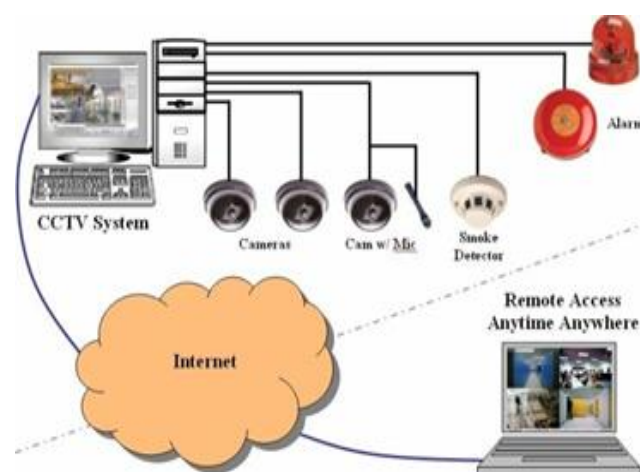
3. Review of the Literature

3.1. Types of ESSs Used by Libraries for Security Purposes

Electronic security systems are the equipment that perform operations like access control and secure library materials [8] (Nath, 2021). An electronic security system is installed, tested and used in different academic libraries to avoid theft and damage [9]. Libraries use numerous security systems to protection their resources and ensure a safe environment for both users and staff. These systems comprise radio frequency identification (RFID) systems, closed-circuit television (CCTV) surveillance, biometric systems, burglar alarms, perimeter alarms, smoke and flame detectors, and security sensors. Together, they safeguard personnel, collections, equipment and facilities from threats like theft, vandalism, physical attacks, and accidents, without conceding the library's primary mission of providing easy and accessible services [10]. A well-functioning security system ensures the safety of all resources and individuals within the library while maintaining its user-friendly atmosphere.

3.1.1. Closed-circuit Television, also Known as Video Surveillance Systems

A surveillance system has been broadly embraced or implemented around the world, due to its flexibility, affordability, portability and fascinating features. In a recent report, the term CCTV has been demarcated as video cameras that transfer signals to a specific place on a limited set of monitors. It differs from broadcast television, as the signal is not openly transmitted, although it may use point to point, point to multi-point or mesh wired or wireless links [11]. Closed-circuit television (CCTV) application has conveyed innumerable benefits to the users, as it is also considered a type of situational crime prevention strategy, in which levels of formal surveillance are increased within a target area [12]. Integrated CCTV programs might increase the reporting of negligible delinquencies that were not informed before.

Source: https://www.elprocus.com/electronic-security-system/2022
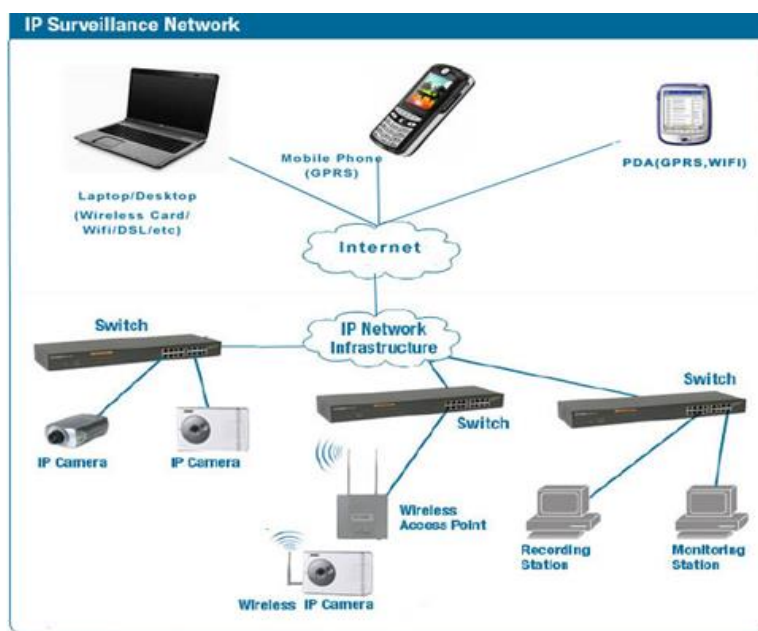
Figure 1. CCTV Surveillance System.

3.1.2. IP Surveillance System

The IP-Surveillance system is intended for security purposes, and it allows clients to manage and record video/audio over an IP PC system/networks, such as a LAN or the Internet. In a nutshell, the IP-Surveillance system consists of a Polaroid system switch, and a computer for reviewing, overseeing, and

recording video/audio, as illustrated in Figure 2. In an IP-Surveillance system, digitized video/audio streams can be delivered to any location, even as far as the eye can see, using

a wired or remote IP system, allowing video management and recording from any location having system/network access.
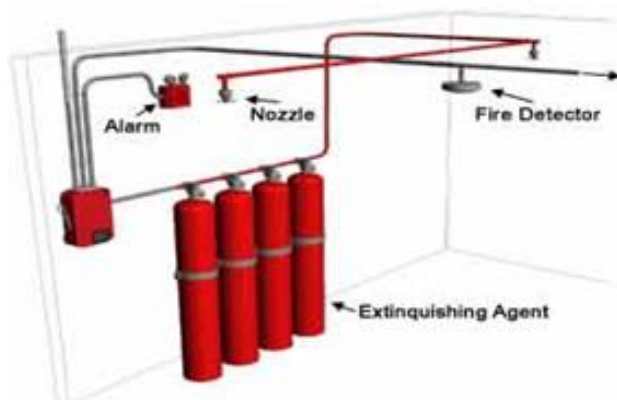

Source: https://www.elprocus.com/electronic-security-system/ 2022.

Figure 2. IP Surveillance System.

3.1.3. Detection and Alarming Systems

There are various types of sensors available for detection, but their use is solely dependent on the application requirements, such as home automation, warehouse fire detection, and intrusion warning. In the library, the system is used to get a quick alert for any fire emergency. It helps the library to keep safely its essential resources from any harmful burn by releasing the gases rapidly. Without human intervention, everything can be kept under control in such an emergency and safe from significant loss.

Source: ttps://www.elprocus.com/electronic-security-system/ 2022.

Figure 3. Detection and Alarming Systems.

3.1.4. RFID Electronic Security System

By using read/write tags in combination with exit readers, libraries will be able to use the RFID security system for theft detection. The security bit can be deactivated at checkout. Then, the exit readers will not react to the security bit.
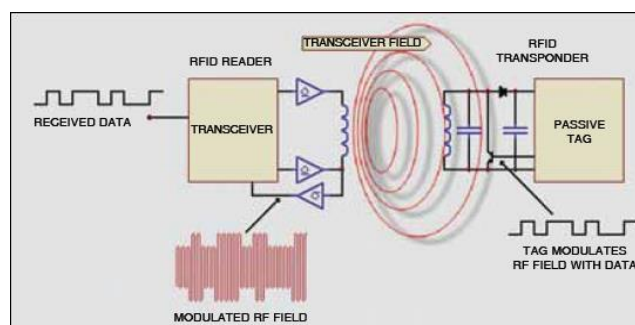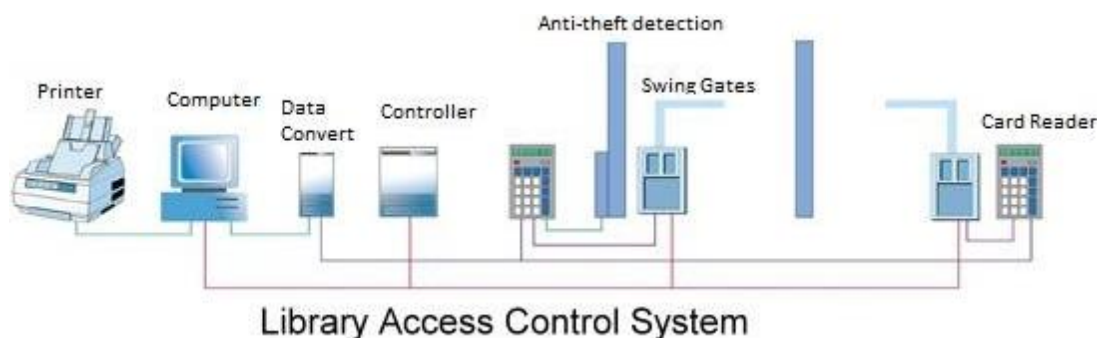

Figure 4. RFID.

Sources
https://www.electronicsforu.com/electronics-projects/hardware-diy/
rfid-based-security-system 2022

This is among of sorts of ESSs that libraries use to protect materials in their collections. The system allows for secure access to a facility or another method of entering or controlling an entrance. It also serves as a time-keeping mechanism,

making it extremely beneficial for security purposes [13]. This access system is divided into categories based on user credentials and belongings; the method of access used by users differentiates the system. To control access, users can use various credentials such as pins, biometrics or smart cards. In contrast, the system can utilize all of a user's goods, al-lowing for the inclusion of numerous access constraints. In the library, this system is used to restrict access to the library to authorized users only and helps to prevent theft of books. Likewise, it helps the librarian to centralize monitoring and control of multiple devices and locations, and sends messages to the Interactive Control Unit for the patron.

Source: https://www.google.com/search?q=library+access+control+system&tbm/

Figure 5. Access Control System.

3.1.5. Intruder Alarms and Detector

This is the primary unit that contains a dedicated hous-ing/box together with a backup/buffer battery along with the power supply, sensors, keypads, anti-tamper circuits, line connection for data transfer, and also detects any faults in the wiring. The system collects information from, in the event of an irregularity, switches on optical and acoustic signaling.

Source: https://www.google.com/search?q=intrusion+detection+system&tbm/...)2022

Figure 6. Intruder Alarms and Detector.

3.2. Effectiveness of Library Electronic Security Systems

The efficacy of ESSSs in libraries is largely well-documented in the literature. RFID systems have been instrumental in reducing material theft and improving inventory management. RFID tags, combined with security gates, create an efficient mechanism to prevent unauthorized removal of library materials [14]. Additionally, RFID systems allow libraries to streamline operations, enhancing overall security without negatively impacting user experience [10]. Biometric systems, like fingerprint or retina scanning, have also been effective in regulating access to high-value collections and sensitive areas in libraries [1]. These systems ensure that only authorized personnel or users can access specific parts of the library, reducing the risk of theft or damage to valuable materials.

The effectiveness of electronic security systems in the library however, depends on various issues including experts' skills, power supply, and regular maintenance of library electronic security systems [15]. If the electronic security system performs its work effectively and efficiently it leads to the reduction of theft and book mutilation and vandalism. It also reduces illegal borrowing of reading materials and puts an end to non-return of borrowed reading materials. Different studies explain about the effectiveness of library electronic security systems. Installation of an ESSS should equally go directly with its ability to perform its work because most libraries continue to face damage and theft of reading materials as their electronic security systems do not work properly [10] (Kombu, 2020). This implies that electronic security systems need to be operated effectively to minimize theft and damage of information resources. Another study by [16] suggests that the better way to deal with security in academic libraries is to embrace electronic security systems which will better ensure effective security of library materials from theft, mutilation or other forms of crime.

3.3. Challenges Facing Academic Libraries in Using Electronic Security Systems

Most libraries in the world have installed and used ESSs to curb theft and mutilation of library materials. Despite their advantages, ESSSs are similarly accompanied by numerous challenges to libraries. One mutual matter is the great cost of installing and maintaining these systems. Budget constraints often limit libraries' ability to implement comprehensive security solutions, particularly in resource-constrained environments [17]. RFID systems for instance, require significant upfront investment in tags, gates and readers, which may be difficult for smaller libraries to afford. However, various factors deter library staff from applying these systems. These factories may emanate from technological, personnel, financial and organizational challenges: Different studies have been carried out that explain the challenges that face academic li-

braries in using electronic security systems [10]. The operation of ESSs is affected by power supply, lack of awareness of the importance of electronic security systems, lack of training on the operation of the electronic security systems, and enough budget [18]. Another challenge is the complication of merging diverse security systems. For example, merging CCTV, RFID and biometric systems into a cohesive security strategy can be technically demanding, requiring professional staff to operate and maintain the systems [19]. In addition, the rapid advancement of technology means that libraries must frequently upgrade their systems to stay current, adding to long-term costs [20, 21]. Confidentiality anxieties similarly arise with using ESSSs in libraries, mostly concerning CCTV surveillance. Although CCTV is active in monitoring activities and averting theft, it may be seen as interfering by library patrons who value their privacy. This implies that libraries must carefully balance security with the need to create a welcoming and comfortable environment for users and patrons.

4. Methodology

A descriptive survey research design was adopted for this study which was carried out only at Mzumbe University Library's Main Campus in Morogoro, Tanzania. The sample of the study comprised 41 library staff. The purposive sampling technique was used to select respondents as they all use the systems to offer services to users and to protect library collections. The instruments used to collect data were an observation checklist and a structured questionnaire. The data collected were presented based on the research questions that guided this study and descriptive statistics and mean were used to analyze the data.

5. Results and Discussions

5.1. Demographic Information of Respondents (No. = 41)

This section describes the demographic variables of the respondents. It comprises respondents' sex, age, designation, departments and their experience. The findings are as exposed in Table 1.

Table 1. Respondents' Demographic Characteristics (No. Respondents =41).

Sex	F	%
Male	32	9
Female	19	68
Total	41	100

Distribution of Respondents by Age

Sex	F	%
21-29	0	0
30-39	23	56
40-49	11	26
50-59	7	17
Total	41	100?
Distribution of Respondents by Designation		
Library Assistant I	8	20
Library Assistant II	11	27
Senior Library Assistant	1	2
Principal library	1	2
Assistant Librarian	4	10
Library officer	9	22
librarian	7	17
Senior Librarian	0	0
Total	41	100
Staff working experience		
1-9 years	15	37
10-19 years	14	34
20> years	12	29
Total	41	100

Source: Data collection 2022

With 67% of the workforce being female and a significant portion being younger (20-29 years old), this could impact the implementation of electronic security systems in terms of technological adaptability. Younger professionals are often more adaptable to new technologies, which could be beneficial for the successful adoption of these systems. However, any potential gender-related attitudes or preferences for technology adoption should be carefully considered to ensure smooth implementation. Thus, gender-sensitive training and capacity-building initiatives could be introduced to ensure that both male and female staff feel equally empowered to handle and manage the new security systems.

The findings also indicate that 56% of respondents are between 20-29 years old and that a significant portion has 1-9 years of experience suggesting that the workforce may be open to learning and adapting to new technologies such as electronic security systems. However, lack of representation in the 30-39 age group could point to a gap in mid-level leadership, which may slow decision-making or effective coordination during the implementation process. The library therefore could invest in leadership development programs for younger staff and middle-management roles, ensuring that these employees can effectively manage and oversee the transition to electronic security systems.

The fact that most respondents hold lower-level positions (Library Assistants II and I) suggests that the workforce may lack extensive decision-making power or authority over new implementations. Senior positions such as Senior Librarians, are unfilled, which could lead to delays in decision-making or gaps in strategic oversight during the implementation of electronic security systems. Since there is a limited number of higher-level positions such as Librarians and Assistant Librarians, it's essential to foster a collaborative environment where staff from different levels are involved in the decision-making process for the security systems. This can enhance engagement, streamline communication, and ensure that all staff members, regardless of their rank, understand the importance of the systems and their role in its success.

The analysis shows that there is a broad range of working experience among staff, from 1-9 years to 20+ years. This suggests a need for tailored training programs, as the more experienced staff may require more intensive training to adjust to electronic security systems compared to younger or newer staff members who might be more familiar with recent technological advancements. Thus, implementation should include structured training sessions that cater to varying levels of technological proficiency. Mentorship programs, where more technologically adept staff assist others, could facilitate smoother transitions. Additionally, involving experienced professionals in the decision-making process for selecting and configuring these systems will ensure that their practical knowledge is taken into account.

The absence of Senior Librarians in the workforce could represent a leadership gap that may hinder the smooth implementation of electronic security systems. This absence could result in unclear oversight, strategic direction, or responsibility, leading to delays or miscommunication during the transition to new security technologies.

5.2. Types of Electronic Security Systems Used in the Library

The findings indicate that MU Library has adopted only three main types of ESSs: theft detection machines (68%), smoke detectors (20%), and CCTV cameras (12%). Other more advanced or comprehensive systems such as access control systems, RFID, electronic recording, and network/server security systems, are not in use.

This reliance on theft detection machines, while effective to some degree, suggests that MU Library is underutilizing the full range of available electronic security systems. The absence of RFID systems, which offer enhanced efficiency in inventory management and security, points to missed opportunities for improving overall security and operational efficiency. Mzumbe University Library should consider expanding its adoption of ESSs to include modern technologies like RFID and access control systems, which provide more

robust protection and easier management of library collections. By doing so they could address challenges like theft, mutilation, and unauthorized access more comprehensively.

A majority (68%) of respondents emphasized the frequent use of theft detection machines to prevent the unauthorized removal of materials from the library. While this system appears to be effective in combating theft, it may not address other security concerns such as network security, unauthorized access to digital resources, or smoke/fire hazards.

Focusing mainly on physical theft suggests that MU Library is prioritizing the protection of tangible collections but may be overlooking other forms of security risks, particularly in the context of digital transformation. As libraries increasingly digitize their collections and provide access to online databases, network security, and electronic recording systems become critical for safeguarding digital assets. In addition to strengthening physical security, MU Library should explore the implementation of network and server security systems to protect digital resources from cyber threats. These systems can prevent unauthorized access to digital materials and ensure the integrity of electronic records, which is becoming increasingly important in modern library environments.

The fact that RFID electronic security systems are not used at MU Library is a significant observation. RFID systems are widely regarded as more efficient and user-friendly compared to traditional theft detection systems, offering benefits such as easier inventory management, faster check-in/check-out processes, and enhanced tracking of library materials. Absence of RFID systems at MU Library could be a result of budget constraints, a dearth of technical expertise, or organizational reluctance to adopt new technology. This deficiency may limit the library's ability to modernize operations, track resources more professionally, and offer better services to users.

The library ought to explore the feasibility of introducing RFID technology, which could not only improve security but also enhance operational efficiency. A cost-benefit analysis should be conducted to assess how RFID can provide long-term savings by reducing staff workload, enhancing inventory accuracy, and minimizing losses.

CCTV cameras make up only 12% of the electronic security systems in use. This suggests that they are not extensively relied upon for monitoring library premises. CCTV provides real-time surveillance and can act as both a deterrent and a tool for investigating incidents such as theft, vandalism, or other misconduct within the library. Underutilization of CCTV may be due to the limited coverage of the cameras, inadequate staff to monitor the footage, or budgetary constraints. Since CCTV systems offer a broad scope of surveillance, underutilizing them could leave certain areas of the library vulnerable to security breaches. In consequence, MU Library could enhance the security of its collections and facilities by increasing the deployment of CCTV cameras, particularly in high-traffic areas, rare collection sections, and any other vulnerable spots. Additionally, staff training in surveillance monitoring can help ensure that the cameras are used effectively in detecting suspicious activities.

Equally, the use of smoke detectors by 20% is a positive step in ensuring fire safety. However, smoke detectors alone may not be sufficient in providing comprehensive fire protection. Without integrated fire suppression systems, the library remains vulnerable to potential fire damage. While the presence of smoke detectors shows some attention to fire risks, the absence of more advanced fire protection measures such as automated sprinklers or fire suppression systems, leaves collections susceptible to damage in the event of a fire. Given that libraries often house valuable and irreplaceable materials, comprehensive fire safety systems are essential. This enlightens that MU Library should consider upgrading its fire safety measures to include fire suppression systems, which can automatically extinguish fires before they cause significant damage. This could help to preserve physical collections and ensure the safety of patrons and staff.

Lack of certain security systems (e.g., access control, RFID, electronic recording, network security) could be due to budgetary constraints or a lack of technical expertise in implementing and managing these systems. The costs associated with procuring and maintaining advanced electronic security systems might present significant challenges to the library.

Table 2. Types of Electronic Security Systems Used in the Library (No.=41).

Electronic Resources Instilled and Used at MU Library	More than 6 yrs	More than 10 yrs	Not sure	Not at all	Mean
	Fq & %	Fq & %	Fq & %	Fq & %	
Smoke detector machine	7 (17)	18 (44)	16 (39)	0 (0)	25.0
Surveillance machine	5 (12)	12 (29)	17 (42)	7 (17)	20.5
control systems	0 (0)	4 (10)	28 (68)	9 (22)	16.0
RFID electronic security system	0 (0)	0 (0)	35 (85)	6 (15)	17.5
Theft detect machine	5 (12)	13 (32)	23 (56)	0 (0)	30.0

Source: Data collection 2022

Data reveals the mean scores for the different ESSs used at MU Library: theft detection machines (30.0), smoke detectors (25.0), RFID electronic security systems (17.5), and access control systems (16.0). This suggests that while all of these systems are present, the most frequently used ones are theft detection machines and smoke detectors.

The higher usage of theft detection machines and smoke detectors indicates a focus on physical security measures. These systems are heavily relied upon to safeguard library materials from theft and fire-related data collection; 202 damage. However, the relatively lower mean scores for RFID systems and access control systems highlights underutilization of more advanced and versatile technologies that could offer broader security coverage and efficiency. The library should look into increasing usage and integration of RFID and access control systems. These systems can significantly improve inventory management, track the movement of materials, and control access to restricted areas, providing a more holistic approach to security beyond just theft prevention. A more balanced usage of all available ESSs could enhance overall operational efficiency and security.

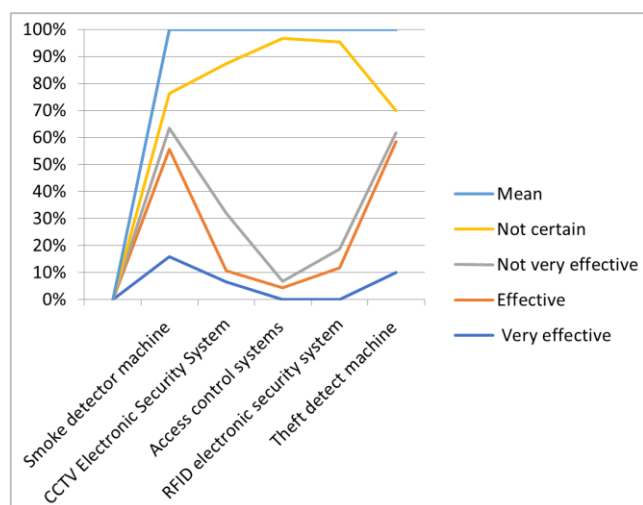## 5.3 Duration of the Library Use of ESSSs

Figure 7. Duration of the Library Use of ESSs to Protect.

The analysis also indicated that MU Library has been using these security systems for over a decade, implying that the systems have played a key role in preventing theft and protecting materials during that time. The long-term use of these systems suggests that MU Library has gained valuable experience in managing ESSs and integrating them into daily operations. This indicates institutional familiarity with the systems, which is a strength in terms of maintaining continuity and operational security. However, it also suggests potential challenges related to aging technology or systems that may require upgrading to meet modern standards. While the

Library has benefited from its long-term use of ESSs, it is essential to regularly evaluate the performance and condition of these systems. Conducting periodic technology assessments and upgrading systems that are outdated or less efficient can ensure that the library remains equipped with the latest security technology to address emerging threats. This would also support efforts to digitize and modernize the library's infrastructures.

The relatively low mean scores for RFID (17.5) and access control systems (16.0) indicates that these systems are not being fully utilized, even though they are installed at the library. This underutilization suggests either lack of operational focus on these systems or insufficient training for staff to maximize their potential. The RFID and access control systems are valuable tools for securing both physical and digital resources. Underutilization of these systems could indicate missed opportunities for improving efficiency in library management, enhancing user experience, and providing advanced protection for sensitive or high-value collections. It may also reflect a lack of investment in staff training to fully leverage the benefits of these technologies.

Although the library has been using ESSs for over 10 years, the low scores for some systems suggest that certain technologies might not have been fully adopted or implemented to their maximum potential. This may be due to budgetary constraints, lack of technical expertise, or limited institutional priority for these systems. The lower adoption of RFID and access control systems may indicate challenges in adapting to newer technologies or expanding their use. The library may face hurdles such as budget limitations, insufficient technical support, or a lack of strategic focus on upgrading its security infrastructures. Over time, this could hinder the effectiveness of its overall security strategy.

The library should prioritize conducting a cost-benefit analysis to explore the possibility of increasing its investment in advanced technologies like RFID and access control. Furthermore, collaboration with external vendors for technical support or seeking external funding could help bridge the gap between current usage and optimal performance. Strengthening technical expertise through capacity-building initiatives would also facilitate better adaptation of these technologies.

The fact that theft detection machines and smoke detectors are the most frequently used systems suggests that MU Library's current security framework is primarily reactive, aimed at preventing theft and fire damage after they occur. Since the library's reliance on traditional security systems (theft detection and smoke detectors) may limit its ability to proactively address other security threats, such as unauthorized access to digital materials or cyber threats. As libraries increasingly rely on digital resources and electronic records, the security framework needs to expand to include network security, data encryption, and more advanced access control measures to protect both physical and digital collections.

To future-proof its security infrastructure, the library

should consider increasing its security systems to include network and server security, as well as more robust data protection measures. By doing so, the library can ensure that its

security strategy aligns with a wider drift of digital transformation in library services, providing comprehensive protection for both physical and digital assets.

Table 3. Effectiveness of Electronic Security Systems at MU Library (No. 41).

Effectiveness of Electronic Security Systems	Very effective	Effective	Not very effective	Not certain	Mean
	Fq & %	F & %	F & %	Fq & %	
Smoke detector machine	10	25	5	8	15.0
CCTV Electronic Security System	3	2	10	26	6.0
Access control systems	0	2	1	41	1.5
RFID electronic security system	0	05	3	33	2.0
Theft detect machine	6	29	2	5	18.0

Source: Data collection 2022.

The mean score results show varying levels of effectiveness for the different ESSs in use at MU; theft detection machines: 18.0, smoke detector machines: 15.0, CCTV electronic security systems: 6.0, RFID electronic security systems: 2.0 and Access control systems: 1.5. This implies that theft detection machines and smoke detectors are the most effective systems in place, scoring relatively high in the mean scores. However, the low scores for CCTV (6.0), RFID (2.0), and access control systems (1.5) suggest that these systems are underperforming or ineffective in protecting library materials and managing access. This calls that the Library should focus on enhancing the functionality and utilization of CCTV, RFID, and access control systems. Increasing the effectiveness of these systems would help fill the gaps left by the reliance on basic security systems like theft detection machines. For instance, improving RFID effectiveness could enable more efficient tracking of materials, while properly functioning CCTV cameras would provide comprehensive surveillance and monitoring.

The findings suggest that some of the installed ESSs, particularly access control systems and RFID systems are ineffective. The low scores for these systems point to their inability to fully prevent unauthorized access or track library materials, which can leave the collections vulnerable to theft or misuse. Ineffective systems, such as access control and RFID, increase the risk of materials being removed or tampered with without detection. This poses a serious threat to the library's ability to safeguard its collections. Abubakar & Aduku (2016) also highlighted that the ineffectiveness of ESSs is a common challenge in libraries, especially in developing countries, where funding and technical expertise may be limited.

To mitigate these challenges, MU Library should prioritize repairing or replacing outdated or ineffective systems. It may also be necessary to invest in staff training to ensure that all

personnel are capable of using these systems to their full potential. Additionally, regular maintenance checks should be conducted to prevent systems from falling into disrepair, as seen with the CCTV cameras, which are not functioning in many areas.

The study reveals also that the CCTV cameras at MU Library do not function in many areas, which is a significant security concern. CCTV systems are essential for monitoring real-time activity and deterring theft, vandalism or unauthorized access. The non-functioning CCTV cameras represent a major weakness in MU Library's security infrastructures. Without effective surveillance, it becomes difficult to monitor activities within the library, leaving both the collections and the users vulnerable to security threats. This gap in security highlights the challenges of maintaining complex systems like CCTV in a resource-constrained environment. Immediate action should be taken to repair or replace the non-functioning CCTV cameras. Furthermore, it would be beneficial to expand CCTV coverage to all critical areas of the library, including high-traffic sections, rare book collections, and staff-only areas. Properly functioning cameras provide a visual deterrent against theft and misconduct while offering evidence in the event of an incident.

Equally, the low mean scores for RFID (2.0) and access control systems (1.5) indicate that these systems are largely ineffective at MU Library. RFID systems are typically used to streamline inventory management and secure materials from unauthorized removal, while access control systems regulate entry to sensitive areas. Underperformance of RFID and access control systems suggests either technical issues or lack of proper implementation and usage. RFID systems, if properly used, can significantly reduce theft by tracking every movement of library materials, while access control systems can prevent unauthorized individuals from entering restricted

areas. Therefore, the library needs to assess the technical condition of these systems and investigate why they are not functioning effectively. If necessary, upgrading to more modern versions of these systems could improve performance. Additionally, staff training on how to operate and maintain RFID and access control systems is essential to fully leverage their benefits.

An overall effectiveness of the installed ESSs at MU Library is mixed, with some systems working well (e.g., theft detection machines and smoke detectors) while others (e.g., CCTV, RFID, and access control) perform poorly. This uneven performance leaves gaps in the security infrastructures that could expose the library to theft, unauthorized access, and potential damage to materials. The findings underscore the importance of having a well-rounded and fully functional security system. While certain systems like theft detection machines are effective in preventing unauthorized removal of materials, they are not sufficient on their own to protect against all security risks. The library's failure to utilize more advanced systems (e.g., RFID, access control, and CCTV) to their full potential leaves it vulnerable to both physical and digital threats. MU Library should embrace a universal approach to security that balances physical theft prevention with digital asset protection and access control. This can be achieved by upgrading and maintaining underperforming systems, ensuring that CCTV is operational, adequately covering all areas of the library, increasing the usage and functionality of RFID and access control systems to track materials and manage access efficiently, developing standard operating procedures (SOPs) for staff to manage these systems and ensure that they remain effective over time.

Thus, refining the efficiency of Electronic Security Systems (ESSs) at MU Library directly facilitates understanding of Sustainable Development Goals (SDGs), particularly SDG 4, SDG 9 and SDG 16. By safeguarding educational resources through enhanced RFID and access control systems, the library can safeguard equitable access to learning materials while fostering a safe and conducive learning environment with fully functional CCTV cameras. Upgrading these systems also aligns with SDG 9 by updating infrastructures, displaying technological advancements in library management, and maintaining rare and valuable collections vital for research and innovation. Furthermore, strengthening accountability through reliable surveillance systems and ensuring equitable access to library resources reflects the principles of SDG 16. To achieve these outcomes, MU Library should replace outdated systems like RFID and CCTV with modern alternatives, expand surveillance coverage to critical areas, train staff to maximize system functionality and establish standard operating procedures for effective management. Additionally, collaborating with stakeholders to secure funding and technical expertise will ensure sustainable improvements, positioning the library as a model for innovation, resource management, and equitable access in support of global development goals.

6. Observation Findings

The observations made during the study at Mzumbe University Library provided valuable insights into the effectiveness of the Electronic Security Systems (ESS). Specifically, it was observed that many CCTV cameras were non-functional in critical areas, with only a few cameras operating sporadically. This was in line with the findings from the survey, where respondents indicated issues with system failures, particularly CCTV cameras. Additionally, during the observation, it became apparent that library staff lacked a clear understanding of operational protocols for handling ESS-related issues. For example, staff members were often unable to resolve minor technical malfunctions with the access control system, which further exacerbated the system's inefficiency. These observations aligned with the challenges identified in the survey, where personnel-related issues received a high mean score of 16.0. The lack of proper training and expertise was evident, as staff struggled to operate and troubleshoot the systems, thereby limiting the library's ability to safeguard its materials effectively. Moreover, the lack of clear operational protocols and maintenance schedules observed in the library further confirmed the organizational challenges highlighted in the survey, suggesting that systemic issues within the library's structure hinder the efficient use of ESS. These observational findings validate the survey results and emphasize the need for improved technical support, staff training, and clearer organizational protocols to enhance the effectiveness of ESS at Mzumbe University Library.

7. Conclusion

The analysis of the effectiveness of ESSs at MU Library highlights a mixed performance, with certain systems like theft detection machines and smoke detectors being effective, while others like CCTV, RFID and access control systems are underperforming or non-functional. These findings align with broader challenges observed in libraries across developing countries, as noted by Abubakar & Aduku (2016). To ensure comprehensive protection of library materials and facilities, MU Library must address these gaps by repairing or upgrading ineffective systems, enhancing staff training, and regularly assessing its security infrastructures to keep them up to modern standards.

The researchers investigated the effectiveness of the installed ESSs at the MU Library. The findings in Table 4 demonstrated how respondents responded regarding their effectiveness. The effectiveness was collected using a mean score whereby smoke detector machines scored 15.0, access control systems scored (1.5), CCTV Electronic Security systems scored 6.0 mean score, RFID electronic security scored 2.0, and theft detection machines scored 18.0. It implies that some ESSs used at the MU Library are ineffective. This can expose the danger to library materials as they can be moved out of the collections without being known by the library staff.

Also, the researchers observed that cameras at MU Library do not function at all in most areas of the library.

7.1. Using Electronic Security Systems

In assessing the implementation of Electronic Security Systems (ESS) at Mzumbe University Library, the findings highlight several significant challenges that impede the effective use of these systems. The assigned mean scores for the challenges are technological (12.0), personnel (16.0), financial (12.5), and organizational (16.0). These scores provide a quantitative overview of the library's struggles in integrating ESSs into its operations

7.2. Technological Challenges

The technological challenges, with a mean score of 12.0, indicate that the library's current ESS infrastructures may be outdated or inadequate. This aligns with the observations of previous research, such as Pas's (2018) findings, which underscore that insufficient budgets can severely limit the effectiveness of electronic security systems. Without regular updates or modern technology, the systems may not function optimally, leading to issues such as system failures, particularly with CCTV cameras. These failures prevent the library from effectively monitoring and controlling vandalism and theft, as highlighted by the respondents.

7.3. Personnel Challenges

Personnel challenges with a notably high mean score of 16.0, suggest that the library lacks skilled staff who can operate and manage ESSs effectively. The absence of system librarians who are trained to handle technical issues exacerbates the problems associated with technological failures. This gap in expertise may lead to delayed responses to system malfunctions, further allowing for the deterioration of library materials. Without qualified personnel, the library cannot leverage the full potential of its ESSs, limiting its ability to safeguard its collections.

7.4. Financial Challenges

The financial challenges indicated by a mean score of 12.5,

illustrates the economic constraints the library faces in implementing and maintaining effective security systems. Lack of funding can lead to inadequate resources for purchasing necessary technology, conducting regular maintenance and hiring qualified personnel. This financial limitation is critical since [22] emphasized the importance of reliable electricity for the operation of ESSs. If the library cannot ensure continuous power supply or allocate funds for maintenance, the reliability of these systems is compromised.

7.5. Organizational Challenges

The organizational challenges also scored 16.0 indicating that there may be systemic issues within the library's operational framework that hinder the effective implementation of ESSs. This may involve bureaucratic delays in decision-making processes, insufficient training programs for existing staff, and a lack of clear protocols for the operation of security systems. The organization's structure and culture must adapt to embrace the integration of technology in library operations; otherwise, the potential benefits of ESSs may not be fully realized.

7.6. Impact of System Failures

The consequences of these challenges manifest in real-world scenarios within Mzumbe University Library. The research highlights incidents of system failure, where CCTV cameras are unable to operate, resulting in increased theft and damage of library materials. The inability to monitor these activities effectively allows users to steal, hide or damage books without detection. This situation not only compromises the physical integrity of the library's collections but also undermines the confidence of users in the library's security measures. The challenges facing Mzumbe University Library in using Electronic Security Systems are multifaceted, encompassing technological, personnel, financial, and organizational issues. Addressing these challenges is crucial for the library to enhance its ESS implementation. Recommendations may include securing additional funding, investing in staff training, upgrading technological infrastructures, and establishing clear operational protocols. By tackling these obstacles, Mzumbe University Library can not only better protect its materials but also improve overall performance of its roles.

Table 4. Challenges Hindering Electronic Security System Functionality at MU Library.

Challenge	S. Agree	Agree	S. Disagree	Not sure	Mean
	Fq & %	Fq & %	Fq & %	Fq & %	
Technological Challenge	11 (27)	15 (37)	9 (22)	6 (14)	12.0
Personnel Challenge	8 (20)	16 (39)	14 (34)	3 (7)	16.0
Financial Challenge	11 (27)	9 (22)	16 (39)	5 (12)	12.5

Challenge	S. Agree Fq & %	Agree Fq & %	S. Disagree Fq & %	Not sure Fq & %	Mean
Organizational Challenge	8 (20)	17 (41)	11 (27)	5 (12)	16.0

Source Data collection 2022

8. Recommendations of the Study

This study was conducted at Mzumbe University Library to assess the challenges facing libraries in using electronic security systems. The study was both qualitative and quantitative and was guided by three objectives: the first one was to analyze the types of electronic security systems which are installed and used at MU Library. The second one was to evaluate the effectiveness of ESSSs at MU Library; and the last was to find out the challenges facing MU Library in Using Electronic Security Systems. Based on the findings of the study, it is concluded that the Mzumbe University Library currently employs only a limited range of ESSs, specifically smoke detectors, CCTV cameras, and theft detection devices, to address security issues related to theft and mutilation of library resources. While these systems have been in place for over a decade, uncertainty among staff regarding their operational duration raises concerns about their reliability and maintenance. The findings indicated that the most effective ESSs were the smoke detectors (with mean score of 15.0) and theft detection devices (with mean score of 18.0). However, the study identified significant personnel challenges (with mean score of 16.0) as the primary barrier to the effective application of these systems.

Based on the findings, the study, therefore, recommends the following:

Installation of additional security systems: The library management should consider installing more comprehensive electronic security devices to better manage and mitigate issues related to theft and mutilation of library materials. This expansion is essential to create a robust security environment.

Addressing personnel challenges: To overcome the identified personnel challenges, the library should conduct regular orientation and training sessions for staff on library security, emphasizing the importance of ESSs in protecting library materials.

Policy formulation: Developing clear policies regarding the use and maintenance of ESSs will provide a structured approach to library security activities. Policies should outline responsibilities, protocols, and procedures for staff to follow in the event of security breaches.

Budget allocation for maintenance: Management should ensure an adequate budget is allocated for the maintenance and upgrading of existing ESSs. A well-maintained system is crucial for its effective operation and longevity.

Infrastructure improvement: To support the effectiveness of ESSs, there is a need for improvements of the library's infrastructures. Reliable power sources and stable Internet connectivity are vital for the smooth operations of electronic security devices.

Prioritizing security challenges: Finally, library management should treat the challenges related to ESS implementation as a top priority, ensuring that they are addressed comprehensively. This proactive approach will foster a culture of security and responsibility among library staff and users.

9. Area for Further Studies

Based on the findings and gaps identified in the study which was specifically "Assessing the Implementation of Electronic Security Systems at Mzumbe University Library: Challenges and Recommendations", another area of study could be: "Exploring User Awareness and Attitudes Toward Electronic Security Systems in Academic Libraries". The present study has highlighted several challenges facing Mzumbe University Library in implementing Electronic Security Systems (ESSs), particularly personnel challenges and the effectiveness of existing systems; however, it has not delved into the perceptions and behaviours of library users regarding these security measures. Understanding users' awareness and attitudes towards ESSs could provide valuable insights into how security measures are perceived and their impact on library usage at MU Library.

Abbreviations

ESSs	Electronic Security Systes.
MU	Muzumbe University
RFID	Radio Frequency Identification
CCTV	Closed-Circuit Television
SPSS	Statistical Package for Social Sciences

Author Contributions

Zuhura Ibraimu: Writing original draft
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Conflicts of Interest

The authors declare no conflicts of interest.

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