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Research Article

Design and Development of a Co-Operative Society Information Management System

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About Article

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ABSTRACT

Cooperative societies in Zambia, particularly in rural areas, are increasingly forming to support each other financially. One such society is Nangoma Multi-purpose Cooperative Society Limited, which faces challenges in managing cooperative records due to manual techniques. The study proposes a web-based loan application management system to address these issues. The system, developed using MySQL, PHP, HTML, CSS, and JQuery, focuses on loan application management in a custom manner. This custom-developed system can promote member loan application creation and management within the cooperative society, making it a more effective approach for managing custom operations of cooperative society activities. The system is expected to improve the efficiency of cooperative society operations.

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1. INTRODUCTION

This system aims to improve the day-to-day operations of a cooperative society in Zambia, a country with a large population and high density in urban areas. The rising population has led to more co-operatives being registered, resulting in poor resource management. One major reason for this is the violation of cooperative rules and poor tracking systems for board members. A survey revealed that 78% of co-operatives are registered in rural areas of Zambia. To prevent these issues, a highly regulated governance system is needed.

The system will provide a decentralized information system for managing and monitoring cooperative affairs, accessible everywhere within Zambia, provided they have internet access. A detailed methodology and comparative study with past works will provide a detailed overview of the management system. The system will provide a decentralized information system for managing and monitoring cooperative affairs, ensuring equitable growth and better governance for members.

1.2. Motivation of the study

Co-operative society administration in rural regions faces challenges due to the traditional manual approach to communication. This time-consuming process can fail to deliver daily announcements, monthly gatherings, and security warnings.

To address these issues, an automatic solution must be devised. The society administration framework aims to integrate multiple programs into a single web-based application for handling alerts, updates, well-being, and social events. The application also assists in event management and provides information about them in the interface. This will reduce people's efforts and improve the overall cooperative society administration.

1.3. Significance of the study

The co-operative society is undergoing a significant transformation, necessitating the replacement of its current system with a new, computer-based one, as it struggles to meet the growing demand for efficiency and utility in its procedures. The need for computerization in an existing system was primarily driven by the provision of competitive services, cost savings, and the potential for information loss due to manual processes. The old system was also vulnerable to mutilation and fire outbreaks, causing potential loss of information. Furthermore, the old system was unable to handle the increasing demands of data processing in the department, resulting in slowness and inefficiency compared to the new system. Therefore, the adoption of a computerized system is crucial for enhancing efficiency and productivity.

1.4. Scope of work

The world is rapidly developing information technology to enhance efficiency, competitiveness, and productivity. With over 700,000 daily internet users and 10,049,584 secure internet servers per 1 million people, the average internet user spends 6 hours and 55 minutes on the internet daily. The Zambian government should adopt cooperative management databases to compete with global leaders and create employment opportunities for youths as data clerks in cooperative offices. This project will save time and waste of paperwork, while also promoting global competitiveness.

1.5. Problem statement

Nangoma Multi-Purpose Cooperative Society Limited is currently manually maintaining member and loan application records, despite the numerous benefits cooperative societies offer. The current system is manual-based, causing issues such as laborious registration of member details, errors in computation, and inability to generate loan reports for easy accountability. Additionally, the manual system does not allow members and management staff to easily access or document records for loans or other facilities. The study suggests the need for a web-based loan management solution designed for custom purposes. Cooperatives provide opportunities for people to pool financial resources together to achieve common development needs. The proposed solution aims to effectively handle records and provide more benefits for both members and the executive in the cooperative's day-to-day activities. The study supports the idea that cooperatives provide opportunities for people of similar minds to pool financial resources together.

1.6. Objectives

The main aim of the study is to design and implement a database cooperative management systems that will easy the procedures of co-operative society both for the members and management of the co-operative society.

1.6.1. General objective

i. To design and develop cooperative Society management system for Nangoma Multi-purpose Co-operative Society Ltd.

1.6.2. Specific objectives

i. To design, a database scheme for the co-operative management system.

ii. To design, a front-end template for the Co-operative management.

iii. To develop, test and validate the system.

2. LITERATURE REVIEW

2.1. Overview

This reviews the literature on the Co-operative Society Information Management System (CSIMS), focusing on automated systems in cooperative societies. It examines research on cooperative society management, challenges in manual data handling, integration of technology in society operations, and the benefits of digitized record-keeping systems.

The first successful co-operative society in Finland was formed in 1844 by 28 workers in Rochdale, Finland. The co-operatives, consisting of weavers, shoemakers, cabinet makers, tailors, printers, hatters, and engineers, wrote down principles for operating their food co-operatives, which contributed to their success and spread to other co-operatives worldwide.

The Rochdale pioneers' ideas transformed the traditional producer/consumer relationship and created a pathway for community-based economic and social development. Today, these heritages continue to affect the lives of millions of working people worldwide over 150 years.

2.2. Review of the literature

Cooperative societies in Zambia have become crucial for enhancing economic resilience among smallholder farmers, particularly in rural areas. These organizations facilitate collective action, enabling members to pool resources and access markets more effectively.

Membership in cooperatives contributes significantly to women's empowerment by providing a supportive network and opportunities for skill development, such as training in dairy management and marketing strategies. The role of cooperatives becomes even more pronounced in sectors like dairy farming, where they not only enhance milk production through shared knowledge but also improve product quality by advising on best practices, such as mastitis prevention.

The first successful cooperative society in Rochdale, Finland, in 1844, marked the beginning of the modern co-operative era. The ideas of Rochdale pioneers were simple but profoundly transformed the traditional producer/consumer relationship and created a pathway for small and larger-scale community-based economic and social development. Today, these heritages continue to affect the lives of millions of working people worldwide.

The adoption of Information and Communication Technology (ICT) is prone to actualities in the concept of 'rurality' and 'urbanity'; depending on which side of the geographic divide a cooperative is situated. Access to ICTs remains very low, particularly in rural areas and village levels, compared to townships and urban-city centers. However, the explosion of information and communication technology offers numerous opportunities for cooperative movements to communicate, connect, share, learn, access information, and transact business with social-economic prosperity as the end-goal.

2.3. Related works

Literature of similar systems developed on management systems was considered and reviewed from a wide perspective ranging from local, regional and global perspectives respectively. Cooperative Information Management System enables the right user to have access to the right resource at the right level of trust . Only the right users will gain access to the database.

Actually, Nangoma Multi-Purpose Co-operative Society Information Management System is a web-based application which is implemented to help people getting online services. This project is useful for management and members. In Nangoma there's no app like this. But some of the features of NMCSIS are partially similar to other online application. They are:

i. Web based housing management system by P. Kalavadekar.
ii. Cooperative society management system - Zambia

2.4. Gaps in the literature

Identifying gaps in the literature is essential for advancing the research and development of cooperative society management systems. By addressing these gaps, researchers and developers can create more effective, user-friendly, and scalable systems. Here are some key gaps in the literature on the design and development of cooperative society management systems.

2.4.1. Comprehensive frameworks

Existing frameworks lack comprehensiveness to address the unique requirements of cooperative societies, such as member participation, democratic governance, and shared ownership. A robust framework can standardize the design and implementation process, ensuring consistency and effectiveness across different societies.

2.4.2. User-centered design

Many studies overlook the importance of user-centered design principles, which involve understanding user needs, behaviors, and preferences through interviews, surveys, and usability testing, thereby enabling developers to create accessible, user-friendly systems that align with user expectations.

2.4.3. Scalability and flexibility

Research on designing scalable and flexible systems for cooperative societies is limited. As cooperatives evolve, their information management needs may change, necessitating research to develop systems that can handle increased data volume, user load, and functional expansion without significant overhauls.

3. METHODOLOGY

3.1. Overview

This chapter outlines the methodology adopted in designing and developing the Co-operative Society Management System, focusing on a comprehensive approach to meet the needs of the co-operative. The process involved identifying system requirements through a baseline study, applying a research design suited to system development, and employing structured data collection. Key stages include research design, data collection, development, and detailed system design to ensure an effective and user-friendly system for police record management.

3.2. Research design

The study utilized an exploratory research design to examine the unique requirements of Co-operative Society Management Systems at Nangoma Multi-Purpose Co-operative Society. This approach allowed for flexibility in assessing existing manual processes and identifying system requirements based on challenges. The case study approach effectively investigated context-specific issues, providing insights into operational inefficiencies and challenges faced by cooperative members in record management.

3.3. Baseline study

The methodology for designing and developing a Co-operative Society Information Management System (CSIMS) involves a structured approach to ensure that the system meets the functional requirements of a co-operative society while being user-friendly, secure, and scalable.

The methodology adopted in this study involves system analysis, design and implementation. The existing system was properly analyzed, and the proposed system was carefully designed and implemented. The system analysis performed in

this study helped identified the features that are needed in the application. The features are targeted at meeting the custom needs of the cooperative society. It is argued herein that this approach enabled the achievement of custom web-based Cooperative Loan Management solution. Information was elicited from members as well as selected executive members of the cooperative. Different data types used for capturing data and design are as detailed in Tables 1 to 2.

The usage scenario of the loan management module was modelled with the use of Use Case Diagram depicted in Figure 1. Based on the desired objectives, some web development tools such as XAMPP, PHP, MySQL, JQuery were used for the development. Then, the testing of the application was carried out using hypothetical cooperative records. The main modules in the application are the membership registration and member renewal modules. The solution allows registered member to apply for loan and the cooperative administrator verifies the application and approve same in the online platform at much better speed compared to the existing system in Nangoma cooperative. After reviewing similar studies, it was found that most of the similar studies did not focus on custom web-based solution for members application management.

3.4. Input Design Specification

Tables 3.1 – 3.2 are used to design the format in which data can be captured into the proposed application. The tables reflect the different data types that were used in the design of the databases required for the membership registration and member application modules.

Table 1. Cooperative Member Registration

Field Name	Data type	Field Description
Member Id	Integer	Co-operative member Id
Full Name	Varcha (255)	Member Full name
Date of Birth	Date	Member date of birth
Gender	Varchar(10)	Member gender type
Contact number	Varchar	Member contact number
Email address	Varchar(255)	Member's email address
Address	Varchar(255)	Member's address
Village	Varchar (255)	Member's village of residence
Post code	Varchar	Member's post code
Occupation	Varchar	Member's occupation
Membership type	Integer	Member's type
Membership number	Varchar	Member's card number
Date created	Timestamp	Member date created
Photo	Varchar	Member's profile photo
Expiry date	Date	Member's expiry date

Table 2. Member login

Field Name	Data Type	Field Description
Member id	Character (Text)	Admin Personal subhead number
Password	Character(Text)	Admin password

3.5. Data collection

Interview research technique is a qualitative method that involves talking face to-face with the respondent to find out the different process obtained in a sampled area, and also the differences, which they feel they can do without.

i. Stakeholder interviews: Conduct interviews with co-operative society members, administrators, and decision-makers to gather insights into their information management needs, such as member registration, financial tracking, loan management, and report generation.

ii. Observation: Observe the current manual or digital processes used by the co-operative to understand existing challenges and identify areas for automation.

iii. Requirement documentation: Create a detailed requirements document covering essential functionalities, user roles, security requirements, and data management needs.

3.6. Research approach

An iterative research approach was used to refine system requirements based on feedback and observations. This approach allowed for continuous improvement and adjustment of system features to align with the operational needs of the Cooperative Society. Each iteration focused on different aspects of the system, such as data entry processes, case management functions, and administrative controls, allowing for incremental adjustments based on user feedback.

3.7. Development of the application

The development process followed the Agile methodology, with iterative phases that allowed for adjustments based on ongoing feedback. This approach facilitated rapid prototyping and testing, ensuring the system aligned with user requirements.

i. Requirements analysis: System requirements were defined through analysis of collected data, identifying key functionalities such as member registration, membership tracking, and secure data access. Requirements analysis guided the development of modules to meet the specific needs of the front desk and Administrative divisions.

ii. Modular development: The system was divided into core modules to address different aspects of cooperative society operations. The main modules include Manage members Module, and Administrator Module, generate report module and renew membership module each with distinct functions to enhance user experience and streamline data management.

3.8. System design

The system design phase was informed by both data analysis and feedback from Co-operative Society members. The design process emphasised security, ease of use, and scalability, ensuring the system can be expanded or modified as required.

3.9. System design

The system design involved a multi-level architecture, from high-level diagrams to detailed data models and user interfaces. This section presents each component of the system design in detail.

3.10. Context diagram

The context diagram illustrates the interaction between the users and the system. The system's primary user will be the Administrators who will interact with the system to enter, update, and retrieve data. External stakeholders, such as ordinary members, could potentially access certain reports through secure channels, expanding the system's applicability.

3.11. System software level architectural design

The system employs a three-tier architecture, which separates the presentation, logic, and data layers:

i. Presentation layer: Comprises the user interface, accessible via a web-based front end using HTML, CSS, and JavaScript.

ii. Logic layer: Consists of the application's business logic, built with PHP, managing data processing and enforcing role-based access control.

iii. Data Layer: Utilises a MySQL database for data storage, with secure access configurations ensuring data confidentiality and integrity.

3.12. Modular design of the system functions

Each module in the system is designed to handle specific functionalities to streamline police operations:

i. Dash board module: This module will display all the functionalities of the system. In simple terms it summarises and shows all the modules.

ii. Renew membership module: Allows admin to renew a member who has paid his/her membership fee after the expiry date, assign case IDs, and store initial case details.

iii. Membership report module: Enables admin to generate report of members registered and the dates on when they will expire.

iv. Revenue report module: This module shows the revenue each member has contributed towards the society.

v. Add member's module: Here the admin will have the privileges to add members to the system.

3.13. System class diagram

The class diagram represents the system's core objects and their relationships, outlining the structure of data classes such as Revenue report, Membership types, Manage members, and Renew members. Each class contains attributes and methods specific to society record management. For instance, each member who is added into the system, he/she has an ID number attached.

3.14. System data model design

The data model is based on a relational structure with tables for Membership types, reports, manage members, and revenue reports. Each table is linked by foreign keys to ensure data integrity and reduce redundancy. Revenue report table is linked to the membership table and in return the system will be able to generate the revenue reports of members.

3.15. User interface Design

The user interface (UI) design focuses on accessibility and usability, employing Bootstrap for a responsive layout. Key design features include:

i. Simple navigation: Ensures users can access core functions (e.g., View reports, updating members) with minimal clicks.

ii. Form validation: Includes client-side and server-side validation to ensure data quality and accuracy.

promised to offer. A few of the non-functional requirements are listed below.

3.16. User case diagrams

A use-case diagram in the unfired modeling language (UML) is a type of behavioral diagram defined by the diagram created from a use-case analysis. Its purpose is to present a graphical overview of the functionality provided by a system in terms of actors, their goals (represented as use cases), and any dependencies between those use cases. A use case diagram is a graphical model which shows the system in relation to the actors in its environment.

A use case is the sequence of actions which occurs when an actor uses a system to complete a process.

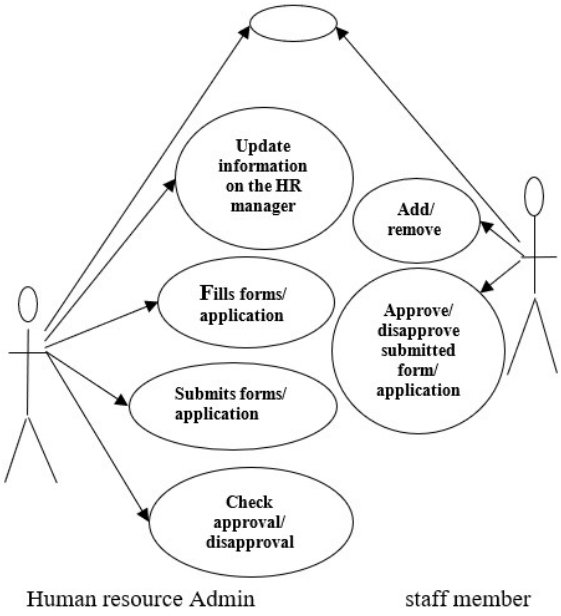

Figure 1. User case diagrams

3.16. Activity diagrams

Activity diagrams graphically show the representation of the performance of actions or sub activities and the transaction that are triggered by the completion of the actions or sub actions. It is a means of describing the workflow of activities.

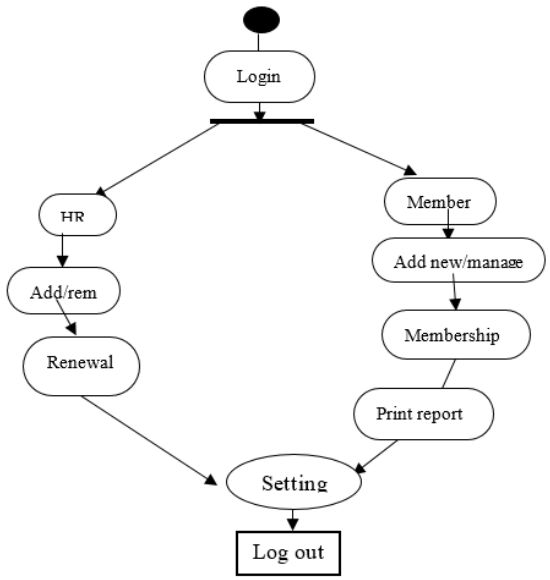

Figure 2. Activity diagram showing flow of process/author

4. RESULTS AND DISCUSSION

4.1 Overview

This chapter presents the results of the baseline study, survey feedback, system testing, and data analysis. The baseline study findings provide insights into the current challenges faced by cooperatives in managing records manually. Following this, system implementation results are shared, showcasing how the Co-operative Society Management System performs in terms of functionality, usability, and efficiency. Finally, data analysis results demonstrate the system's impact on data handling, processing time, and overall improvement in police record management.

4.2. Baseline study results

The baseline study involved gathering information on the current record-keeping methods and identifying the key challenges and inefficiencies in the existing system. Data was collected through structured surveys and interviews with cooperative members and administrative staff at the Nangoma Multi-purpose Co-operative Society. Observations of daily operations further highlighted the issues that the new system aims to address.

4.3. Survey results and discussion

4.3.1. Results

The survey focused on understanding the specific pain points in the current manual system and identifying user expectations for the new digital platform. The survey results are summarised as follows:

• **Inefficiency in data retrieval:** 85% of respondents indicated that retrieving records from the manual Book was time-consuming, often taking up to 15 minutes per case file. This delay was attributed to the manual search and entry processes.

• **Data redundancy and inaccuracy:** Nearly 75% of survey participants reported issues with data redundancy, where the same information was recorded multiple times in different formats, leading to inconsistencies and errors.

• **Limited accessibility:** members noted limited access to records, as only authorised officers could view certain files, which sometimes delayed information sharing. Furthermore, with physical records, data access was restricted to those present at the secretariat, making it challenging for members in the community to obtain necessary details promptly.

• **User expectations:** Respondents highlighted a need for a more secure, efficient, and user-friendly system that could provide real-time access to case records and simplify complaint logging. The survey also indicated a strong demand for a feature that would allow secure role-based access to sensitive information.

4.3.2. Discussion

The survey results underscore the inefficiency of the existing system and reveal critical areas for improvement. By addressing these challenges, the new Co-operative Society Management System promises to reduce retrieval times, minimise redundancy, and enhance accessibility and data accuracy. These findings informed the design of the system, particularly the emphasis on secure access controls, streamlined data entry, and efficient retrieval processes.

• **Software:** The choice of software in this project is basically because of the following reasons:

• **Portability:** This software can be used on any system worldwide from personal computers to super computers from windows operating system to Linux based operating system and so on.

• **Open source:** These technologies are not only free to the market but can also be developed and improved freely by anyone from any part of the globe.

• **High security:** Because of the nature of developing these software technologies a lot of people with different ideas have improved the security capabilities of this software resulting in world class security techniques.

4.3.3. Choice of database management system usedand justification

The Database management system considered for the development of these projects includes Microsoft Office Access and My SQL. My SQL was chosen over Microsoft office access. Mysql is one of the most popular and powerful DBMS in the world today because it is a server based DBMS. Some of the reasons why it is justified to be the used DBMS for this project are as follows:

• It is easy to learn
• Its functionalities are users friendly
• It is supported by other object-oriented programming languages that can reference a variety of objects.

4.3.4. Programming language used and justification

The programming languages considered for the development of this project include VB Application, Java, PHP and MySQL. PHP and MySQL were considered the best.

PHP is an open source, server side programing language that can be used to create websites, applications, customer relationship management systems and more. PHP stands for

Hypertext Pre-processors, is a popular scripting language that is widely used for website development and interacting with databases. For this reason, we have decided to use PHP as our programming language for this system.

The benefit of PHP and MySQL which was among the fundamental reasons why it was selected for the construction of the co-operative society management system are;

• **Open source:** Both MySQL and PHP are open source, meaning they are free to use and modify. This makes them a costeffective solution for web development.

• **Ease of use:** PHP is a powerful yet easy to learn programming language, and MySQL is a userfriendly relational database management system. Together, they make it simple to create dynamic, database-driven websites.

• **Cross platform compatibility:** PHP and

MySQL works on various operating system, including Windows, Linux, and macos. This flexibility allows developers to build applications that can run on different environments.

• **Strong community support:** Both technologies have large, active communities. This means you can find plenty of resources, tutorials, and forums to help you troubleshoot issues and learn best practices.

• **Scalability:** MySQL is known for its scalability, making it suitable for both small and large applications1. PHP can handle a large number of requests, making the combination ideal for high-traffic websites.

• **Integration with other technologies:** PHP and MySQL integrate well with other web technologies, such as HTML, CSS, JavaScript, and various frameworks. This makes it easy to build comprehensive web applications.

• **Security:** MySQL offers robust security features, including user access control and data encryption.

• **PHP** also has security measures in place to protect against common web vulnerabilitis.

• **Flexibility:** The combination of PHP and MySQL allows for a high degree of customization and flexibility in web development. You can tailor your applications to meet specific requirements and preferences.

First, we must set up the development environment to build the project. To set up we must install Xampp which has Apache, MySQL and PHP components in it. After completing the installation set up of the software according to our requirements, we must create a new society management project.

To create a new project, we must open the terminal or command prompt and select the location for the project. Then run "CREATE DATABASE db_membership;" command and launch the development server with command line.

To design the user interface, we must mention modules and components using commands for the project. Then create the templates, stylesheets, components using HTML, CSS, and JavaScript to build the interface.

Create the RESTful APIs for backend set up using Node.js and Express.js. Various operations such as authentications, managing services, managing residents etc., and define their routes in the specified file. Then connect the backend with the database (MySQL) using the library MySQL and then implement the database model and the CRUD operations. Make sure that our backend APIs are handling the authentication and authorization appropriately.

SQL is a language used for storing, manipulating the data and deleting the data that is stored. The data stored in the database in the form of tables with rows and columns with specific information. In the below table each row represents a student, and each column represents a characteristic of that student.

phpMyAdmin is a database management system used for visualization. It is a free and open-source web-based application which provides graphical user Interface (GUI) for MySQL database.

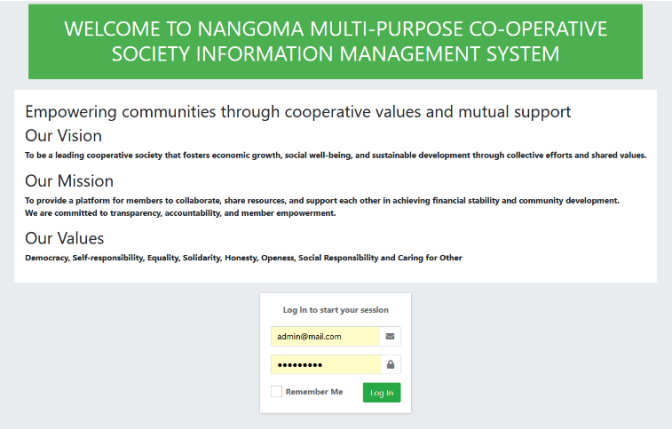

Figure 3. Welcome page/Author

This is a welcome page where users will be able to see the vision statement, Mission statement and values of the co-operative society. Later on the admin will proceed to login.

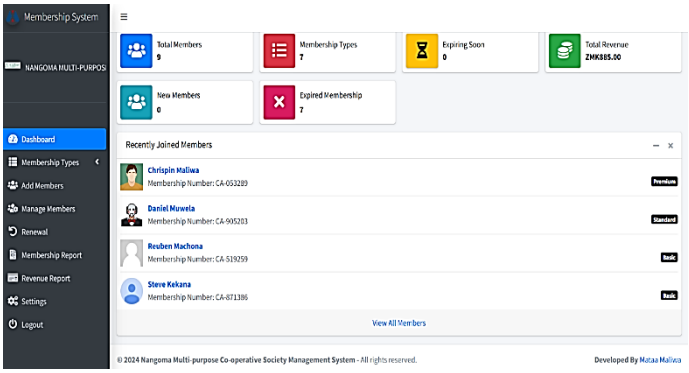

Figure 4. Admin panel (dash board)/author

4.4. Admin panel

The PHP membership system project features a robust admin panel, providing administrators with full control over all facets of the platform. This panel offers comprehensive control, including memberships, revenues, types, and cards. It also provides detailed reports and insights for informed decision-making. The system setting allows administrators to change minor settings, update passwords, and currency, with only one system user accessing all features.

4.5. Membership types

The system administrator is the key to managing membership types within the project. They can add and manage membership

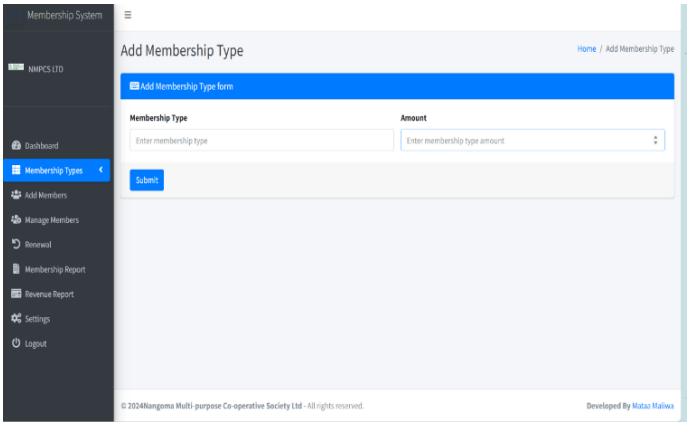

Figure 5. Membership type/author

types by providing the name of the membership type and the total charge or amount. Membership types can be basic, silver, bronze, or premium, with their respective amounts. The amount section is linked to the selected membership type when adding members or renewing them.

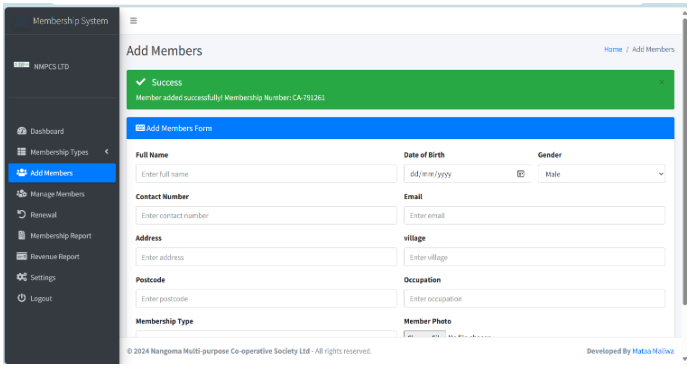

Figure 6. Add members

4.6. Add members

The system allows admin users to add members, known as memberships, after completing the membership type section. Members are required to provide information such as name, date of birth, address, contact information, gender, membership type, occupation, and an attachment of the member photo. The system automatically attaches a default photo for new members, but it is optional. After adding members, each member is in expired status, requiring payments for their membership type through the renewal section. New members cannot receive their membership.

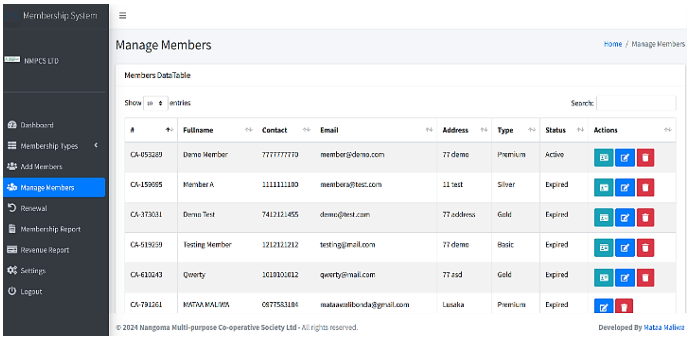

Figure 7. Manage members/authors

4.7. Manage Members

Admin can access the member's information and make some changes within the lists.

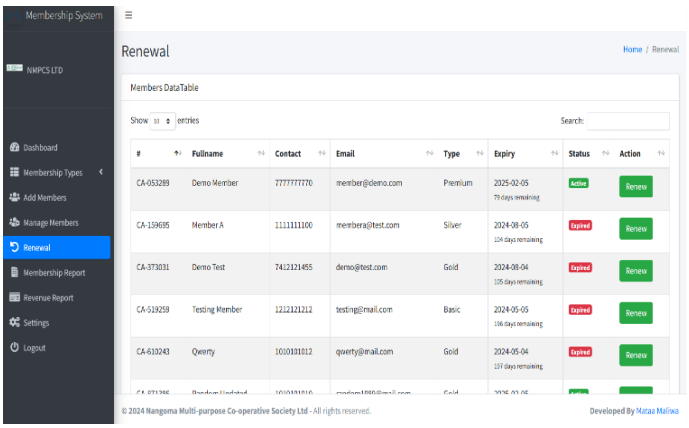

Figure 8. Renew membership/author

4.8. Renew membership

Talking about the membership renewal section serves as the foundation of this whole project. The revenue part of things and activation of membership, all come under this. Once a member is added to the system, the admin has to renew his/her record through this section. The renewal section lists all the records of members with their membership expiry dates and the status of each. The admin can renew memberships of each. To renew the membership, the admin just has to select a type and total duration. The system automatically calculates the total amount according to the selected type and duration of it. The membership card is only available for active members. The card contains details such as membership number, name, type, photo, and validity.

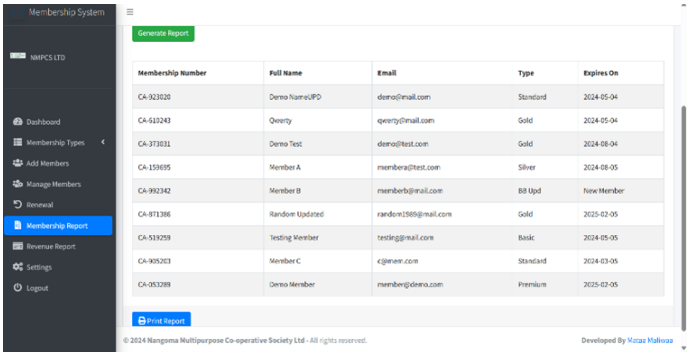

Figure 9. Membership report/Author

4.9. Membership report

On this one the admin through the system will generate the report based on the period entered in the blank spaces provided above.

On the other hand, the admin user can filter and view reports on their records. There are a total of two reports, revenue and membership. The process for both is identical and simple. The user just has to provide a starting and ending date. In return, the system returns the list of records within that specific date range in the form of a table. Well, this applies to both revenue reports and membership. In terms of membership reports, the system

shows details such as membership number, name, status, and type whereas in revenue, the system shows membership name, number, type, and amount. Both of these reports are printable. Rest, the admin can change the name of the system along with its logo and currency through settings.

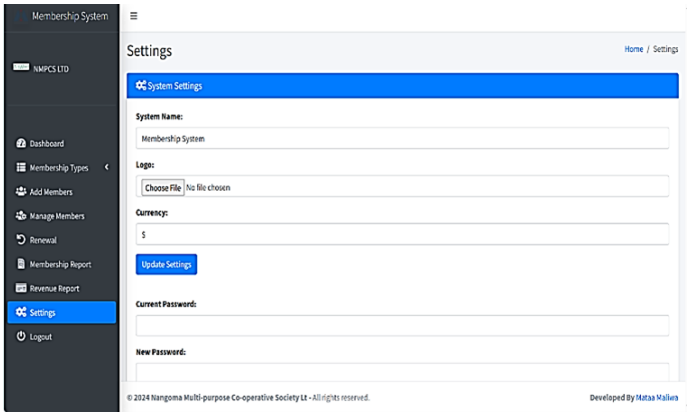

Figure 10. Settings/Author

4.10. Settings

on this module, the admin can still do some changes to the system through settings. For example, the admin can change the currency type, change the logo, and also reset PIN.

4.11. Discussion

4.11.1. Overview

We started this report in a seemingly innocent manner introducing us to the concept of cooperative society DBMs, and after that we expanded our view of work that has been owe and is being done in the field. In Chapter 3 we ventured into the area of designing our very own system of co-operative society Database management system to suite our use at Nangoma Multi-Purpose Co-Operative Society Ltd and eventually use implemented the system based on the design in chapter 4. In this chapter, we will make relevant deductions from our research so far.

4.11.2. Discussion

The Baseline Study: The baseline study highlighted several inefficiencies in the Co-operative Society's manual record-keeping system, including slow data retrieval, data redundancy, and limited accessibility. The baseline findings demonstrated that the manual system required officers to spend significant time on record entry and retrieval, limiting their ability to focus on active policing duties. In response, the developed system streamlined data entry, improved data accuracy, and enabled faster access to information, demonstrating a clear alignment with the study's objectives.

Use of technology: The impact of information and communication technology (ICT) on commercial bank performance in South Africa was studied using the orthogonal transformation approach and residual co-integration regression analysis. The study found that ICT increases returns on capital employed and return on assets of the South African banking industry, with more contribution to performance coming from cost efficiency compared to investment in ICT.

The authors recommend that banks emphasize policies that enhance proper utilization of existing ICT equipment rather than additional investments.

Franklin *et al.* (2008) conducted a study covering 13 countries to develop new indicators on the economic impact of ICT in businesses without increasing the burden of surveys on respondent firms. The results showed additional productivity effects associated with ICT, through competitive substitution in addition to the effects of firm.

Esselaar *et al.* (2007) argued that the negative return on investment reported in the literature can be attributed to the failure to distinguish between the formal and informal sectors. The study shows that ICTs are productive input factors and that their use increases labor productivity for informal as well as formal SMEs. The primary policy recommendation of the study is that applications for SMEs need to be developed using mobile phones.

Devaraj & Kohli (2003) posited that the driver of IT impact is not the investment in the technology, but the actual usage of the technology. Their data analysis provided evidence for the technology usage-performance link after controlling for various external factors. The study observed that technology usage was positively and significantly associated with measures of hospital revenue and quality, and this effect occurred after time lags.

introduce ICT supports in all areas of businesses. The paper employed mostly secondary data collected from different business reports and journal papers.

Pellegrina *et al.* (2017) investigated the extent to which a large international bank offers better credit conditions to enterprises that use ICT more extensively. They found that banks tend to grant increasing volumes of credit to such enterprises, interpreting this evidence as the ceteris paribus effect of ICT adoption by small businesses on the quality of information transmitted to banks. Another possible interpretation is that banks consider ICT adoption as a signal of firms' willingness to innovate.

Attom (2013) in a study titled "The Impact of Information Communication Technology (ICT) on Business Growth Strategies of Small and Medium Scale Enterprises (SMEs) in the Amutu-Senya East Municipality of Central Region of Ghana" explained that SMEs in Ghana have played a pivotal role in socio-economic development, employment creation, and poverty alleviation. They also previously faced avoidable challenges caused by poor information management coupled with non-compliance with information communication technological (ICT) innovations.

Development of the system as a solution: Cooperative management systems facilitate resource-sharing among members, leading to cost savings and greater efficiency in production and distribution. Training and capacity-building programs for members improve their skills in managing the cooperative, financial literacy, and sustainable agricultural practices. Cooperatives help members mitigate risks associated with agriculture or other industries by sharing risk and loss.

Cooperative management systems encourage sustainable practices within the cooperatives, such as environmentally friendly farming methods or responsible resource management.

Well-organized cooperatives are often more attractive to financial institutions and donors, making it easier for members to access credit and funding for investment in their businesses.

Comparison with Other Similar Works: Comparing the Co-operative Society Management System with other systems implemented globally reveals similarities and key differences. In Rwanda, Cooperative Society Information System (CSIMS) links multiple cooperatives across 19 districts of Rwanda, enabling data sharing and providing a comprehensive data security. The CSM system emphasises data sharing and interagency collaboration, which was beyond the current scope of the Nangoma Multi-purpose Cooperative Society system but represents a potential area for future integration with Ministry of Agriculture departments.

Kenya's Websacco serves as another relevant example. Websacco, a centralised database for managing financial and non-financial records, with features like USSD, Android, and iOS apps.

Although similar in design to Websacco, Nangoma Multi-purpose Co-operative Society Ltd is tailored to local needs, focusing on internal record management and streamlined revenue handling. While Websacco is national in scope, the current system at Nangoma Multi-purpose Co-operative Society is designed to manage data at the station level, with possibilities for expansion across additional cooperative associations across the nation.

These comparisons underscore the adaptability of the NMCS Management System. While the cooperative system currently operates at a smaller scale, the modular framework could support future expansion, such as the inclusion of mobile access and advanced analytics to support proactive member services.

4.11.3. Possible Applications

A Cooperative Society Management System (CSMS) offers various functionalities that can streamline operations, enhance transparency, and foster growth for cooperative societies. Below are the key applications:

i) Communication and Notifications- Sends automated messages and notifications about payments, meetings, or policy updates. Facilitates communication between members and administrators through in-app messaging or email integration. This Strengthens member engagement and awareness. Also ensures timely dissemination of information.

ii) Event and Training Management- By expanding the system, events such as training sessions, workshops, and member gatherings. It can track attendance and provides resources or materials for events. In return it improves member education and involvement in society activities. It also enhances the society's capacity-building initiatives.

iii) Integration with the Co-Operative Society of Zambia System:

The system could be expanded to link with Co-operative Society of Zambia databases, facilitating data sharing between members and government systems and reducing delays in data processing.

4.12. Summary of Findings

The automated system provides ease co-operative members information processing, Performance, computation and analysis, storage and retrieval of member information. It can be used to replace the operations of manual storage system and performance compotation. It also fosters reduced complexity in managing co-operative information and performance records. As a result of its design approach and software development technique it is easy to use.

Government Departments of Cooperatives and National Federations or Country Apex have roles to play in the adoption of usable cooperative ICT. The strengths of affiliation, visibility and recognizability confer a power, capable of molding opinion of acceptance and, or rejection, on them.

While Agenda Setting starts from cooperative associations as the focal point, the need to carry along various stakeholders cannot be overemphasized. It should be pointed too, that cooperatives may not have a hundred percent buy-in at first, but the rank of support will grow, as various federations see the altruistic reasons for the call for a flexible, usable ICT. Furthermore, the study found that more cooperative came up in the last 10 years than previous decades. Zimbabwe, South-Africa and Rwanda, have experienced increase in primary cooperative in the last 10 years than prior years, compared to other countries.

The study shows that on percentile scale, computer literacy is low among members across the continent. This, partly accounts for the reason why most cooperatives did not automate their operations. The import of this is that integration and adoption of computer use in Cooperative business administration is very low. Results shows that information gathering process among cooperatives in Africa is largely manual. Automation and use of ICT tools enhance data gathering process and makes it seamless.

5. CONCLUSIONS

Even with the limitation of the new system, it will still play a very important role as illustrated in chapter 3. The new system is far from perfect yet; as it has not considered other aspects of management even within the staff members-cooperative society system and we will discuss this on section 5.4 when we talk about recommendations for further developers.

Nangoma Cooperatives are not entirely new to ICT. However, the robustness of the available application is limited by user skills, cost i.e. ability and willingness to pay by users, and some other geographical factors. Most of the available solutions are Accounting applications. More is required for management information system (MIS). To fill this void, Cooperative Resources Information Management Solutions (CRIMS) is recommended for the Cooperative Sector to bridge the universal information-availability and data automation gap an uptake of ICT is truly in the best interest of Nangoma Multi-purpose cooperative Society. It is an enabler that will speed-up growth, transparency and accountability.

There is need for Members to have e-mail accounts and, or phone. E-mail and phones are unique identifiers. It is one of the minimum requirements to associate, to be identified and granted access on many ICT platforms. For a start, Cooperatives should sensitize members who have the requisite skills, ditto for those who are literate to do so. This way, the cooperative will deliberately move towards modern mode of communication in

addition to traditional methods as opposed to drifting towards the modern mode of communication in the 21st century. Record keeping among the sample group is mostly manual, and by extension bulky. Data and its aggregate, records present yardstick for measurement and benchmarking.

Les Robinson (2009) in his review of Everett M. Rogers, Diffusion of Innovations Captioned A summary of Diffusion of Innovations warned that the innovator usually can't address them all at once. There is a correlation between positive believe and positive action(s). Across the spectrum of the study group among African cooperatives, there is a consensus that appropriate ICT can be useful in receiving and sharing of market information, enhance trade and ease communication within the movement and to external stakeholders. This paradigm shift in thought process should be embraced by all. Essentially it should be supported by stakeholders to fruition.

A major obstacle to ICT Uptake would be willingness to pay for ICT services. However, one of the findings of the study is the affirmation of majority of the respondent in the sample group who expressed willingness to make a token financial commitment towards the deployment of ICT platform. There is no gainsaying the fact that Effective decision making is founded on the quantity and quality of available data. By extension, Individuals and Institutions; both for profit, self-help and charity organizations need timely data for effective decision making, too. Now, It is left to Alliance Africa to Champion the course of a popular platform and galvanize the yearning for ICT platform into reality.

FUTURE DIRECTIONS

While CSIMS research has advanced, certain areas remain underexplored. Future studies could investigate the integration of AI for predictive analytics in areas like credit risk assessment and member engagement, as suggested by Chang and Wu (2021). Another area of potential development is blockchain technology, which could provide secure, transparent transaction records, enhancing trust among co-operative members. Additionally, research into optimizing user interface design for improved accessibility is crucial, particularly for societies with limited technical skills among staff. Lastly, studies could explore data standardization protocols across different types of co-operatives to enable system interoperability and facilitate data-sharing among co-operative networks.

The system can be implemented with a responsive design and ensure that it is compatible with different devices. Notification systems can be implemented or developed to inform members about important updates and announcements by sending text messages so that the members get updates. visual elements such as charts and graphs can be implemented so that data can appear to be more visually appealing manner. conduct security audits and updates frequently to ensure the system remains secure and up to date without any issues.

Implement a two-factor authentication for user login to prevent unauthorized access so that the user data will be safe and secured. Strengthen the system's security measures to protect sensitive resident information.

Regular user surveys, feedback collection, and collaboration with the management committee will help to identify and improve future development of the system.

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