

**DEVELOPMENT OF A WEB-BASED RECORD MANAGEMENT
SYSTEM FOR PRIMARY COOPERATIVE SOCIETIES IN TANZANIA:
A CASE OF KILIMANJARO REGION**

George Sizya Germinous

**A Dissertation Submitted in Partial Fulfilment of the Requirements for the Degree of
Master's in Information and Communication Science and Engineering of the Nelson
Mandela African Institution of Science and Technology**

Arusha, Tanzania

August, 2024

ABSTRACT

Co-operative societies in Tanzania play a vital role in the country's economic development, serving as a means to combat poverty and enhance members' economic prospects. However, the current in-house methods of documentation and record-keeping in co-operatives poses challenges for stakeholders such as District Co-operative Offices (DCOs), Regional Co-operative Offices (RCOs), the registrar of co-operatives, and researchers. Manual processes or limited-access summary reports hinder real-time data availability for management and decision making. This study addressed these challenges by developing a Centralized Record Management System (CRMS) for District Co-operative Offices and their members. To collect user requirements, administered questionnaire was used among District Co-operative Offices (DCOs), the Registrar of cooperatives and researchers in the co-operative arena. The study revealed that both hard and soft copies were used for record's keeping purposes interchangeably. Physical files such as clip and spring files, as well as file cabinets, were commonly used for storing hard copies, while electronic files in various formats (e.g., word processors, spreadsheets, pdf, and images) were employed for digital record-keeping. Both manual tools (pens and papers) and electronic tools (computers, smartphones, and cameras) were used for data processing. Following careful analysis of user requirements, CRMS was designed and implemented using a Joint Application Development Model incorporating an Evolutionary Prototyping (EP). The developed CRMS facilitates online registration and approval of cooperative societies, reporting of cooperative data to the DCO, DRCO and Registrar, and disseminate the generated cooperative reports to the stakeholders. By implementing the CRMS, primary co-operative societies can benefit from streamlined processes and improved access to data, ultimately fostering their growth and contributing to a more transparency and thriving co-operative sector.

DECLARATION

I, George Sizya Germinous, declare to the Senate of the Nelson Mandela African Institution of Science and Technology that this dissertation is my original work and that it has neither been submitted nor concurrently submitted for a degree award in any other institution.

George Sizya Germinous

Name of Candidate	Signature	Date
--------------------------	------------------	-------------

The above declaration is confirmed by:

Dr. Mussa Dida

Name of Supervisor 1	Signature	Date
-----------------------------	------------------	-------------

Dr. Edith Luhanga

Name of Supervisor 2	Signature	Date
-----------------------------	------------------	-------------

COPYRIGHT

This dissertation/thesis is copyright material protected under the Berne Convention, the Copyright Act of 1999 and other international and national enactments, in that behalf, on intellectual property. It must not be reproduced by any means, in full or in part, except for short extracts in fair dealing; for researcher private study, critical scholarly review or discourse with an acknowledgement, without the written permission of the office of Deputy Vice Chancellor for Academic, Research and Innovation on behalf of both the author and NM-AIST.

CERTIFICATION

The undersigned certify that they have read and, with this recommendation for acceptance by the Nelson Mandela African Institution of Science and Technology, a dissertation titled *“Development of a Web-Based Record Management System for Primary Co-operative Societies in Tanzania: A Case of Kilimanjaro Region”* in partial fulfilment of the requirements for the degree of Master’s in Information and Communication Science and Engineering of the Nelson Mandela African Institution of Science and Technology.

Dr. Mussa Dida

Name of Supervisor 1	Signature	Date
-----------------------------	------------------	-------------

Dr. Edith Luhanga

Name of Supervisor 2	Signature	Date
-----------------------------	------------------	-------------

ACKNOWLEDGEMENTS

This research was supported by Moshi Co-operative University (MoCU), Registrar of co-operatives office, Moshi municipal council, Moshi district council, and Rombo district council. All the gratitude is to almighty God who endlessly provided me strength and courage to do the task. I would like to thank my best supervisors Dr. Mussa Dida and Dr. Edith Luhanga for their tireless support on this work as well as the Nelson Mandela African Institution of science and Technology (NM-AIST), Arusha-Tanzania, who provided insight and expertise that greatly assisted this study. On the other hand, I would like to express my sincere thanks to my family, friends and collage-mates for the sharing their knowledge and dedicating their scarce time tirelessly to me while undertaking this research work.

TABLE OF CONTENTS

ABSTRACT	i
DECLARATION	ii
COPYRIGHT	iii
CERTIFICATION.....	iv
ACKNOWLEDGEMENTS	v
LIST OF TABLES	x
LIST OF FIGURES.....	xii
LIST OF APPENDICES	xiv
LIST OF ABBREVIATIONS	xv
CHAPTER ONE	1
INTRODUCTION.....	1
1.1 Background of the Problem	1
1.2 Statement of the Problem	2
1.3 Rationale of the Study.....	3
1.4 Research Objectives	4
1.4.1 General Objective.....	4
1.4.2 Specific Objectives.....	4
1.5 Research Questions	4
1.6 Significance of the Study	4
1.7 Delineation of the Study.....	5
CHAPTER TWO	6
LITERATURE REVIEW.....	6
2.1 Empirical Literature Review	6
2.1.1 Current Methods at DCOs.....	6
2.1.2 Use of Web-Based Records Management Systems in Organisations	7

2.2	Theoretical Literature Review.....	9
2.2.1	Technology Acceptance Model.....	9
CHAPTER THREE.....		11
MATERIALS AND METHODS		11
3.1	Research Philosophy	11
3.2	Study Area.....	11
3.3	Study Design.....	11
3.4	Sample Size.....	12
3.5	Reviewing Existing Record Management Practices and Associated Challenges	12
3.5.1	Key Informant Interviews	12
3.5.2	Observations.....	13
3.5.3	Documentary Review.....	13
3.5.4	Questionnaires	14
3.6	Determining Requirements for a Web-Based Records Management System.....	14
3.6.1	Functional Requirements.....	15
3.6.2	Non-functional Requirements	18
3.7	Designing and Developing the Web-Based Records Management System.....	21
3.7.1	Software Development Model	22
3.7.2	Conceptual Design of the Co-operative Record Management System	22
3.7.3	Database Design.....	22
3.7.4	Physical Design/Implementation of the Web-based Co-operative Records Management System	24
3.8	Validation and Maintenance of the Developed Software Solution	24
3.8.1	User Validation Testing	25
3.8.2	Acceptance Testing	26
3.8.3	Compatibility Testing.....	26

3.8.4	Performance Testing	26
3.8.4	Maintenance of CRMS.....	27
CHAPTER FOUR	28
RESULTS AND DISCUSSION	28
4.1	Demographic Information	28
4.2	Records Keeping Practices.....	29
4.2.1	Existing Ways/Tools and Types of Information for Records Keeping of Co-Operative Societies.....	29
4.2.2	Records Accessibility Options and Its Management.....	31
4.2.3	Suggested Ways for Improving the Existing Process of Accessing Co-Operative Data	35
4.3	Types of Records Sought and Their Usability	36
4.3.1	Co-operative Information Being Kept and Searched in the Existing In-House Record Keeping System.....	36
4.3.2	Use of Co-Operative Information Being Searched	37
4.3.3	Reliability of Co-Operative Information Being Searched.....	37
4.3.4	Feedback Methods	38
4.4	Challenges Associated with Records Keeping, Accessibility, and Dissemination Management.....	39
4.4.1	Challenges in the Feedback Method	39
4.4.2	Challenges Experienced in the Existing Process for Co-Operative Data Handling.....	39
4.4.3	The Severity of the Challenges Outlined in Obtaining Co-Operative Societies' Information.....	41
4.5	User Needs and Expectations for a Web-Based Records Management System.....	42
4.5.1	General User Expectations on Designed System	42
4.5.2	Suggestions on Reporting Requirements	54

4.6	Analysis and Examination of The Preliminary Prototype for a Proposed Solution.....	58
4.6.1	Preliminary Prototype of the Designed Solution.....	59
4.6.2	Areas for Future Enhancement of CRMS	65
CHAPTER FIVE.....		66
CONCLUSION AND RECOMMENDATIONS		66
5.1	Conclusion.....	66
5.2	Recommendations	67
REFERENCES.....		69
APPENDICES.....		70
RESEARCH OUTPUTS		83

LIST OF TABLES

Table 1:	The functional requirements of designed CRMS.....	15
Table 2:	General System Requirements of designed CRMS	19
Table 3:	Operational Requirements of designed CRMS	20
Table 4:	Security requirements.....	21
Table 5:	User Validation Test Results.....	25
Table 6:	Shows maintenance trend of CRMS	27
Table 7:	The demographic characteristics of the system users	28
Table 8:	Responses from DCOs and Registrar's office on the types of generated information for records keeping.....	30
Table 9:	Existing record acquisition methods	31
Table 10:	Responses on co-operative information that are non-disclosed to the public.....	35
Table 11:	Shows responses on procedure for accessing non-disclosed co-operative information.....	35
Table 12:	Usage of information being searched.....	37
Table 13:	Shows responses on ways to get feedback from higher levels of management to DCOs.....	38
Table 14:	Responses on ways DCOs provide feedback to co-operative societies	39
Table 15:	Challenges in the feedback method	39
Table 16:	Challenges experienced in the existing process for co-operative data handling....	41
Table 17:	Severity of the stated challenges in the acquisition of co-operative information ..	42
Table 18:	Information proposed to be in CRMS.....	44
Table 19:	A list of suggested features from interviewees	49
Table 20:	Shows the responses from all the four respondents	50
Table 21:	Uploading requirements	50
Table 22:	Information that DCOs share with DRCOs and Registrar's office	51
Table 23:	Proposed security concerns in CRMS.....	52

Table 24: Reports which interviewees wished CRMS to generate	55
Table 25: Reports to be openly accessible to the public in CRMS	56
Table 26: Format for reports to be generated by CRMS.....	56
Table 27: Responses about data visualization in the CRMS.....	57
Table 28: The frequency for reports' generation	57
Table 29: Responses from DCOs and Registrar on frequency for reports' generation	58

LIST OF FIGURES

Figure 1: Shows the current situation on how recordings of co-operatives societies are handled in Kilimanjaro region Tanzania.....	3
Figure 2: Excel Sheet for Recording SACCOS' Data by DCOs	6
Figure 3: Excel Sheet for Recording AMCOS' Data by DCOs.....	6
Figure 4: National consolidated report for registered co-operative societies in Tanzania.....	7
Figure 5: An evolutionary prototyping model	10
Figure 6: General framework of the developed system	22
Figure 7: Data Flow Diagram level zero of CRMS	23
Figure 8: Data Flow Diagram level one of CRMS.....	24
Figure 9: Compatibility test score	26
Figure 10: Results for performance test	27
Figure 11: Respondent's experience on using online resources	32
Figure 12: Tools currently being used to access online resources	32
Figure 13: Proposed tools for accessing co-operative information	33
Figure 14: The way co-operative data are presented to those who request them.....	34
Figure 15: Co-operative information being kept and searched in the existing in-house record keeping system.....	36
Figure 16: Reliability of co-operative information being searched	38
Figure 17: Challenges experienced in the existing process for co-operative data handling	40
Figure 18: Information proposed to be in CRMS	43
Figure 19: Templates for co-operative data entry in SACCOS	44
Figure 20: Templates for co-operative data entry in AMCOS.....	45
Figure 21: Data presentation format	46

Figure 22: Additional information to be in the CRMS	47
Figure 23: Suggested features for CRMS	48
Figure 24: The rate at which each suggestion was chosen by participants	52
Figure 25: What respondents hoped for CRMS to achieve.....	54
Figure 26: Reports to be generated by CRMS	55
Figure 27: Login page for primary co-operative societies	59
Figure 28: Co-operative societies' registration page.....	60
Figure 29: The CRMS dashboard.....	60
Figure 30: Application phase	61
Figure 31: Application status	61
Figure 32: Application status at the DRCO	62
Figure 33: Application status at the HQ.....	62
Figure 34: Application approval and rejection.....	63
Figure 35: The DCO Dashboard	63
Figure 36: Report submission Dashboard.....	64
Figure 37: Report accessibility.....	64
Figure 38: Statistical report.....	65

LIST OF APPENDICES

Appendix 1:	Questionnaire for MoCU's Regional Programme Co-ordinators (RPCs)	70
Appendix 2:	Interview Guide Questions for DCO's	77
Appendix 3:	Interview Guide Questions for the Registrar's Office	80
Appendix 4:	Poster Presentation	84

LIST OF ABBREVIATIONS

AMCOS	Agricultural and Marketing Co-operatives Societies
CB	Common Bond
CCM	Co-operative College Moshi
CRMS	Co-operatives' Record Management System
CSS3	Cascading Style Sheet
DCO	District Co-operative Officer/Office
DFD	Data Flow Diagram
DRCo	Deputy Registrar of Co-operative
EP	Evolutionary Prototyping
HTML5	Hyper Text Make up Language
ICA	International Cooperative Alliance
ICT	Information and Communications Technology
ILO	International Labour Organization
JAD	Joint Application Development
JS	JavaScript
KNCU	Kilimanjaro Native Co-operative Union
KNPA	Kilimanjaro Native Planters Association
MFI	Microfinance Institutions
MoCU	Moshi Co-operative University
PHP	Hypertext Pre-Processor
RMS	Record Management System
RPC	Regional Programme Coordinator
SACCOS	Savings and Credit Cooperative Societies
TAM	Technology Acceptance Model
TCDC	Tanzania Co-operative Development Commission
UTAU	Unified Theory of Acceptance and Use of Technology

CHAPTER ONE

INTRODUCTION

1.1 Background of the Problem

The International Co-operative Alliance defines co-operative societies as autonomous associations of persons united voluntarily to meet their economic, social and cultural needs and aspirations through a jointly-owned and democratically-controlled enterprise (International Co-operative Alliance, 2015).

Both establishment and activities of Co-operative Societies bring concerns about records management. This is due to the fact that activities of Co-operative societies tend to generate a number of records (International Co-operative Alliance, 2015).

Records, as defined by Bakare *et al.* (2016), encompass any information created, received, and retained as evidence by an organization or individual in the pursuit of legal obligations or in the transaction of business; meanwhile, records management, also outlined by the same authors, constitutes a management field tasked with the systematic control of the creation, maintenance, use, reproduction, and disposition of records.

Currently, records kept, especially, those directly related to activities and operations of co-operative societies are physically kept at primary co-operative society and office of the district cooperative officer (Anania *et al.*, 2020). For instance, information such as name of the Co-operative society, physical address, common bond activities, number of registered members in terms of sex, registration number and year, audit status, and the total number of each co-operative society type are solely availed at the district co-operative office and thus, not openly available to the public (Rwekaza *et al.*, 2018). Consequently, this obliges those in need of them such as researchers, policy makers and the public, in particular, to either physically pay a visit to the offices or use any other manual means like email or phone.

Following this analogical records management practice, there have been difficulties in updating and incorporating all the records regarding a specific primary co-operative society at the district level. This is, in particular, when moving to either regional or national level during the registration process (Katundu, 2018). Likewise, synchronizing the co-operative records, updating activity from the primary co-operative society to the district co-operative office up to

the National level is quite obscured. Moreover, there is a problem of getting real-time data to measure co-operative performance and realize the status of co-operatives (Katundu, 2018).

This study contributes to understanding the challenges in records management within co-operative societies and proposes a web-based Record Management System as a solution. The system's implementation will enhance information dissemination, reduce costs, distribute authority, promote gender equality and membership openness, and encourage researchers to contribute to the co-operative sector.

1.2 Statement of the Problem

The management of records generated by co-operative societies in Tanzania is currently lacking transparency and efficiency, despite the recognized economic benefits of co-operatives. In particular, the Kilimanjaro region of Tanzania relies on in-house record-keeping practices using ink and paper as well electronic means like excel and word files kept in stand-alone computers, resulting in various limitations. These include time-consuming processes, high maintenance costs, space constraints, vulnerability to damage and loss, limited flexibility for modifications, and restricted accessibility and security. Additionally, these records are solely accessible at the District Cooperative Officers (DCOs) and are not available to the public through cloud storage facilities as the technology focuses onto. Furthermore, there has been a lack of progress in leveraging information communication technologies (ICTs) to improve records keeping and management within co-operatives. This has led to difficulties in consolidating data from primary co- operative societies at the district level during the registration process at the regional or national level. Additionally, obtaining up-to-date data for assessing co-operative performance and understanding the current state of co-operatives is a challenge.

To address noted challenges associated to records management in co-operative societies, a web-based record management system was developed. By developing cooperative records management system (CRMS), the study enhances records management practices and improve the accessibility, accuracy, and efficiency of co-operative data for primary co-operative societies as all records will be centrally accessible through cloud facilities.

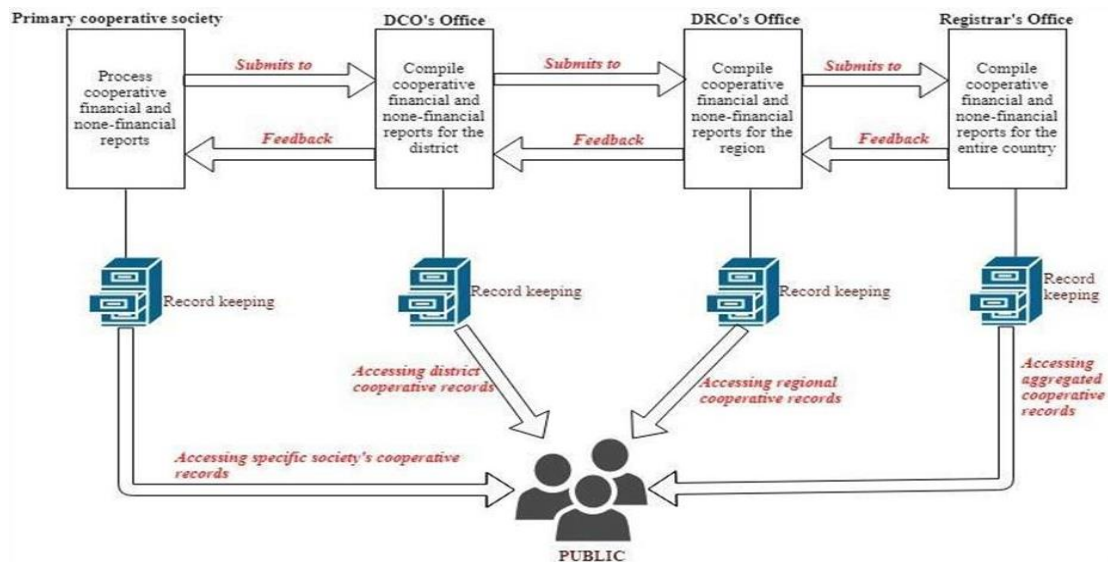


Figure 1: Shows the current situation on how recordings of co-operatives societies are handled in Kilimanjaro region Tanzania

1.3 Rationale of the Study

The study is motivated by the current deficiencies in the management of records generated by co-operative societies in Kilimanjaro region. The existing practices, characterized by in-house record-keeping using traditional methods and stand-alone computers with tools like Excel and Word, have proven to be inefficient and lacking in transparency. These practices result in numerous limitations, including time-consuming processes, high maintenance costs, space constraints, vulnerability to damage and loss, limited flexibility for modifications, and restricted accessibility and security (Azumah, 2018). Notably, the records are exclusively accessible at the DCO and remain unavailable to the public.

Moreover, the reliance on outdated record-keeping methods has impeded progress in leveraging Information and Communication Technologies (ICTs) to enhance records management within co-operatives. This gap in technology adoption has contributed to challenges in consolidating data from primary co-operative societies at the district level during the registration process at the regional or national level (Shonhe, 2017).

In response to these challenges, the study proposed the development of a web-based cooperative record management system (CRMS) tailored for co-operative societies. By introducing this CRMS, the study aimed to address the noted deficiencies and significantly enhance records management practices by availing all cooperatives records over cloud accessible facilities. The system is designed to improve the accessibility, accuracy, security and efficiency of co-

operative data for primary co-operative societies (Chang & Wills, 2016). Therefore, CRMS will contribute to the overall transparency and effectiveness of co-operative management in the Kilimanjaro region and beyond

1.4 Research Objectives

1.4.1 General Objective

To develop a Web-based Record Management System software for primary co-operative societies in Kilimanjaro region, Tanzania.

1.4.2 Specific Objectives

The study aimed to achieve the following specific objectives:

- (i) To gather requirements for a web-based records management system for primary co-operative societies in Kilimanjaro, Tanzania.
- (ii) To develop the web-based record management system for primary co-operative societies in Kilimanjaro, Tanzania.
- (iii) To validate the developed software solution.

1.5 Research Questions

The study intended to answer the following questions:

- (i) What features and functionalities are essential for a web-based records management system tailored for primary co-operative societies in Kilimanjaro?
- (ii) What technologies and programming languages are most suitable for developing a web-based records management system for co-operative societies?
- (iii) To what extent does the developed system meet the specified requirements and expectations of the primary co-operative societies in Kilimanjaro, Tanzania?

1.6 Significance of the Study

The study offers an opportunity to enhance the categorization, handling, and maintenance of co-operative records, particularly at the district level. This is because the district co-operative

offices are the sole government bodies that interact directly and collaborate with primary co-operatives at the grassroots level.

In addition, the developed system will provide accurate statistics showing exact growth number of co-operative societies in the country among others. Not only the developed system will be a source of information to policy makers, entrepreneurs, practitioners and the public at large, but also will provide a dynamic platform that will enable the DCO to update any permissible information regarding a specific co-operative society whenever provided and make it available online for other users of such information. Furthermore, the developed system will enable DCOs Office to record; manipulate and generate reports on co-operative societies' data electronically and thus, reducing challenges concerning with time, error in recording financial details and loss of information. As a result, a significant portion of the issues currently faced in Tanzania regarding the retention and distribution of co-operative information would be resolved.

Similarly, this work provides further prospects for more studies to be conducted on the building up of co-operatives in Tanzania. This will further leverage the integration of various systems used by co-operatives as well as its stakeholders such as SCULT, TCDC, and other financial institutions. Also, it is a stepping stone towards the use of user-centered design (UCD) approach in order to exhaust the needs/expectations of users on systems being developed.

As a result, the software developed would enhance the distribution of statistics related to primary co-operative societies throughout the country. This would, in turn, decrease the expenses required to obtain such information, lessen the control of those in charge of the information, promote gender equality and inclusivity in primary co-operatives, and ultimately encourage researchers to enhance the Co-operative sector by providing convenient access to relevant data.

1.7 Delineation of the Study

This work did not embrace Unions, Federation and pre-co-operatives as part of the study even though they constitute part of the co-operative industry. On the same note, it was not probable to study all related systems in co-operatives due to short of either breathing literature in relation to them or login right to them. The study re-examined some of published systems and those with access credentials provided only.

CHAPTER TWO

LITERATURE REVIEW

2.1 Empirical Literature Review

2.1.1 Current Methods at DCOs

From this work’s case, the researcher managed to go through some of the computerized methods DCOs use in gathering and keeping co-operatives’ records. For instance, in Moshi rural DCO’s office, it was clearly stated that “there is an excel sheet (Figs. 2 & 3) prepared by Deputy Registrar’s office which is used by all DCOs to feed co-operative records in their respective districts. These records in turn are forwarded to DRCO’s office in a quarterly basis and the same is done to the Registrar’s office.

JEDWALI LA UINGIZAJI WA TAARIFA ZA VYAMA VYA USHIRIKA WA AKIBA NA MIKOPO WILAYA YA MOSHI - VIJUJINI																					
Na.	JINA LA CHAMA	NAMBA YA USAJILI	TAREHE YA USAJILI	WILAYA	KATA/KUJI/MTAA	HISA ZA CHAMA (TSHS)	AKIBA (TSHS)	AMANA (TSHS)	MIKOPO ILIYOTOLEWA KWA WANACHAMA (TSHS)	BAKI YA MIKOPO KWA WANACHAMA (TSHS)	MIKOPO KARISAJI	NAMBA YA SIMU	FUNGAM ANO	WANACHAMA				AJIRA		HALI YA SASA	

Figure 2: Excel Sheet for Recording SACCOS' Data by DCOs

JEDWALI LA UINGIZAJI WA TAARIFA ZA VYAMA VYA USHIRIKA WA KILIMO NA MASOKO MOSHI - VIJUJINI																				
Na.	JINA LA CHAMA	NAMBA YA USAJILI	TAREHE YA USAJILI	MKOA	WILAYA	KATA/KUJI/MTAA	KUJINI/MJINI	AINA YA CHAMA	AINA YA ZAO	HISA ZA CHAMA	NAMBA YA SIMU	FUNGAM ANO	WANACHAMA				AJIRA		HALI YA SASA	
										HISA ZA CHAMA			ME	KE	VIKUNDI	TAASISI	ME	KE	HAI/SINZIA	

Figure 3: Excel Sheet for Recording AMCOS' Data by DCOs

Consequently, Registrar’s office aggregates all reports from all over the country and provides a national consolidated report for co-operative societies in Tanzania through its website in a module seen as statistics (Fig. 4). The challenge of using website as a means of communication

include; difficulties to get real time data, does not provide platform for co-operative registration and does not generate reports as other information systems.

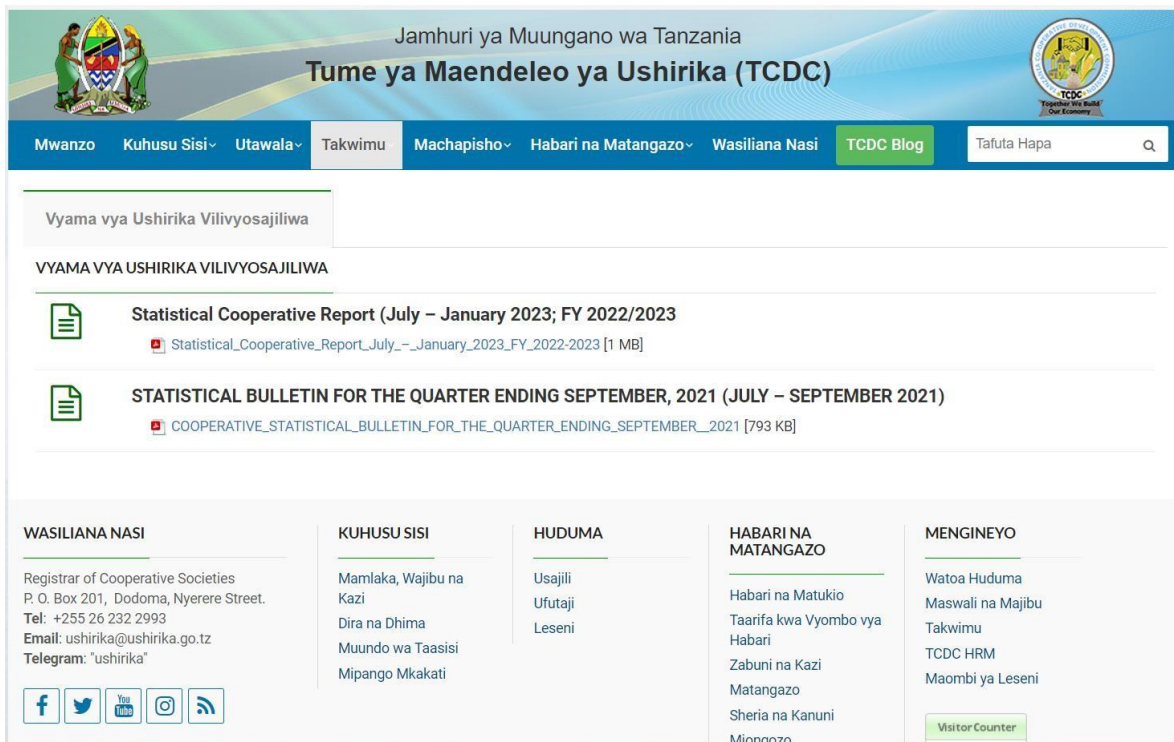


Figure 4: National consolidated report for registered co-operative societies in Tanzania

Generally, literatures and works that were reviewed revealed to the researcher that there is a need for a system that not only aggregates all the co-operative societies' records, but also provide a platform for DCOs to dynamically update records whenever required. The works reviewed were either co-operative society specific, based more on microfinance banking or did not provide an avenue for DCOs to update the contents as required by stakeholders. However, there were some features that seem more suitable for integration in the newly developed system.

2.1.2 Use of Web-Based Records Management Systems in Organisations

A web-based system comprises one or more web applications, a specific functionality-oriented component, information components, and other non-web components. Its goal is to publish and maintain data using hypertext-based principles (Adewojo *et al.*, 2013). Web-based records management systems have ability to address various challenges associated with in-house records keeping systems. Challenges could involve redundant and inconsistent data and

records, illegal access to important information and files, file security and storage, and the timely production of reports for decision-making (Olipas *et al.*, 2022).

Uka (2019) found that the use of a web-based student records management system accelerated the processing of student results, improved computation accuracy, eliminated cases of students' files being misplaced and increased the generation of records. It also facilitated timely student clearance, expedited processing of transcripts, and many other benefits. These findings suggest that the use of a web-based student records management system can assist organizations in increasing efficiency, effectiveness, and timely decision-making. In order to enhance city-scale building energy efficiency, Chang *et al.* (2016) created city BES, a web-based platform that acts as a data and computing urban platform to assist city officials and their consultants in assessing possibilities and challenges related to energy efficiency in buildings at the district and city-scale. In this sense, web-based systems offer a platform for computing tasks and data accessibility, thereby empowering policymakers to make well-informed decisions.

A study by Dagher *et al.* (2018) on the usage of blockchain technology in a privacy-preserving framework for electronic record access and control found that using an electronic records management system provides a high degree of data integrity and privacy preservation. Because a web-based records management system restrict access to authorizes staff only and allows authorized staff to access records only, it can improve the management of data. Literature consulted has shown that the use of web-based records management systems offers numerous benefits to organizations.

In Tanzania, Matto (2011) developed a secure system for customer information and portfolio tracking in microfinance institutions that held a case of selected SACCOS in Moshi municipal. The researcher identified weaknesses of existing systems and potential SACCOS information systems security threats. Later, the researcher developed a mechanism to secure the figured threats and finally validated the prototype for its viability. Regardless of all the efforts poured, still the fact remains that the researcher focused much on entity-specific systems i.e., those systems which were used in a specific SACCOS. The canvasser did not address the issue of a collective repository for co-operatives' records management as this study entails.

However, the cooperative sector in Tanzania is still lagging in developing and adopting a functional web-based records management system that could enable regulators such as the Tanzania Cooperative Commission Development (TCDC), SCULT, and others to access data

from various cooperative societies in the country, which could in turn enable them to make timely and informed decisions. Thus, CRMS is expected to provide insights on the usefulness of web-based record management systems to policymakers, whom can suggest better ways of improving the performance of cooperative in the country.

2.2 Theoretical Literature Review

2.2.1 Technology Acceptance Model

The study adopted the Technology Acceptance Model (TAM) model for theoretical framework. The TAM is one of the useful models for determining the adoption and utilization of new technology (Sayaf *et al.*, 2021). The TAM model has two factors that determine the adoption and use of new technology. The two TAM factors are the individual's perception of how simple the new technology is to use and the utility of the technology to the individual. The TAM has additional factors, which are the social influence process and the cognitive instrumental process. The use of new technology has cultural and social merits.

The system will be developed using two aspects of TAM: perceived ease of use and perceived usefulness. These two constructs were used to ensure the acceptance and usability of the proposed system. Several studies depicted that the acceptance of new technology depend much on these two TAM constructs (Deslonde & Becerra, 2018). The CRMS users will be involved in all different phases of the development process in order for them to be acquainted with the system. This makes users to perceive CRMS to be easily used as well as regard it useful in their daily cooperative undertakings hence TAM model is incorporated to address objectives of this study.

The development process of Cooperative Records Management System (CRMS) adopted a Joint Application (JAD) Model in which an Evolutionary Prototyping (EP) method was paramount throughout the process. The EP was implemented in order to increase users' involvement in the development process as well as to capture users' requirements exhaustively. This method encompasses the following development phases; designing, prototype construction, prototype testing by user, user feedback, prototype refining, and final product development as presented in Fig. 5.

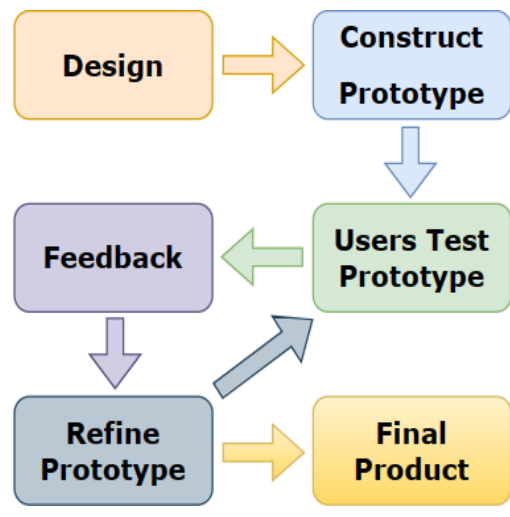


Figure 5: An evolutionary prototyping model

CHAPTER THREE

MATERIALS AND METHODS

3.1 Research Philosophy

Research philosophy has been used in the development of knowledge and the nature of that knowledge (Saunders, 2009). Research philosophy is divided into two schools of thought, positivism and interpretivism. Positivists states that reality can only be extracted from observable phenomena. Proponents of this school believe that there is only one reality independent of the observer. Positivists consider the universe to be administered by definite principles or laws discovered objectively (Cardwel, 2015). Interpretivism explains that reality depends on the interpretation of the observer and its prevailing situations. All social phenomena depend on the environmental context in which they occur and can therefore be interpreted based on that context according to the perception of the observer (Cardwel, 2009). This study adopted a positivist school of thought, which is why the quantitative data was gathered from the field using questionnaires.

3.2 Study Area

The present study was conducted in the Kilimanjaro region. The region was selected due to presence of more co-operative societies and key stakeholders: District Co-operative Officers (DCOs), Researchers (who represented the public) and Registrar of co-operatives.

3.3 Study Design

To optimize the chances of achieving improved outcomes, a combination of quantitative, qualitative, and modeling techniques was utilized in gathering requirements for the design, development, and validation phases. It is recognized in the literature that each technique for eliciting requirements has its own strengths and weaknesses, which depend on factors such as information density, cost, time, follow-up possibilities, user involvement level, and potential audience size (Abbasi *et al.*, 2015). Additionally, Sood and Arora (2012) suggest that while using multiple techniques may not be cost-effective, it does ensure maximum coverage.

3.4 Sample Size

For this research, a sample of 13 participants was chosen taken from all 13 regional offices of the Moshi Cooperative University (MoCU) in Tanzania to represent researchers working in the co-operative arena. Furthermore, key informants included three District Co-operative Officers (DCOs) from Moshi municipal council, Moshi district council, and Rombo district, as well as a representative from the office of the Registrar of co-operatives in Dodoma, Tanzania.

3.5 Reviewing Existing Record Management Practices and Associated Challenges

To achieve a thorough comprehension of record management practices, challenges, and user expectations, as well as to promote strong user involvement throughout the study, a range of data collection techniques were employed, including key informant interviews, observations, documentary review, and questionnaires. The subsequent sections outline the specific application of each method.

3.5.1 Key Informant Interviews

Interviews involve direct communication with one or two individuals, wherein questions are posed and the responses are documented, ultimately leading to a comprehensive understanding of requirements. According to Sood and Arora (2012), interviews can be structured, semi-structured, or unstructured. In this study, semi-structured interviews were utilized with key informants to gather detailed information and gain a deeper insight into user expectations.

The interview guide questions (Appendices 4 & 5) were divided into two main parts, 1 and 2. Part 1 focused on evaluating the current system, while Part 2 was further divided into two sections. Section A was designed to solicit feedback on the overall requirements for the proposed co-operative records management system, while Section B aimed to identify specific requirements related to generating reports.

Interviews were carried out with three DCOs as well as one representative from the office of the Registrar of co-operatives. The objective of the interview was to understand the in-house process recording and preparing co-operative societies reports. On the other hand, all contents regarding co-operative industry are owned by Registrar of co-operatives while DCOs are the content processors from the grass roots i.e., co-operative societies. Co-operatives' records originate from co-operative societies and passed on to DCOs who intern process them for upper

levels of management. Therefore, it is evident that primary users of the developed system are the DCOs while Registrar stands as an overall overseer.

The semi-structured interviews were conducted using entirely open-ended questions to obtain a comprehensive list of the types of information and records being kept, as well as those that participants would like to access online. The researcher also inquired about the participants' desired features and reporting requirements for the proposed system. The suggested features and requirements provided by the respondents were examined and incorporated into the prototype of the new system. Additionally, the study utilized verbatim transcription, which captured a respondent's acknowledgement of the challenges associated with using paper during co-operative society registration. He stated that, "*we use paper and ink to record co-operative societies information and face challenges such as; consumption of time, loss of data and errors in recording financial details*".

3.5.2 Observations

Observation is a data collection method that involves the ability to notice and gather information on both significant and seemingly insignificant details (Mintrom & Luetjens, 2016). This method provides the advantage of confirming and validating requirements obtained through other techniques, as well as being less financially demanding (Sood & Arora, 2012). Physical observation was conducted at the DCO Office to observe the in-house process of keeping co-operative records, as well as the challenges faced by employees during the process. Furthermore, observation was utilized to identify requirements that respondents were unable to explain adequately or were uncertain if they were requirements.

3.5.3 Documentary Review

One of the methods for collecting data is through a documentary review, which includes examining published and unpublished documents such as co-operative society registration forms, reports, internet sources, statistics, journals, and other grey literature from various sources like ILO, ICA, SCCULT, and government reports related to co-operatives and record-keeping practices. The aim of using this approach is to gain a better understanding of the management practices of records, potential difficulties, and any expectations from users. The reports being analyzed are prepared by co-operative societies, DCOs, DRCOs, and the Registrar.

3.5.4 Questionnaires

A questionnaire is a straightforward tool that enables the efficient collection of information from multiple respondents, and can comprise both open and closed questions, which ultimately characterize responses as either quantitative or qualitative data (Gahyyur *et al.*, 2010). In this study, questionnaires (Appendix 3) were administered to 13 researchers from 13 Moshi Cooperative University's (MoCU) Regional Offices all over Tanzania.

The questionnaires primarily consisted of closed questions to accurately capture and analyze respondents' data without estimations. However, open-ended questions were also included to provide respondents with ample opportunity to explain their perspectives. The questionnaire was divided into five sections, namely A, B, C, D, and E. Section A pertained to the demographic information of the respondents, while section B reviewed the current process of acquiring co-operative records. Section C aimed to assess respondents' experience with online resources. Section D was further divided into two subsections, D(i) and D(ii). Subsection D(i) focused on gathering respondents' input on general requirements for the proposed system, while subsection D(ii) aimed to elicit specific reporting requirements for the system. Finally, section E aimed to gather respondents' general knowledge and expectations regarding the anticipated objectives that the proposed system would achieve.

Additionally, the research employed this approach to obtain comprehensive data on the obstacles associated with the in-house process of storing information on co-operative societies as well as the type of reports that researchers require, including statistics on the number and type of co-operatives, information on co-operative activities, the number of registered co-operatives and their membership status, and financial reports. Moreover, experts in the ICT field emphasized the importance of designing a user-friendly system capable of producing reports in various formats.

3.6 Determining Requirements for a Web-Based Records Management System

This section investigates the necessary requirements to achieve the anticipated result. The survey data from this study disclosed the user expectations that an ideal Record Management System (RMS) software solution should concentrate on to meet the objective of this study. Structured questions were presented in both hard-copy and soft-copy formats using the Open Data Kit (ODK) software to gather information on CRMS requirements. The collected data, including both quantitative and qualitative responses, underwent statistical analysis for

multiple purposes. The SPSS software was utilized for statistical analysis due to its simplicity and standardized presentation of tables and charts, such as pie charts and histograms. Other statistical software programs, including Excel, R, and SAS, were not utilized due to the requirement for manual formula input, the level of difficulty in learning them depending on a user's programming background, or the lack of standard visualization options.

3.6.1 Functional Requirements

The functional requirements usually detail what the system shall do in response to the user's requests. This might include calculations, technical details, data manipulation and processing, the system's behavior, and other specific functionality that define what a system is supposed to accomplish. Table 1 displays the functional requirements as they were given out by respondents during the survey.

Table 1: The functional requirements of designed CRMS

Module	Req. ID	Activity	Entity	Requirements
User Management	FR.1	Login/logout	Admin, DCO , DRCO and Registrar	System should provide an interface to allow user to login and logout
	FR.2	Office Location	Admin And DCO	System should provide an interface to allow user to view, add and edit the following details for office location: District, Province
	FR.3	Create users and assign roles	Admin	The system should provide an interface to: Create users, Assign privileges
	FR.4	Add or create user	Admin	System should provide an interface to allow user to add new user to the system. Name of the Officer in Full Office address Select district and province Email Address (username) Password (Can change password and if lost can reset him/her self) Select User Role (allow multiple roles) Mobile number

Module	Req. ID	Activity	Entity	Requirements
Cooperative Records	FR.5	Update users	Admin	The system should provide an interface to allow user perform the following user updates: Block/mute user, Remove user
	FR.6	Update accounts	Admin, DCO, DRCO, Registrar	The system should provide an interface for user to: Change password Reset password Change themes Change profile photo
	FR.7	Manage user roles (DCO)	Admin	System should provide an interface to allow user to create and assign the following roles: Enter coop. data in the district Update coop. data in the district
	FR.8	Manage user roles (Registrar)	Admin	System should provide an interface to allow user to create and assign the following roles: Register coop. societies De-register coop. societies
	FR.9	Perform back-up	Admin	System should provide an interface to allow user to perform system back-up on a timely basis
	FR.10	Manage adverts	Admin	The system should provide an interface for user to: Post adverts, Remove adverts
	FR.11	Manage approved collaborators (Registrar)	Registrar	The system should provide an interface for user to add or remove collaborators with the following information: Collaborators' profile, Objectives of the collaboration, Collaboration period Value of the collaboration, Execution plan for the collaboration
	FR.12	Enter cooperative data (Registrar)	Registrar	The system should allow the user to register a cooperative society with the following data: Name and location details of the society, Type of coop society, Registration date Initial membership status (gender-wise)

Module	Req. ID	Activity	Entity	Requirements
	FR.13	Enter cooperative data (DCO)	DCO	<p>The system should provide an interface for user to enter the following primary coop. society's data in the district:</p> <p>Name</p> <p>Address (physical & postal)</p> <p>Type of coop. society</p> <p>Membership (gender-wise)</p> <p>Status (active/inactive)</p> <p>Share capital</p> <p>Disbursed loans</p> <p>Business operations</p> <p>Employees & contacts</p> <p>Coop's leadership</p>
	FR. 14	Update cooperative data	DCO	<p>The system should provide an interface for user to update the following coop records:</p> <p>Address (physical & postal),</p> <p>Type of coop. society,</p> <p>Membership (gender-wise), Status (active/inactive),</p> <p>Share capital, Disbursed loans</p> <p>Business operations</p> <p>Employees & contacts</p> <p>Coop's leadership</p>
	FR.15	Search cooperative information	DCO, DRCO, Registrar, and Public	<p>The system should allow a user to search for:</p> <p>Gender segregated data</p> <p>Coop type-based data</p> <p>Number of cooperatives (in the district, region or country)</p>
	FR.16	Share cooperative information (Registrar)	Registrar and DRCO	<p>The system should allow the registrar to share the following:</p> <p>Internal memo, Internal resolutions</p>
		Enter chartroom	DCO	<p>The system should provide an interface for DCO's and DRCO's have a private chat</p>

Module	Req. ID	Activity	Entity	Requirements
Reports Generation	FR.17	View and print financial reports	Public, DCO, DRCO, and Registrar	<p>The system should allow user access coop society's financial reports with the following information:</p> <p>Total shares</p> <p>Savings</p> <p>Loans disbursed</p> <p>Loans returned</p> <p>Pending loans</p> <p>Expenditures</p> <p>Report status (audited/unaudited)</p>
	FR.18	View and print cooperative registration records	Public, DCO, DRCO, and Registrar	<p>The system should allow users to see the number of registered coop societies based on the following:</p> <p>Total (district-wise, region-wise and country wide)</p> <p>Total (based on specific year)</p> <p>Total (based on type of business operations)</p>
	FR.19	View and print cooperative membership status	Public, DCO, DRCO, and Registrar	<p>The system should allow users view co-operative membership status report by filtering:</p> <p>Gender</p> <p>Area (district, region, or country)</p> <p>Specific year</p>

3.6.2 Non-functional Requirements

Non-functional requirements define the standards that can be employed to assess the functioning of a system. Rather than specifying particular behaviors, they establish quality characteristics that evaluate the system's operation. This research divides non-functional requirements into three sections: general system requirements, operational requirements, as well as security requirements. The listed non-functional requirements are the result of analyzing the documents studied by Inayat *et al.* (2015). outlining the essential considerations for developers while developing electronic systems.

(i) General System Requirements

There are a number of general requirements that are not business process-specific but are important from the perspective of overall system functioning. These requirements describe system capabilities that are necessary to support the design and how the systems should work. The designed CRMS software solution should adopt the following general requirements as seen in Table 2.

Table 2: General System Requirements of designed CRMS

Req. ID	Function Description
NFR. 1	The system should be compatible to different technologies; iOS, ubuntu and Microsoft
NFR. 2	The system should be flexible to interface or integrate with other systems.
NFR. 3	Reliability and portability of the system
NFR. 4	Short response time of the system

(ii) Operational requirements

Operational requirements are among non-functional requirements that focus on how user operates the system including interfaces and interoperability with other systems (Abran, 2010). The following operational requirements (Table 3) generated from the responses provided by the public who were presented by researchers on co-operative arena.

Table 3: Operational Requirements of designed CRMS

Req. ID	Function Description
NFR. 6	The system should be able to back up data automatically, at a schedulable frequency, and the backup data should be held at an offsite location so that it is recoverable in the event of a system or hardware failure.
NFR. 7	The system should not require high bandwidth only devices and should accommodate client devices with low bandwidth or irregular connectivity.
NFR. 8	The system should provide adequate data capacity for archiving data.
NFR. 9	The system should be user-friendly and intuitive to use for experienced and inexperienced users.
NFR. 10	The system should be centralized, web-based, and work in both the intranet and internet environments.
NFR. 11	The system should support browser compatibility.
NFR. 12	The system should not require paying additional application software license fees.
NFR. 13	The system should support users with a knowledgeable and responsive help desk, with remote access to computers for quick diagnosis and solution of issues.
NFR. 14	The system should provide a menu of service options with navigation between options and sub-options.
NFR. 15	The system should be based on a system of unique identifiers, preventing the creation of duplicates, and issuing warnings if users try to do so.
NFR. 16	The system should ensure that only complete transactions are saved to the database; incomplete pieces to be rolled back.
NFR. 17	The system should be easily scalable to cater for “peak” processing volumes.
NFR. 18	The system should accommodate a large number of concurrent (1000s) users and multiple (1000s) users with the reasonable response time.
NFR. 19	The system should be available at all times, 24/7.
NFR. 20	The system should be easily supported and maintained.

(iii) Security requirements

Inayat *et al.* (2015) study on non-functional requirements asserted that security requirements are crucial in the development of systems to safeguard data from unauthorized access. The

study emphasized three fundamental principles of security (confidentiality, integrity, and availability) that guide the field of information security. To ensure the protection of records from unauthorized access, this research adopted the following security requirements for the developed record management system as seen in Table 4, based on a documentary review of papers on non-functional requirements (Saad, 2016; Rune, 2007; Julio, 2009; Inayat *et al.* 2015).

Table 4: Security requirements

Req. ID	Functional Description
NFR. 32	The system should easily be scaled to support large transaction volumes and many users concurrently.
NFR. 33	The system should be tested and enhanced as required, using the appropriate system development tools, to support increasing numbers of system users as necessary to provide nationwide support of the activity.
NFR. 34	The system should enable a task to be canceled and rolled back to its previous state.
NFR. 35	The system should be able to archive data/records that have reached a certain age specified by administrators.
NFR. 36	The system should support a range of data entry devices and form factors.
NFR. 37	The system should enable a task to be interrupted and resumed.
NFR. 38	The system should exchange data with other approved systems

Moreover, the provided functional and non-functional requirements enabled development of co-operative record management system which allows registration and manipulation of co-operatives societies' data. In addition, the system provides interface for DCO, DRCO and Registrar to view and generate reports of co-operative societies. Lastly, the front-end of the system allows the public (including policy-makers, researchers, and government officials) to access and print information on co-operative societies.

3.7 Designing and Developing the Web-Based Records Management System

This section aims to provide a blueprint or plan for the CRMS, which outlines the system's functionalities, architecture, and user interface design. It considers user and system requirements and identifies the optimal approach to meet these requirements.

3.7.1 Software Development Model

In the present study, a Joint Application Development (JAD) approach incorporated an Evolutionary Prototyping (EP) method was used for records management software development (Nguyen-Duc *et al.*, 2017). The principal lead of EP is its flexibility in requirements elicitation, especially when client's goal is not well understood (Chandra, 2015).

3.7.2 Conceptual Design of the Co-operative Record Management System

The conceptual design focuses on the system's structure and components. The system flow begins with co-operative societies submitting their information manually to the DCOs Office, which registers and enters the data into the system before submitting it to the DRCOs Office. The DRCOs Office then manipulates the data and submits it to the Registrar. All offices can search and generate reports as needed, and all processes are carried out through the system. The general framework of the proposed system is illustrated in Fig. 6.

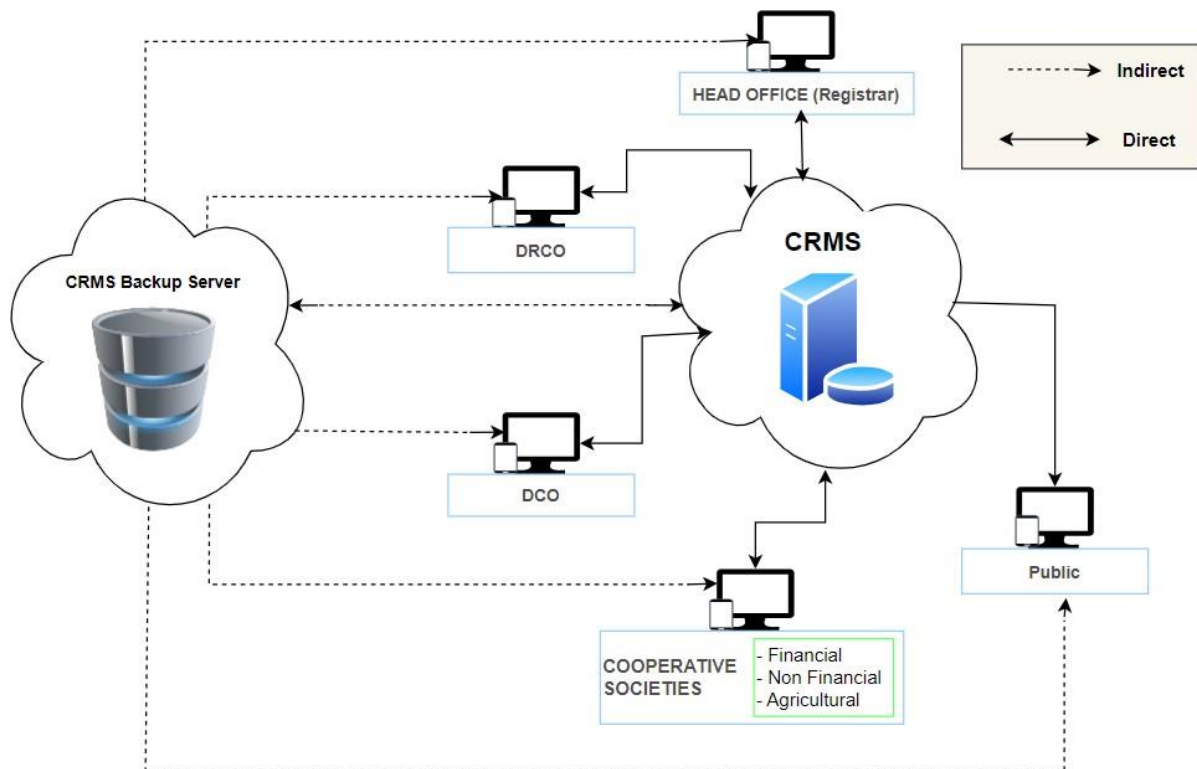


Figure 6: General framework of the developed system

3.7.3 Database Design

The designing was aimed for storing organized and relational information in a centralized database. In this case, Data Flow Diagram (DFD) technique was considered to depict database

structure of the designed software solution (CRMS). Also, it was used to show where the data comes from, where it goes and how it gets stored. This technique was used because, it makes easy to map out an existing system and make it better or to plan out a new system for implementation. Therefore, the DFD for CRMS was designed through the following cases: -

(i) Case I: Data Flow Diagram (DFD)-level zero of CRMS

This section describes a top-level data flow diagram which shows the process node for the proposed web application namely CRMS and that depict the function of the whole system. That is, Registrar, DCO, public and DRCO is confirmed as external entities, because they offer and retrieve from a central process node, which is CRMS. As shown in Fig. 7.

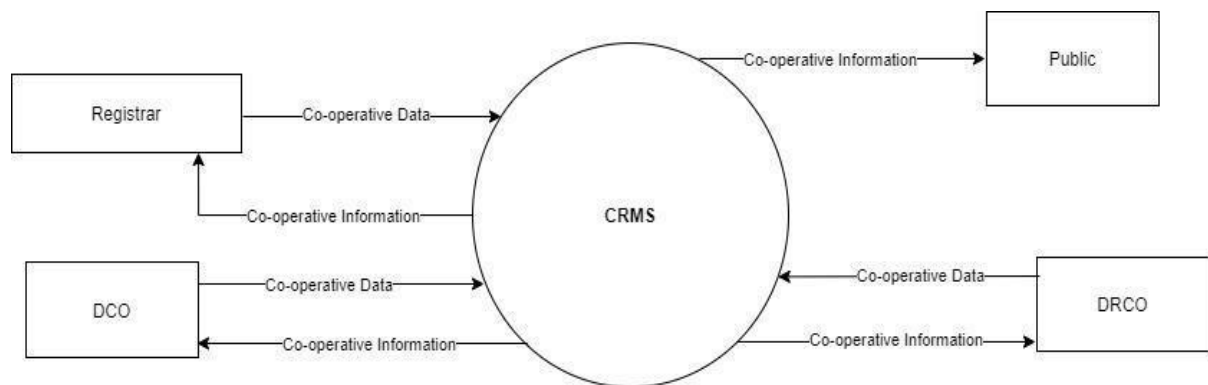


Figure 7: Data Flow Diagram level zero of CRMS

(ii) Case II: Data Flow Diagram level one of CRMS

In this case of level 1 of CRMS offers detailed information of the processes that make up a proposed web application than level 0 DFD does. The DFD level 1 is elucidate to plan and design the specific makeup of the proposed software solution, that embody storage, external entities, processes and flow of information from process to process, external entities to process and process to process (Fig. 8).

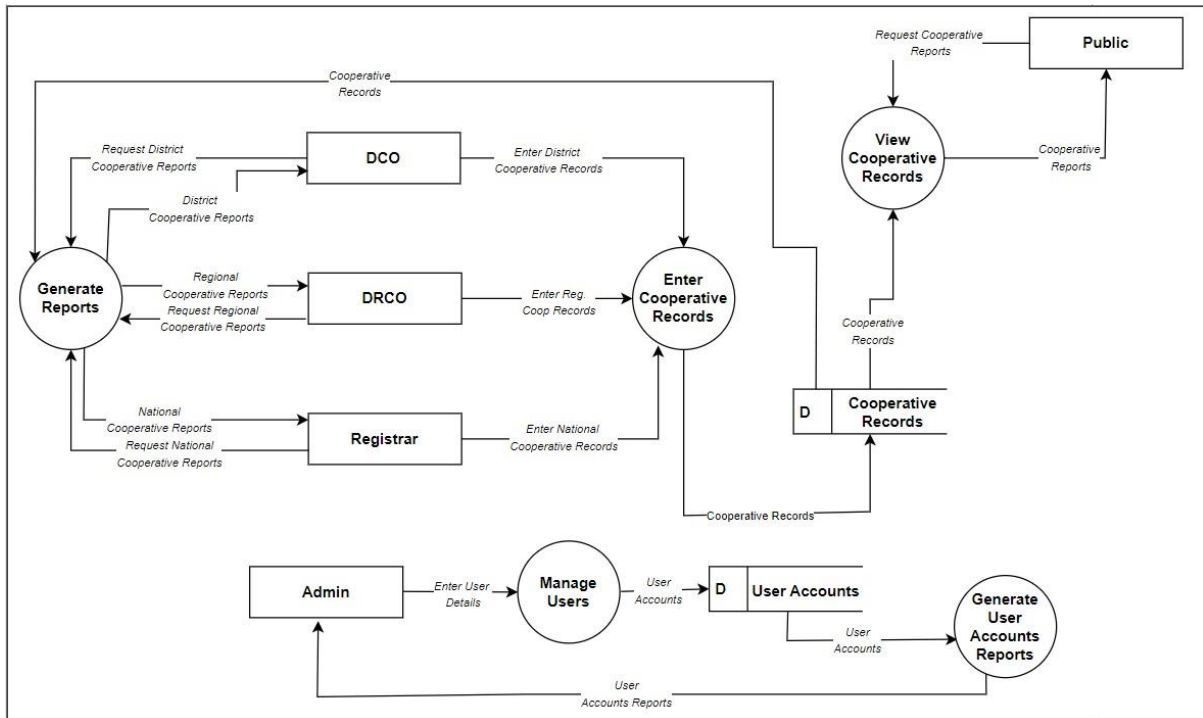


Figure 8: Data flow diagram (DFD) - level one of CRMS

3.7.4 Physical Design/Implementation of the Web-based Co-operative Records Management System

This part describes how the system will operate in a physical environment. Herein, requirements from the logical design were implemented using the following front-end tools; HTML5 (Hyper Text Make up Language) which was used for structuring and presenting content of CRMS on the World Wide Web while CSS3 (Cascading Style Sheet) was used to describe iteration of the CSS standard used in the styling and formatting of CRMS Web pages; including layout, navigations, colors, menus and fonts. Nonetheless, for back-end implementation the following tools aided greatly in the development of CRMS; PHP (Hypertext Pre-Processor) was used because is a widely-used open source-general-purpose scripting language that is particularly suited for web development and can be embedded into HTML, JS (JavaScript) used to make the designed web pages interactive, and MySQL database was used because it is suitable for deploying cloud-native applications.

3.8 Validation and Maintenance of the Developed Software Solution

this part of the study discusses design strategies that don't have a major impact on the overall structure and organization of the system. These tactics focus on the finer details of the system's

interface and implementation, rather than making significant changes to the system's high-level structures.

3.8.1 User Validation Testing

Hundred (100) entries were collected through questionnaires, and only those that were completed correctly were used for the subsequent analysis. The 100 entries were divided into three clusters of system users: the first cluster comprised 5 officers from the office of Registrar of co-operatives i.e., 3 DCOs, 1 RCO, and 1 representative from Registrar's headquarter; another cluster were the 13 regional offices of Moshi Co-operative University; while the third group comprised 82 primary co-operative societies randomly selected from three districts of the study area. The survey questionnaires, which consisted only of soft-copy questions, were administered using the Open Data Kit (ODK) software, and participants responded by choosing from Agree, Disagree, or Neutral options. Table 5 presents the results of the analysis, which confirm and quantify the effectiveness of the designed software solution and indicate strong agreement with its implementation. However, a minority of participants expressed dissatisfaction with the operational and functional aspects of the designed solution (CRMS).

Table 5: User Validation Test Results

Validation criteria	Respondent	Agree	Disagree	Neutral
Does CRMS improve dissemination of information regarding primary co-operative societies' statistics?	DCOs, RCO, and Registrar, Regional offices, Primary co-operative societies	80%	15%	5%
Is CRMS minimizing the cost needed to acquire co-operative information?	Regional offices	80%	15%	5%
Does CRMS reduce or split the power of custodians of the co-operative information?	Regional offices	72%	18%	10%
Is CRMS encouraging gender equality?	DCOs, RCO, and Registrar, Regional offices, Primary co-operative societies	46%	34%	20%
Does CRMS improve membership openness in primary co-operatives?	DCOs, RCO, and Registrar Regional offices	61%	28%	11%
Does CRMS encourage researchers to improve the co-operative sector due to the easy way of accessing related data?	DCOs, RCO, and Registrar Regional offices	81%	19%	-

3.8.2 Acceptance Testing

According to the survey findings, the CRMS has received positive verification from 80% of applicants i.e., DCOs, RCOs, Registrar, Regional offices, and Primary co-operative societies. The CRMS also has 50 primary co-operative societies which already have full registration and perform their operations using provided features in the system.

3.8.3 Compatibility Testing

To assess compatibility, the CRMS underwent testing on ten web browsers, namely Chrome, Mozilla Firefox, UC-Browser, Internet Explorer, Opera Mini, Safari, Chromium, Vivaldi, Brave, and Microsoft Edge, across three different devices i.e., computer, mobile phone, and tablet. The analysis of the results indicates that the system performs well, with scores of 75%, 80%, and 55% on computer, mobile phone, and tablet, respectively as shown in Fig. 9.

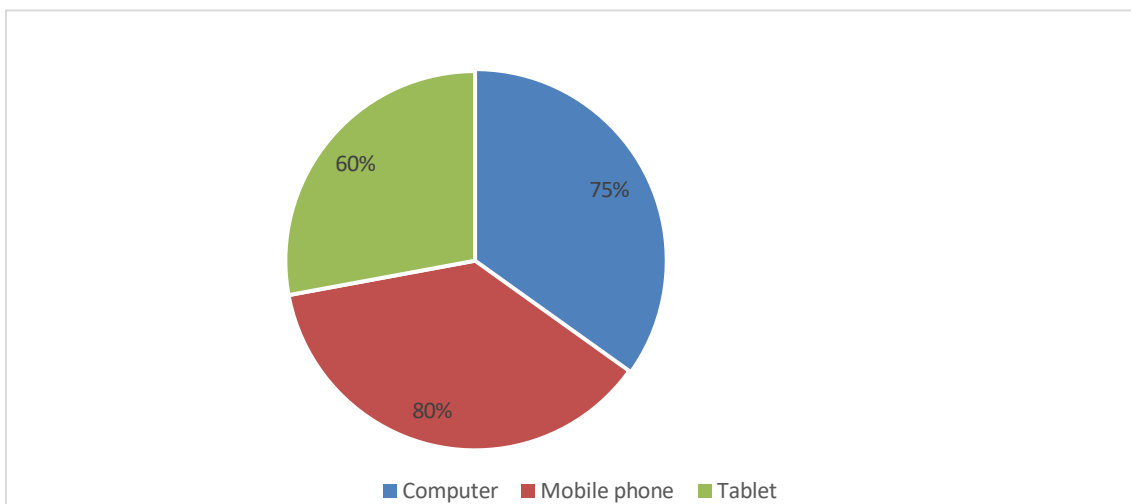


Figure 9: Compatibility test score

3.8.4 Performance Testing

Performance testing is used to evaluate the scalability of applications or websites, as well as to assess the performance of third-party products like servers and middleware that may be considered for purchase. This type of testing is especially valuable for identifying performance bottlenecks in applications that experience heavy usage. Automated testing is typically employed in performance testing, as it enables the simulation of normal, peak, and unusual load conditions. As a result of such testing, the CRMS achieved a score of 89% for computer, 80% for mobile device and 85% for tablet on the Google Speed Insight tool as shown in Fig. 10.

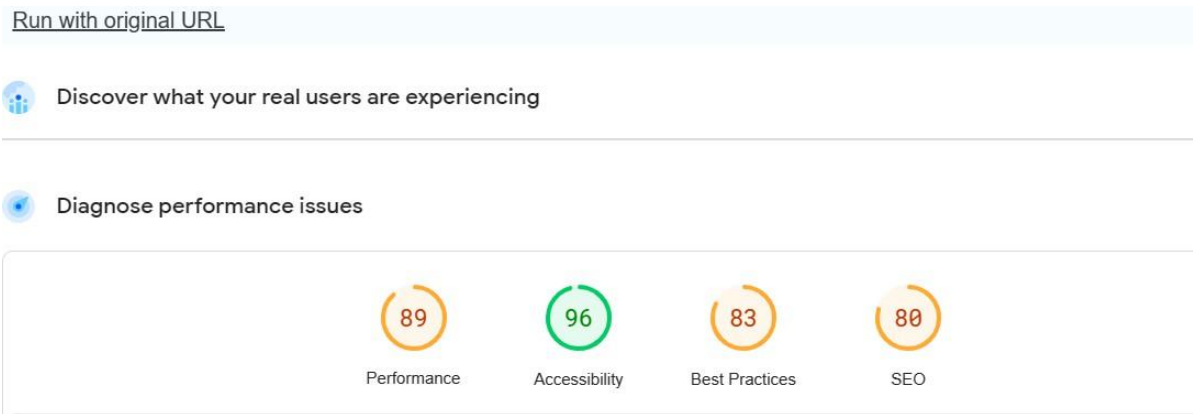


Figure 10: Results for performance test

3.8.5 Maintenance of CRMS

In order to meet customer needs, the CRMS went through various maintenance and testing phases until the ultimate version was reached. Table 6 provides information on how the development and distribution of the test cases, up to the final point of approval, was controlled and tracked.

Table 6: Shows maintenance trend of CRMS

Version #	Revision date	Approval date	Test case
1.0	15-June	01-July	System testing
1.1	02-July	20-July	Unit testing
2.0	21-July	01-August	User validation testing
2.1	02-August	15-August	User acceptance testing
3.0	16-August	18-August	Compatibility testing
4.0	19-August	30-August	Performance testing

CHAPTER FOUR

RESULTS AND DISCUSSION

4.1 Demographic Information

A total of 13 respondents were given questionnaires so as to extract information related to user requirements. Table 7 presents demographic information of the respondents as follows: respondents aged in between 26 and 40 years were 10 out of 13, equivalent to 83%. 3 respondents were aged between 41- and 60-years equivalent to 17%. While none of the respondents was under the 25 nor above 60 years. However, male respondents were 10 which is equivalent to 83% while females were 3, equivalent to 17%. All respondents had university education level. Also, all respondents were Regional Programme Coordinators (RPCs) under Moshi Co-operative University.

Table 7: The demographic characteristics of the system users

Characteristics	Category	Frequency	Percentage
Age (in years)	<25	0	0
	26 - 40	10	83
	41 – 60	3	17
	Above 60	0	0
	Total	13	100
Sex	Male	10	83
	Female	3	17
	Total	13	100
Education level	University	13	100
	College	0	0
	Secondary	0	0
	Others	0	0
	Total	13	100
Job category	Academician	13	100
	Administrative	0	0
	Other	0	0
	Total	13	100

4.2 Records Keeping Practices

The following subsections present the findings from documentary review, respondents' responses from questionnaires, observations by the researcher and interviews' response by key informants to current record management practices, associated challenges and user requirements for a web-based records management system for primary co-operative societies in Tanzania.

This section presents the results for existing practices and challenges of co-operative records management including ways/tools for keeping and accessing them, the types of information being accessed as well as co-operative records accessibility options and its management.

4.2.1 Existing Ways/Tools and Types of Information for Records Keeping of Co-Operative Societies

The researcher conducted interviews with both DCOs and the Registrar's office to explore the types of information generated by co-operatives and the various methods used for record-keeping. The findings from the questionnaires indicated that all 13 respondents (100%) reported using both hard copies and soft copies for record-keeping purposes. During key informant interviews, the DCOs and Registrar's office mentioned using physical files such as clip and spring files, file cabinets, as well as computer files including word processors (Ms. Word), spreadsheets (Ms. Excel), pdfs, and images for record-keeping. Both manual tools such as pens and papers, and electronic tools such as computers, smartphones, and cameras were reported to be used for processing work by all interviewees as seen in Table 8.

Table 8: Responses from DCOs and Registrar's office on the types of generated information for records keeping

Question	Rombo DC	Moshi DC	Moshi Municipal	Registrar
What kind of information do you normally keep?	Number of members (gender-wise)	Name, registration date & number, and location	Coop registration details	Compliance records
	Primary coop societies statistics in the district	Number of members and shares	The number of cooperatives in the district	Coop performance data
	Cooperative registration information	Type of the coop entity	Co-operatives' membership data (gender-wise)	Coop registration data
	Common bond	Common bond	Co-operatives' leadership information	
	Minutes of the first members' meeting	Correspondent number (mobile)	Co-operatives' operating status	
	Number of employees in the coop society	Number of employees	Co-operative financial data (shares, savings, deposits, loans (from internal and external sources), repayments)	
	Coop entity status (active/dormant)	Financial reports and budgets	Collection and selling of crops and products (for non-financial cooperatives)	
	Coops' monthly reports	Current status	Co-operative societies' projections and budgets	
	Budgets		Co-operative partners	
			Community services offered by coop societies	

4.2.2 Records Accessibility Options and Its Management

Both questionnaires and key informant interviews with DCOs and the Registrar's office personnel were used to find out the existing ways used for accessing co-operative records. Table 9 presents the responses from participants.

Table 9: Existing record acquisition methods

Existing record acquisition methods			
S/N	Methods	Frequency	Percentage
1.	Physically visiting respective offices	13	100
2.	Using online resources	9	69.2
3.	Asking others (colleagues)	7	53.9
4.	Reading books and other articles	3	22.1
5.	Other	0	0

(i) Experience on online resources

The researcher had a couple of questions trying to investigate respondents' experience on utilizing online resources especially to the general public. Researcher needed a general overview of respondents to see whether they normally have habit of accessing online resources. In conjunction to habit, this section also explored preferred tools for accessing online resources as well as suggestion to the preferred tools for accessing co-operative information in the designed system.

Respondent's experience on using online resources

The researcher tried to discern respondents' experience on using online resources generally. This part gave respondents an opportunity to manifest their reliance on online resources by selecting strongly dependent, average user or not using online resources at all.

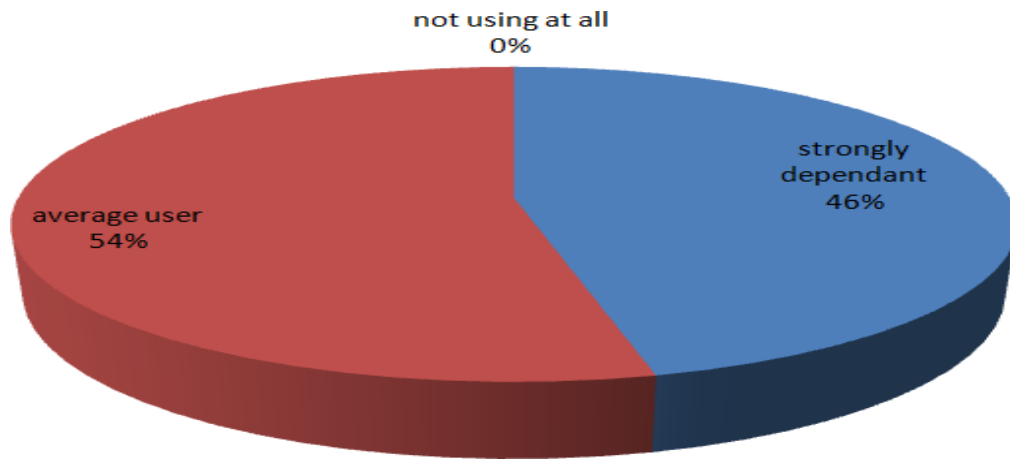


Figure 11: Respondent's experience on using online resources

From Fig. 11, 46% which represents 6 respondents accorded to be strongly dependent on online resources while 54% which represent the other 7 respondents were average consumers of online resources. Therefore, all respondents use online resource.

Tools currently being used to access online resources

This part explored on tools or devices that are currently being used by respondents in order to access online resources. The researcher laid out a list of devices where respondents were to make a choice out of them. Respondents had the ability to make more than one choice if willing.

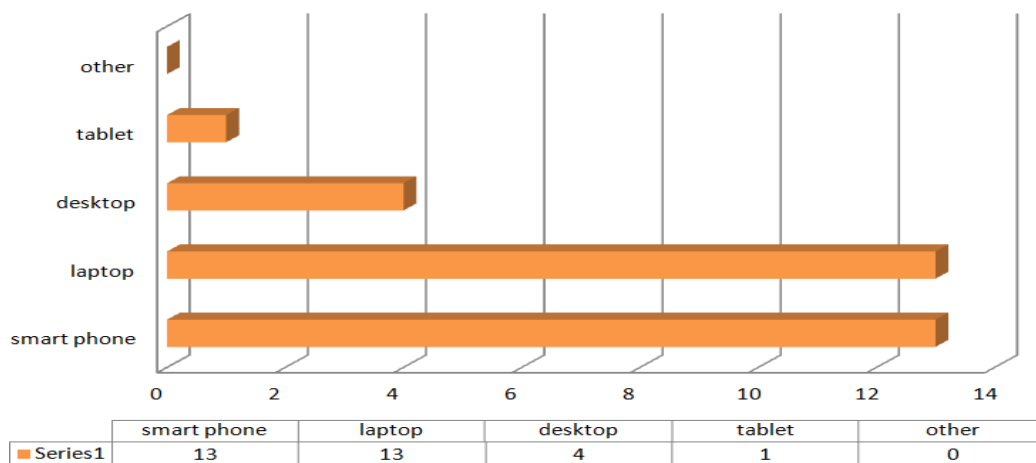


Figure 12: Tools currently being used to access online resources

In Fig. 12 it can be realized that all 13 respondents, equal to 100%, use smart-phones and laptops in order to access online resources. Out of 13 respondents, 4 of them included desktop computers to access online resources while only 1 respondent uses tablet for such activity.

Suggested tools for accessing co-operative information on developed CRMS

The main objective of this study was to develop an applicable record management system for primary co-operative societies in Tanzania. In this section, the researcher provided a list of gadgets which respondents would like to use whenever accessing co-operative records in the developed software solution (CRMS). In this list, respondents were allowed to have multiple selections. As it may be observed in figure 13, out of 13 respondents only 11 (91.7%) replied to the question whereby all of them selected smart phone and laptop for accessing co-operative information. Only 4 (33.3%) respondents included desktop computers and 5 (41.7%) went for tablet as seen in Fig. 13.

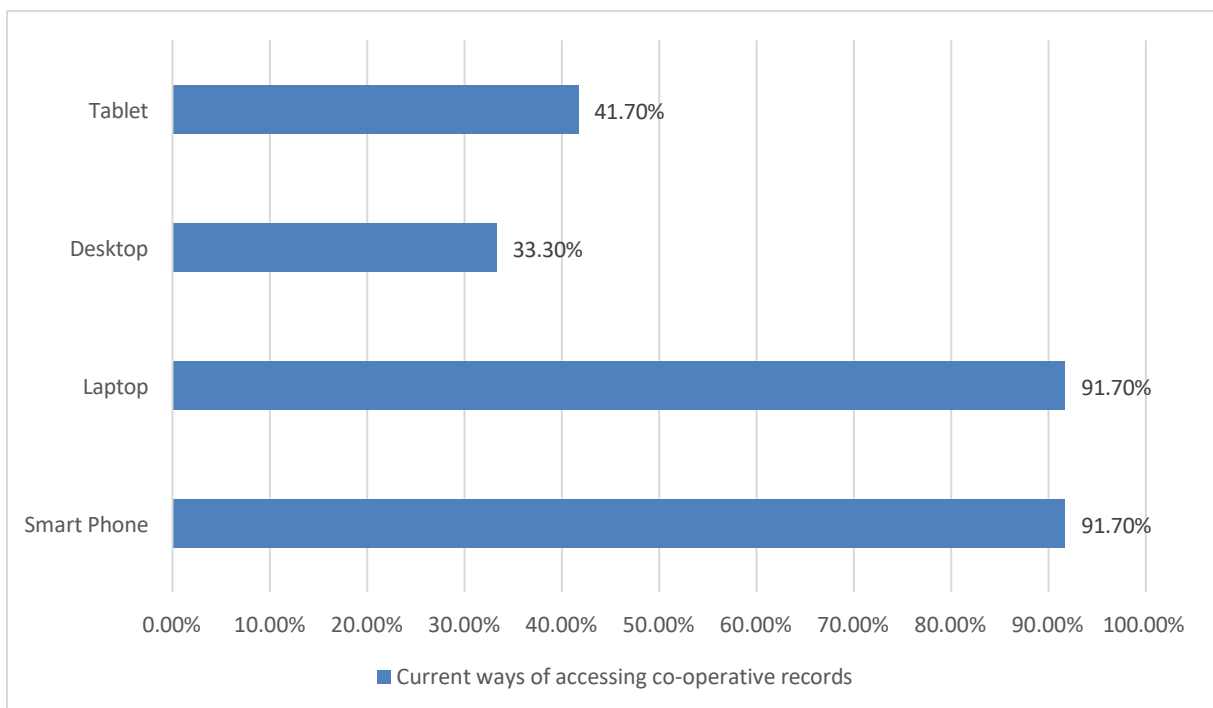


Figure 13: Proposed tools for accessing co-operative information

(ii) Ways for disseminating co-operative information to the public

Apart from receiving and keeping co-operative records, the researcher also wanted to know how updated co-operative information being processed and managed by DCOs and Registrar’s office reach the general public for consumption. Respondents mentioned only two ways as revealed in the interview responses:

“Either by physically paying a visit to respective offices for detailed information or by going through the TCDC website for the summarized reports.”

(iii) Ways co-operative data are presented to those who request them

Here the researcher wanted to know how co-operative records are presented to stakeholders whenever needed. The researcher provided an avenue for respondents to have multiple selections in their responses. From Fig. 14, most of the respondents revealed that they normally get requested co-operative data in paper forms i.e., hard copies. This is observed in the percentage of respondents which reads as 83.3%, while 8 respondents approximately 67% declared that sometimes they get co-operative information just by word of mouth. Apart from them, approximately 42% and 25% of the respondents declared to receive co-operative information in excel files and web format respectively.

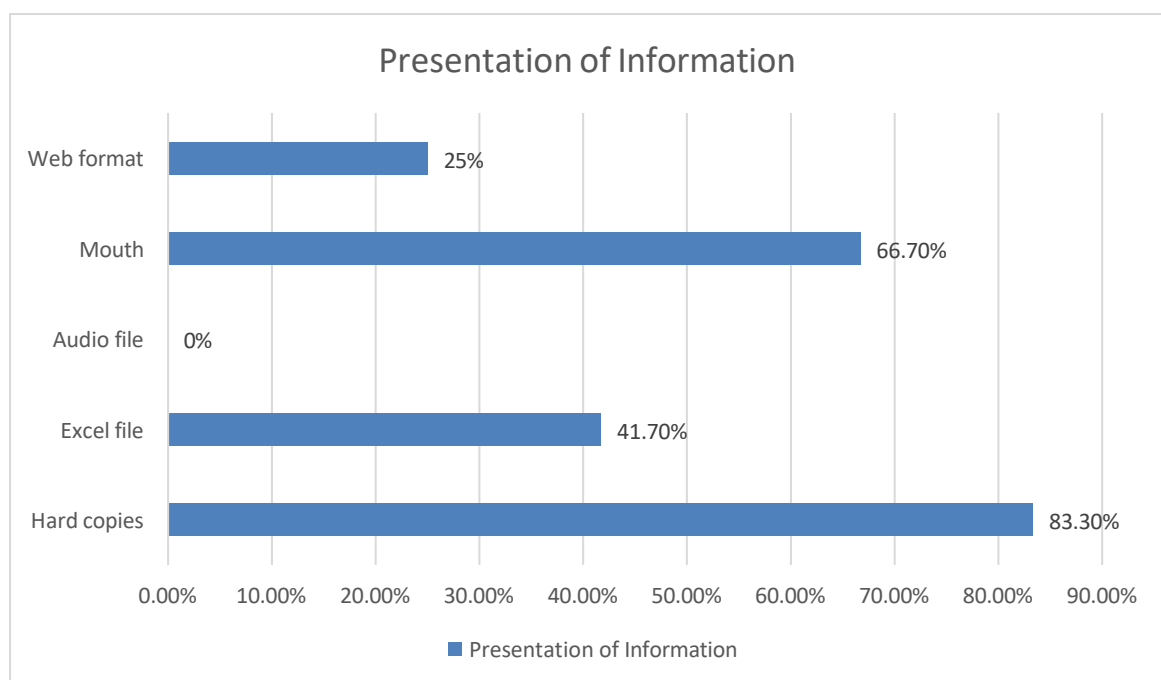


Figure 14: The way co-operative data are presented to those who request them

(iv) Co-operative information that are not allowed to be accessible to the public

From the interview perspective, the researcher wished to know the kind of co-operative information which should not be accessible to the general public. The reason behind this question was to enable the researcher to know which information should be displayed to the public for access and which one should not.

Table 10: Responses on co-operative information that are non-disclosed to the public

Rombo DC	Moshi DC	Moshi Municipal	Registrar
<i>All financial reports (audited/unaudited)</i>	<i>Society's projections on income and expenditures</i>	<i>Income and budgets</i>	<i>and Reports on cooperative frauds Investigative data</i>

(v) Procedures for accessing non-disclosed co-operative information

This interview question wanted to explore procedures which need to be adhered to access non-disclosed co-operative information to the public. Table 11 shows the responses as obtained during the survey.

Table 11: Shows responses on procedure for accessing non-disclosed co-operative information

Rombo DC	Moshi DC	Moshi Municipal	Registrar
<i>Through DED's office</i>	<i>Through district executive director</i>	<i>Visiting physically</i>	<i>DCO By Registrar's permission</i>
<i>Through the Council of ward-leaders</i>		<i>Permission from DED</i>	

4.2.3 Suggested Ways for Improving the Existing Process of Accessing Co-Operative Data

In this part the researcher provided an avenue for respondents to suggest better ways for improving the ways co-operative records are being accessed or disseminated. The thematic analysis of DCO, DRCO and Registrar's office suggestions for improving the process of accessing cooperative data reveals recurring themes in the collected responses. During interview sessions respondents emphasized the need for greater investment in online resources and the proper use of information technologies within cooperatives to enhance data accessibility and management. Additionally, the importance of frequently updating and safely keeping data was repeatedly mentioned, underscoring a strong demand for measures to ensure data accuracy and security.

While these themes were consistently highlighted, one response indicated satisfaction with the current processes, suggesting that some stakeholders find existing methods sufficient. The repetition of these suggestions points to a clear consensus on the need for technological integration and robust data management practices to address the identified challenges and

improve the overall efficiency and reliability of accessing cooperative data.

4.3 Types of Records Sought and Their Usability

4.3.1 Co-Operative Information Being Kept and Searched in the Existing In-House Record Keeping System

The objective of the researcher was to determine the type of information sought by the public in the current in-house system of cooperative records management. The responses captured from the questionnaire disbursed, reflect the co-operative information that the public is searching for. From Fig. 15, twelve (12) respondents equivalent to 92.3% used to search for such information “partners associated in the co-operative movement” and “common business activities in every co-operative society”. The 11 respondents equivalent to 84.6% used to search for such information related to “co-operative performance status”, 9 respondents equivalent to 69.2% used to search for such information “financial reports for co-operatives”, and other 8 respondents equivalent to 61.5% used to search for such information “performance statuses to see the active and inactive co-operatives”. The 6 and other 5 respondents equivalent to 46.2% and 38.5% respectively were interested with such information “campaigns and events related to co-operatives movement”. On the other hand, all respondents used to search for such information: “Active cooperative societies in Tanzania”, “un-audited co-operative financial reports”, “Types of co-operatives in Tanzania”, “co-operative distribution (region-wise)”, “Gender segregated data in co-operative”, “share capital in each co-operative society”, and “current issues on co-operatives”.

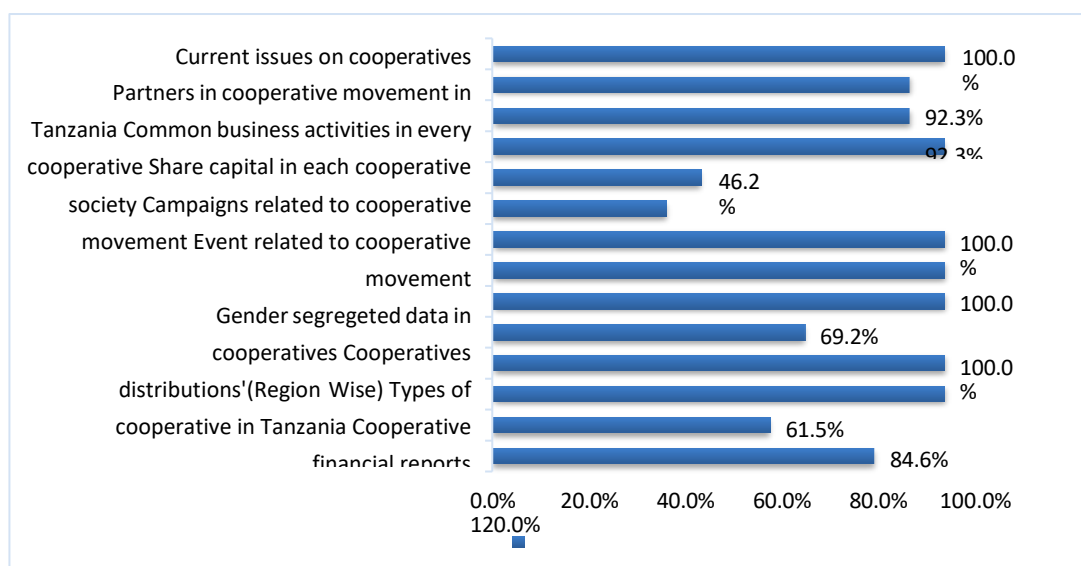


Figure 15: Co-operative information being kept and searched in the existing in-house record keeping system

4.3.2 Use of Co-Operative Information Being Searched

This area of the questionnaire was meant to assess usage of information that is being processed and kept by DCOs as well as Registrar's office. This question provided the respondent an avenue to have multiple selections as shown in Table 12.

Table 12: Usage of information being searched

Usage of information being searched			
S/N	Use	Frequency	Percentage
1.	Research purpose	13	100
2.	For policy issues	7	100
3.	Out of curiosity	6	46.2
4.	Just for knowledge	11	84.6
5.	Training and consultancy (other)	6	46.2

Statistically, all 13 respondents equal to 100% proved to use the co-operative data for research purposes. This was due to the fact that all respondents were academicians from MoCU as Regional Programme Coordinators (RPCs). Apart from research purposes, 11 of them pointed out to use the information for knowledge enrichment, which is equivalent to 84.6% and 7 of them use for policy-related issues. Lastly, 6 respondents equivalent to 46.2% revealed to use the information for training and other consultancy issues, while the same number of respondents replied to just search the information out of curiosity.

4.3.3 Reliability of Co-Operative Information Being Searched

Reliability of data is the availability whenever such data is needed. In this part the researcher wanted to know if respondents normally obtain the required co-operative data when needed. It was a YES/NO kind of questions whereby a small number of only 4 respondents equivalent to 33% showed that they normally get what they wanted whenever in need while 9 of them equal to 67% normally do not obtain co-operative data as required as seen in Fig. 16.

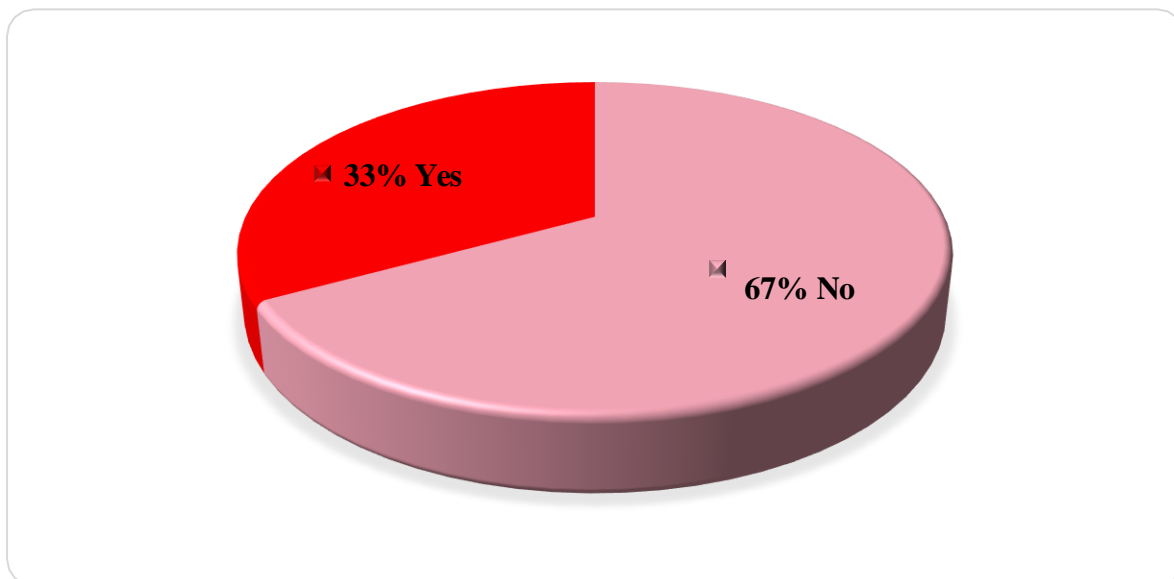


Figure 16: Reliability of co-operative information being searched

4.3.4 Feedback Methods

In this part the researcher wished to know various ways used by either DCOs to get feedback from higher levels of management or how the Registrar’s office provides feedback to DCOs. After performing data cleaning, the researcher obtained responses from interviewees as shown in Table 13.

Table 13: Shows responses on ways to get feedback from higher levels of management to DCOs

Rombo DC	Moshi DC	Moshi Municipal	Registrar
If no problem with report, no feedback	Mail	Through annual assessments (OPRAS)	E-mails
Or else, through email and phone	Annual assessment (OPRAS)		Phones

Also, the researcher wanted to know how DCOs provide feedback to co-operative societies on various resolutions reached as a result of processing co-operative information attained from the fields. Table 14 shows the responses from all the three districts.

Table 14: Responses on ways DCOs provide feedback to co-operative societies

Rombo DC	Moshi DC	Moshi Municipal
Through coops' board meetings	Through coop leaders Annual general meetings	Coop societies' annual meetings Coop societies board meetings Calling leaders by phone

4.4 Challenges Associated with Records Keeping, Accessibility, and Dissemination Management

4.4.1 Challenges in the Feedback Method

After obtaining knowledge on various ways that DCOs and Registrar's office use to provide feedbacks, the researcher wished to know the challenges experienced by DCOs especially when providing feedback to various co-operative societies on resolutions and information from their offices. Table 15 shows responses as obtained from interviewees after data cleaning.

Table 15: Challenges in the feedback method

Rombo DC	Moshi DC	Moshi Municipal
Few board members attending Time wasting while waiting for the meeting Sometimes geographical challenges due to the location of the society Transport problem	Delayed feedback Limited resources eg, transport to coops	Sometimes missing recipients of the feedback Wasting time

4.4.2 Challenges Experienced in the Existing Process for Co-Operative Data Handling

In this part the researcher wanted to acquire all the challenges experienced by respondents as a result of using existing methods for processing, keeping and accessing co-operative information. To accomplish this, the researcher provided a couple of expected challenges for the questionnaire whereby respondents could have multiple selections to suite their choices while during interviews this was just an open question. Figure 17 shows how the question was tackled by the public.

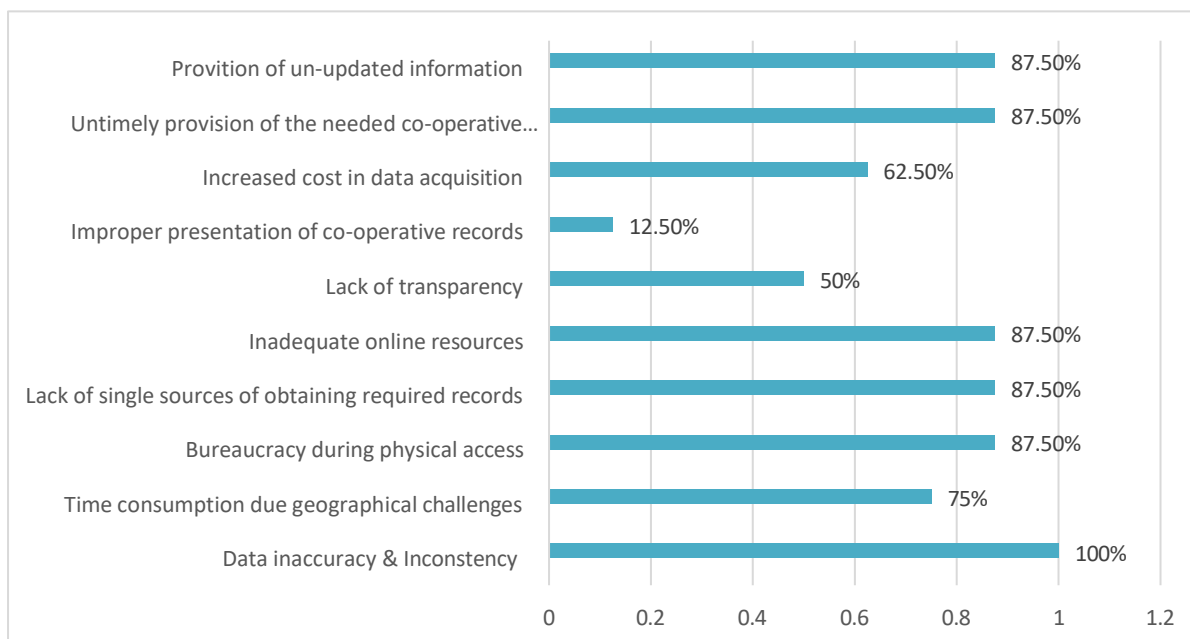


Figure 17: Challenges experienced in the existing process for co-operative data handling

The study observed that, out of 13 respondents only 8 responded to the question whereby all of them agreed that data inaccuracy and inconsistency as well as lack of single source of obtaining required information are the main challenges being experienced in the whole process of acquiring co-operative data. Also, 7 respondents equivalent to 87.5% had similar opinions on the challenges experienced during acquisition of co-operative records by pointing out the following; bureaucracy during physical access, untimely provision of the needed co-operative information and provision of un-updated information, inadequate online resources and most co-operatives do not keep records. Other challenges pointed out with their percentage were; time consumption due to geographical challenges (75%), increased cost in data acquisition (62.5%), lack of transparency (50%) and improper presentation of co-operative information in request (12.5%).

On the other hand, since similar question was paused to DCOs and Registrar's office during interviews, the following table 16 shows their responses as grasped after data cleaning.

Table 16: Challenges experienced in the existing process for co-operative data handling

Rombo DC	Moshi DC	Moshi Municipal	Registrar
Less budget for stationeries and electronic storages e.g., memory sticks	Waste of time in accessing records	Data redundancy	Un-updated records
Internet problem	Manual report writing is tiresome	Wear and tear of in-house storage facilities	Data redundancy
Paper files tearing and getting old	Loss of certain records	Loss of data	Acquisition of false data
Late submission of data from societies (hard copies)	Duplication of records	Increase in time and cost for processing data	
Vulnerability to data loss	Lack uniformity in reporting	Inability to access data from other districts	
Poor feedback mechanism from higher levels	Feedback uncertainties		
Data redundancy			
Difficult in accessing older records			

4.4.3 The Severity of the Challenges Outlined in Obtaining Co-Operative Societies' Information

This question provided a list of anticipated challenges which respondents normally encounter in the course of acquiring information regarding co-operatives in Tanzania. The aim of this question was to find out how serious the stated challenges were. Therefore, the researcher provided a scale to measure seriousness of the problems using numbers 0 to 5 where; 0 meant the challenge was not serious while 5 meant the challenge was very serious. The respondents were supposed to tick (√) where they thought it was appropriate. Table 17 displays the distribution of respondents' answers to the question. In the series of provided challenges, data inaccuracy and inconsistency were mostly declared to be a very serious problem. This is because out of 13 respondents, 7 of them chose number 5 which meant to be a very serious problem. On the other hand, respondents felt that increased costs in data acquisition was a moderate challenge because 8 out of 13 respondents selected number 3 which meant to be a problem but not that adverse.

Table 17: Severity of the stated challenges in the acquisition of co-operative information

Challenges	0	1	2	3	4	5
Data inaccuracy & inconsistency	0	1	1	1	3	7
Wastage of time during the process	0	1	1	3	3	5
Increased in data acquisition cost	1	2	1	8	1	0
Bureaucracy	0	0	1	2	9	1
Lack of transparency	4	2	2	1	2	2
Improper presentation (format) of requested information	1	0	1	1	7	3
Communication barrier	2	4	4	1	1	1

4.5 User Needs and Expectations for a Web-Based Records Management System

The objective of this section was to capture user needs and expectations for the designed system from the participants. It comprised two segments, each aimed at gathering distinct system requirements. The first part focused on general user expectations in the designed system, while the second part focused on expectations related to reports. As the system was intended to generate multiple reports, both sections combined provided the researcher with a comprehensive set of functional requirements for the designed system.

4.5.1 General User Expectations on Designed System

This part was meant to withdraw functional requirements for proposed system from respondents.

(i) Anticipated key users of CRMS

Before grasping system's requirements from respondents, the researcher first wanted to know proposed key users of the proposed CRMS from Registrar's office. Since Registrar of co-operatives is the sole custodian of all co-operative information in Tanzania, the researcher expected also the same to be for the CRMS. Therefore, the office respondent suggested the following to be key users of CRMS; DCOs, DRCOs and Registrar.

(ii) Information suggested to be in CRMS

This part proposed various kind of information supposed to be in the co-operative records management system (CRMS). The researcher provided an avenue in the questionnaire for respondents to select the type of information they would like to access in the CRMS from the given list. Figure 18 reveals only 12 people responded to the question. Although all proposed information in the list were selected, but information such as current issues in co-operatives, types of co-operatives in Tanzania, the distribution of co-operatives, gender segregated data, share capitals, common-bond as well as current issues on co-operatives were selected by all 12 respondents thus scoring 100%.

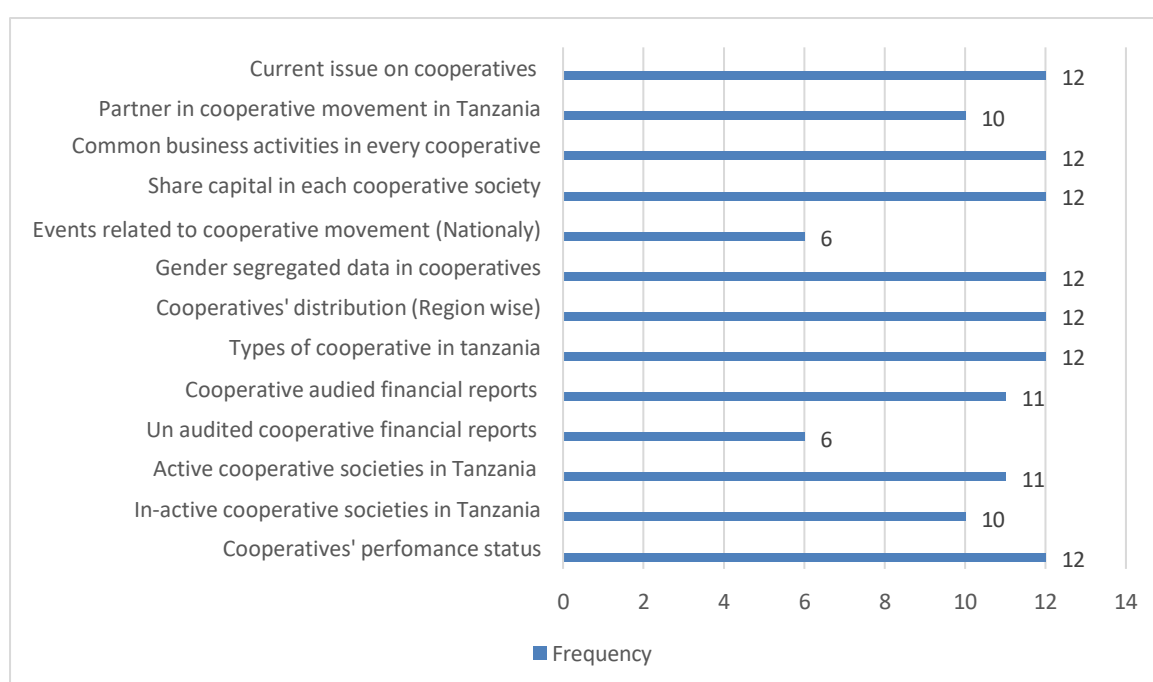


Figure 18: Information proposed to be in CRMS

On the other hand, the researcher interviewed the same question to DCOs and Registrar's office whereby they were given an open space to exhaustively list the kind of data required in the CRMS as shown in Table 18.

Table 18: Information proposed to be in CRMS

Rombo DC	Moshi DC	Moshi Municipal	Registrar
Registration details of each society	Registration details of the society	All the information available in the excel sheet provided by Registrar's office (template)	Compliance records
Societies' membership status (gender-wise)	Current status Shares		Co-operative performance records
All financial reports (audited/unaudited)	Loan status	Reports for activities performed by DCOs	Co-operative registration data
Collection and sales reports for non-financial societies	Projections for income and expenditures		
Monthly societies' performance data for SACCOS'	Collaborators Society's Projects		

(iii) Template for Co-operative data entry

The researcher inquired from DCOs and Registrar's office about the availability of any existing template that was in use for co-operative data entry. The aim of this inquiry was to aid the researcher in creating the user interface (UI) and integrating user experience (UX) into the design process. A total of four templates were provided whereby 2 were for financial co-operative societies and other 2 were for non-financial co-operative societies. Figure 19 shows the template for entering data concerning financial co-operative societies i.e., savings and credit co-operative societies (SACCOS). The templates were obtained from DCOs and Registrar's office.

JINA LA MKOA: KILIMANJARO			WILAYA: ROMBO						TAKWIMU HIZI ZINAISHIA 31.08.2020										
Na	Jina la SACCOS	Reg. Na	Mawasiliano (simu, barua pepe, tovuti)	Mjini/kijijini		Idadi ya wanachama				Thamani kwa shs (000)			Mikopo inayotokana na fedha za chama		Mikopo toka nje ya chama (taasisi za fedha)		Ukaguzi wa mwisho uliofanyika	Hali ya saccos	Mfumo wa computa (saccos/software)
				Mjini	Kijijini	Me	Ke	Vikundi	Taasisi	Jumla	Hisa	Akiba	Amana	Tolewa (sh'00')	Baki (sh *00')	Pokelewa (shs000)	Baki (shs000)	Hisa shiriki	Ukaguzi wa mwisho
1																			
2																			
3																			
4																			

KIAMBATISHO NA.2																
TAKWIMU ZA SACCOS KUISHIA 31 DEC 2020																
Na.	JINA LA SACCOS	Reg. Na.	MAWASILIANO (SIMU, BARUA PEPE, TOVUTI)	ANUANI YA MAHALI KILIPO CHAMA	MAHALI SACCOS ILIPO	IDADI YA WANACHAMA	THAMANI YA TSHS (000)			MIKOPO INAYOTOKANA NA FEDHA ZA SACCOS (JANUARI - MPAKA SASA)		MIKOPO KUTOKA NJE YA SACCOS (JANUARI - MPAKA SASA)		KIPINDI/MSIMU WA MWISHO WA UKAGUZI ULIOFANYIKA		HALI YA SACCOS
							MJINI	KUJIJINI	ME	KE	VIKUNDI	TAASISI	JUMLA YA HISA	AKIBA	AMANA	

Figure 19: Templates for co-operative data entry in SACCOS

Apart from financial co-operative societies, the Registrar’s office also provided templates that are used by non-financial co-operative societies as shown in Fig. 20. Basically, the figure contains templates for co-operative societies that deal with both single and variety of agricultural products. Generally, all the two forms in Fig. 20 were for entering data specific for agricultural marketing co-operative societies (AMCOS).

KIAMBATISHO NA.1																			
TAKWIMU ZA VYAMA VYA USHIRIKA USIO WA KIFEDHA KUISHIA 31/DEC/2020																			
Zingatia "Aina ya zao" kama chama ni AMCOS jaza zao linalohusika mfano, Kahawa, Pamba na kama chama ni cha Nyuki jaza Asali na n.k;																			
Sehemu iliyoandikwa KATA/KUJJI/MTAA jaza jina moja kati ya hayo kulingana na eneo chama kinapatikana; na																			
Sehemu iliyoandikwa AJIRA Jaza idadi ya watendaji walioajiliwa kwenye chama bila kujali ni wa mkataba au hawana mkataba.																			
NA	JINA LA CHAMA	NAMBA YA USAJILI	TAREHE YA USAJILI(YYYY-MM-DD)	MKOA	WILAYA/HAL MASHAURI	KATA/KUJJI/MTAA	KUJINI/MJINI	AINA YA CHAMA	AINA YA ZAO	HISA ZA CHAMA	NAMBA YA SIMU	FUNGAM ANO	WANACHAMA				AJIRA		HALI YA CHAMA
													ME	KE	KIKUNDI	TAASISI	ME	KE	

KIAMBATISHO NA.3																		
TUME YA MAENDELEO YA USHIRIKA-TANZANIA																		
TAKWIMU ZA MAZAO YA BLASHARA(PAMBA,KAHAWA,KOROSHO ,UFUTA..N.K)NA MAZAO MCHANGANYIKO.																		
FOMU HII IJAZWE VYAMA VYA UPILE																		
MKOA...../...../ 2020																		
NA	JINA LA CHAMA CHA UPILE	NAMBA YA KUSAJILI	AINA YA CHAMA	TAREHE YA KUSAJILIWA	ANUANI YA MAHALI CHAMA KILIPO	MAWASILIANO(NA MBA YA SIMU,BARUA PEPE)	WILAYA	MAZAO	SALIO ANZLA(TAN)	MAKUSANYO		MAUZO		GHALANI		MAELEZO		
										KIASI(TAN)	BEI(TAN)	KIASI(TAN)	BEI(TAN)	KIASI(TAN)	BEI(TAN)			
1			AMCOS					MAHINDI										

Figure 20: Templates for co-operative data entry in AMCOS

(iv) Anticipated formats for data presentation in CRMS

Data can be presented in different formats to users. Here the researcher wanted respondents’ views on how they would like to view co-operative data whenever presented to them. Basically, the researcher provided the following options with the ability of multiple selections; text, tables and graphs. From Fig. 21, it was observed that respondents wished to have all suggested formats for clarity depending with the type of information required at specific time i.e., they all scored 100%.

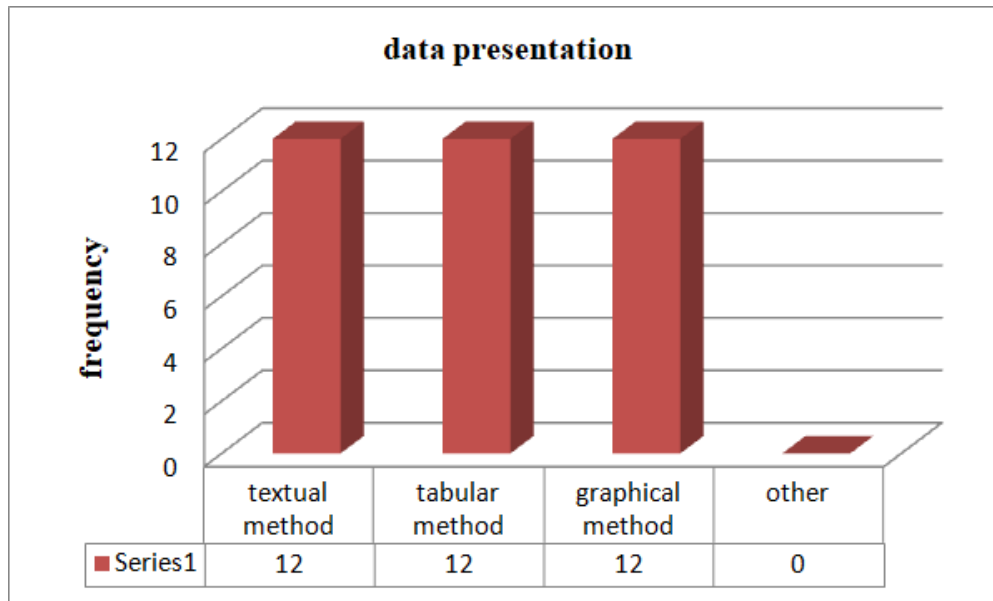


Figure 21: Data presentation format

(v) Additional information proposed to be in the CRMS

Apart from information provided in all sections above, the researcher also presented to respondents an avenue for them to provide extra information by selecting from the provided list. Respondents were allowed to make multiple selections. Figure 22 shows almost 92% of respondents agreed to include projects in co-operative sector in the CRMS as part of information which may be accessible by the public. In conjunction to that, information regarding co-operative stakeholders as well as partners in co-operative sector was suggested to be found in CRMS by 75% of all respondents. On the other hand, the following information was also suggested; news and advertisements in the co-operative sector 58.3%, links to other resources related to co-operative movement 50% and campaigns in the co-operative sector 33.3%. Finally, one respondent suggested the system to include the structure of co-operatives in the country as well as co-operative governance.

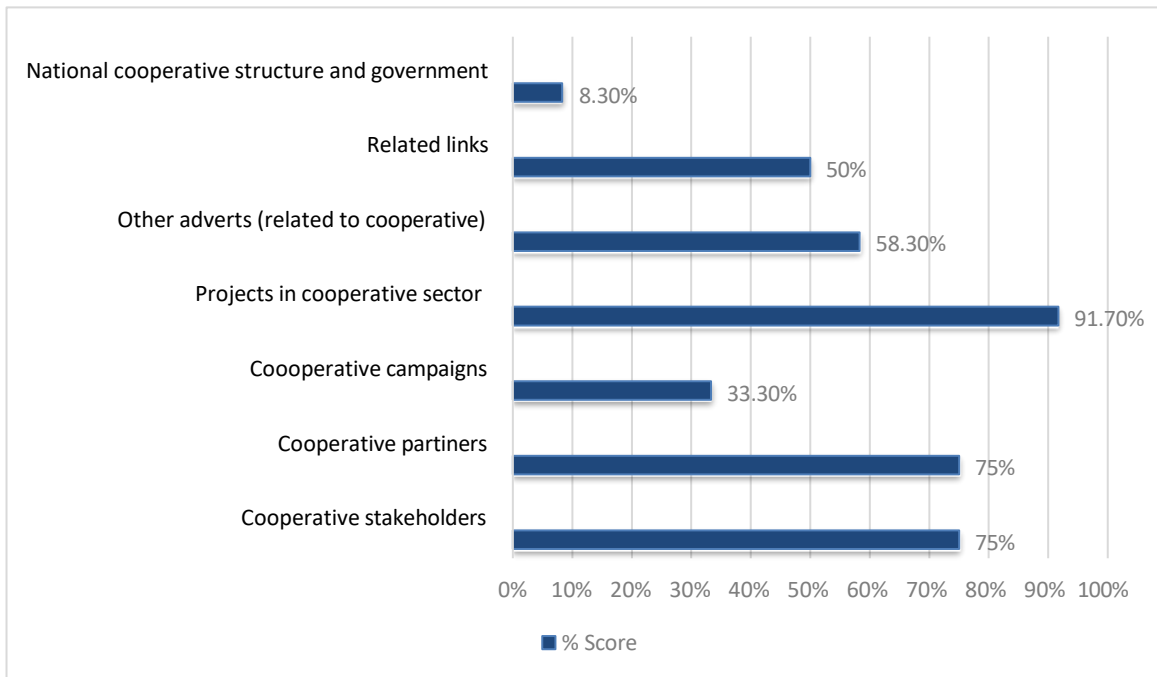


Figure 22: Additional information to be in the CRMS

(vi) Recommended features for CRMS

Several features were presented by the researcher in this part of the questionnaire. Respondents were supposed to suggest features that would cater their need for the CRMS. Also, the researcher provided a list that allowed respondents to have multiple selections. Figure 23 presents frequency distribution as a result of respondents' selections whereby *search tool* and *report viewing* were the components suggested by all respondents while 12 of them included language selection tool. Other choices of anticipated requirements with their frequency to be selected are as seen in Fig. 23.

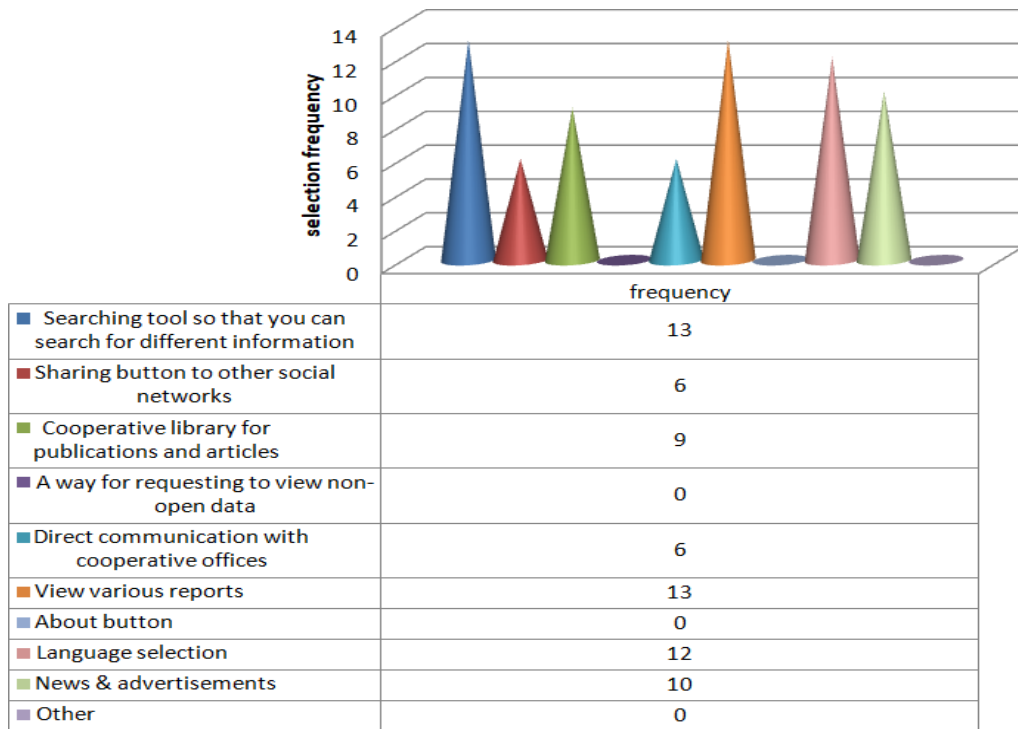


Figure 23: Suggested features for CRMS

On the side of interviews, the researcher also provided the interviewees a list of suggested (or proposed) features that would suite to be incorporated within the CRMS. After data cleaning, the researcher drew out suggested features as provided by respondents in Table 19 though not arranged in the order of preference.

Table 19: A list of suggested features from interviewees

Rombo DC	(i) Upload various forms
	(ii) Download various documents
	(iii) Sharing button
	(iv) News board
	(v) DCO account for personalized space
	(vi) Generate reports
	(vii) Feedback mechanism from DRCo and Registrar's offices
	(viii) Avenue for the public to request for non-open data/information
	(ix) Feedback mechanism to cooperative societies
<hr/>	
Moshi DC	(i) Upload various forms
	(ii) Download various documents
	(iii) Sharing button
	(iv) News board
	(v) DCO account for personalized space
	(vi) Generate reports
	(vii) Feedback mechanism from DRCo and Registrar's offices
	(viii) Avenue for the public to request for non-open data/information
	(ix) Feedback mechanism to cooperative societies
	(x) Feedback mechanism from Registrars
<hr/>	
Moshi Municipal	(i) Upload attachments
	(ii) Download attachments
	(iii) DCO account for personalized space
	(iv) Sharing button
	(v) News board
	(vi) Generate reports
	(vii) Feedback mechanism from DRCo and Registrar's offices
	(viii) Feedback mechanism to co-operative societies
	(ix) Feedback mechanism from Registrars
<hr/>	
Registrar	(i) Searching tools
	(ii) Create accounts for DCOs and DRCOs
	(iii) Assign privileges to personal accounts
	(iv) Revoke privileges
	(v) Upload forms from DCOs and DRCOs
	(vi) Download various documents
	(vii) Sharing button
	(viii) News board
	(ix) Generate reports
	(x) Feedback mechanism to DRCOs and DCOs
	(xi) Post announcements

Additionally, the researcher asked whether the interviewees had any additional criteria that they would like to add to the predetermined list that was provided to them. From Table 20 it may be realized that *chatting space for DCOs* was proposed by DCOs from all the three districts while the DCO from Moshi municipal mentioned an extra requirement of requesting non- disclosed co-operative information. On the other hand, Registrar’s office wished to have an *online registration system* for primary co-operative societies as well as an *online supervision platform* for the same.

Table 20: Shows the responses from all the four respondents

Rombo DC	Moshi DC	Moshi Municipal	Registrar
Chatting space for DCOs	Chatting space for DCOs	Chatting space for DCOs Interface for coop societies to enter required data Feature to request for non-disclosed data	Online registration for primary co-operative societies Online supervision platform for primary co-operative societies

(vii) Uploading requirements

Apart from the requirements aforementioned, the researcher wished to know respondents’ preference when there was a need for uploading any document or material. Since co-operative data in the CRMS are fed by DCOs and Registrar’s office, this part was directed to them during the interview. This was an open question whereby the respondents had to express all their views. From respondents’ perspective, Table 21 shows the responses.

Table 21: Uploading requirements

Rombo DC	Moshi DC	Moshi Municipal	Registrar
Ability to upload scanned document	Scanned documents	Attach files Upload scanned documents	Ability to upload scanned document
Ability to upload normal files (pdf, word, excel, image)	Normal electronic files		Ability to upload normal files (pdf, word, excel, image)

From table 21 it is realized that all respondents had similar uploading requirements which were *uploading scanned documents, electronic file attachment* e.g., pdf, word documents, excel workbook sand image uploading.

(viii) Need for system integration

The researcher was aware of the range of co-operative and non-cooperative information systems available today. As a result, a question was posed to the interviewees, asking them to identify any system they would like to see integrated with CRMS. All three DCOs from three selected districts declared not to have any existing system(s) that need integration with CRMS while respondent from Registrar’s office wished that “if there could be an online co-operative society registration module in CRMS then we would like your system get linked with our accounting system”. Therefore, generally, those were the responses for the need of having system integration with CRMS.

(ix) Information that DCOs share with DRCOs and office of the Registrar

While collecting system requirements, the researcher noticed that DCOs, DRCOs, and the Registrar's office frequently shared co-operative information. This prompted the researcher to investigate the type of information that DCOs typically transmit to the relevant levels. Information stated in Table 22 is normally shared by DCOs to DRCOs and Registrar’s office as a normal procedure for various resolutions.

Table 22: Information that DCOs share with DRCOs and Registrar's office

Rombo DC	Moshi DC	Moshi Municipal
Growth status for SACCOS	The filled template	The filled template provided by Registrar’s office
Collection and sales reports for non-financial coop societies	Supporting documents from societies	Other attachments showing DCO performance

As it may be observed, all three respondents proved that information being filled in the templates is the information shared with respective authorities.

(x) Suggestions for easy use of proposed CRMS

In this study, the researcher sought to elicit non-functional requirements from participants that focused on identifying user-friendly ways of utilizing CRMS. A roster of suggested methods was provided to respondents, and they were permitted to select multiple options. The results in Fig. 24 shows a clear demand for the system to accommodate multiple languages, with 75% of respondents indicating so. The next most crucial requirement was the availability of clear and user-friendly navigation, which was selected by approximately 67% of all participants. Other

preferences included the use of page grids for the user interface, which was favored by roughly 33% of respondents, and the use of cards for the user interface, which was favored by about 17%. Only one respondent, equivalent to 8%, selected the use of breadcrumbs.

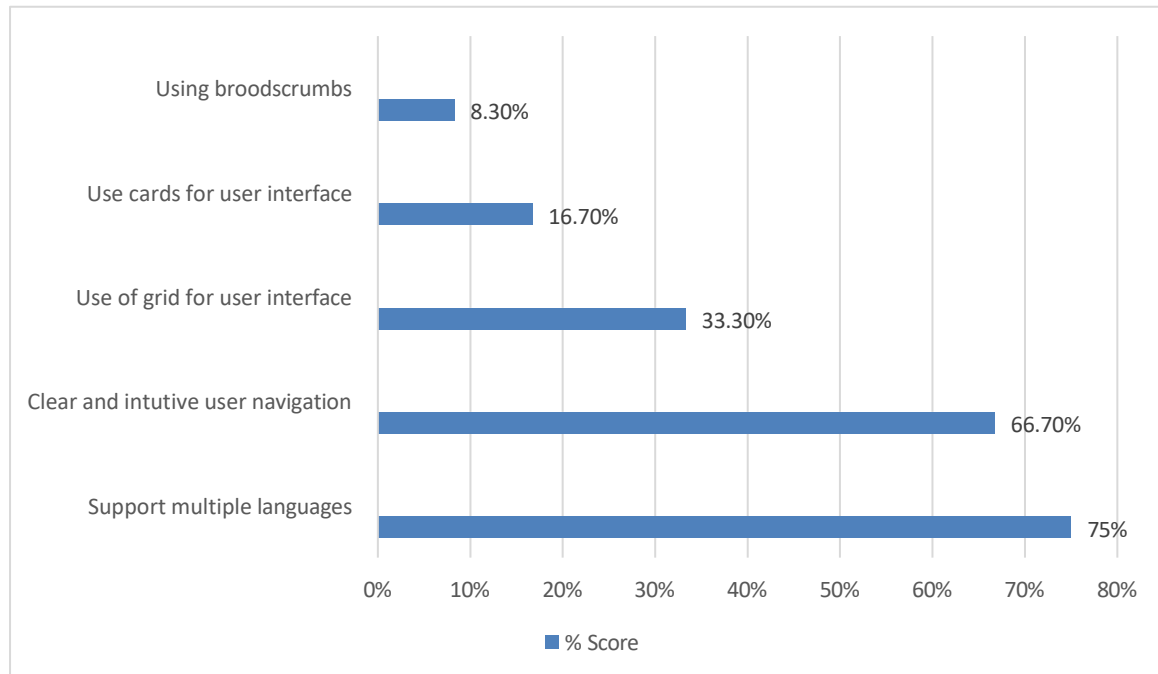


Figure 24: The rate at which each suggestion was chosen by participants

(xi) Proposed security concerns in CRMS

Any system especially electronic systems are prone to security threats. Here the researcher wanted to know if respondents had any security concern(s) to portray regarding CRMS. Table 23 shows the responses.

Table 23: Proposed security concerns in CRMS

Rombo DC	Moshi DC	Moshi Municipal	Registrar
Public getting un-authorized data Cyber-theft	Loosing data when system crush Loosing account credentials	Loosing login credentials	When integrated with accounting systems at TCDC

From Table 23 it can be seen that DCOs from Moshi DC and Moshi municipal had a similar security concern on CRMS. They all raised a concern about losing login credentials for users with accounts. Apart from that, DCO from Moshi DC got worried about losing all co-operative records when CRMS crashes. Surprisingly, respondent from Registrar’s office said “the only

security concern is when your system (CRMS) gets connected to our accounting systems”. From the other side, DCO from Rombo DC highlighted about cyber-theft concern and possibility for the public to access un-authorized co-operative information.

(xii) Additional information to be in CRMS

This section offered respondents an avenue to provide additional information they believed should be incorporated into CRMS. The query was open-ended, which necessitated the researcher to perform data cleaning and generate the responses. The following answers were repeatedly given out by the respondents; (i) membership base, business volume, sales and profit, share and share value, financial reports, and easy of accessing, (ii) cooperative general information, and (iii) Swahili to be incorporated.

From the given responses, it was realized that most of the suggested additional information was already ventured in other parts of requirements gathering tool but were presented differently. Among them were to indicate the co-operative membership base countrywide, show various projects under the co-operative movement, show the business volume for every co-operative society which could outline sales and profits as well as shares and share values to mention but a few.

(xiii) Anticipated objectives to be accomplished by the CRMS

In order to capture respondents’ general picture, the researcher tried to acquire information regarding the whole idea of developing CRMS. To reap the information, the researcher asked respondents to anticipate objectives likely to be accomplished after the development of CRMS. There was a list of several anticipated objectives which respondents were supposed to have multiple selections. Figure 25 shows distribution of the responses as obtained during the survey.

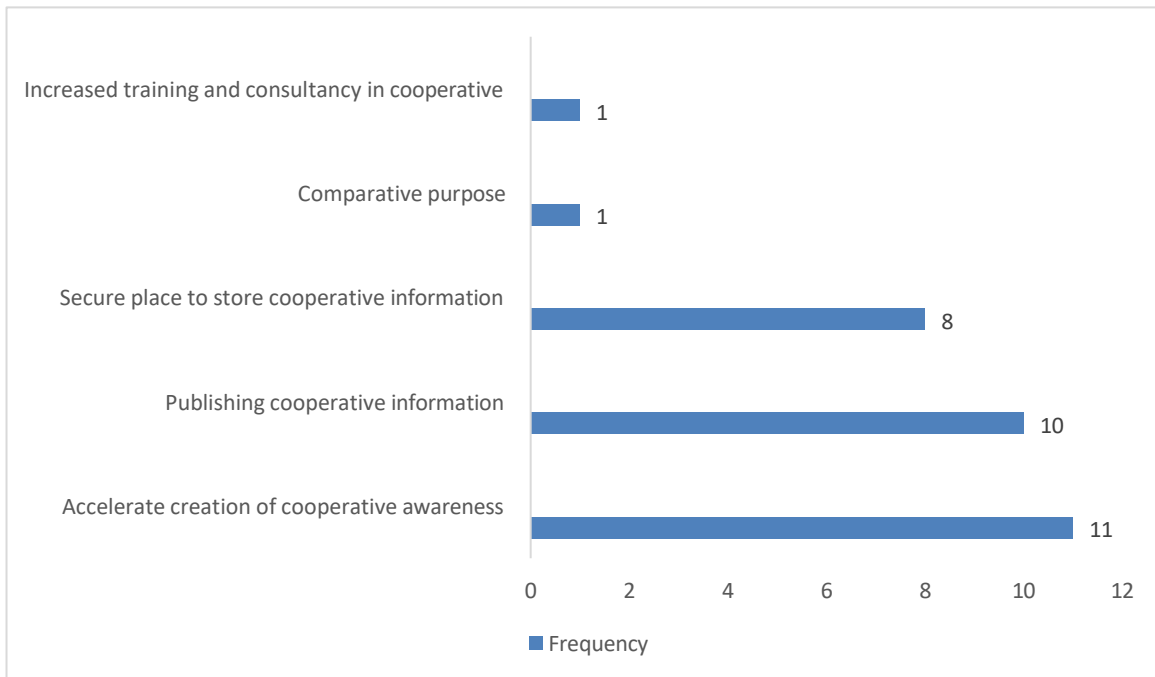


Figure 25: What respondents hoped for CRMS to achieve

4.5.2 Suggestions on Reporting Requirements

During data collection activity the researcher provided a separate avenue for respondents to express their needs when it comes to issues about reports generation by CRMS. To provide an insight for respondents to have a clear picture on the kind of information needed at this part, the researcher here also provided 1 closed type question and other 2 open-ended questions.

(i) Anticipated reports to be generated by CRMS

Among other things, this part required respondents to indicate the kind of reports they would like to access from CRMS after processing. The researcher provided an anticipated list of reports that required respondents to make a choice out of them. The list allowed respondents to make more than one choice. From Fig. 26 it can be realized that 12 respondents tackled the question whereby 100% showed the necessity for reports about co-operative products being offered by societies in the markets. The next kind of report by frequency of selection was audited financial report showing the performance status of every co-operative society which was pointed out by 11 respondents that is equivalent to 92%. Other kind of reports suggested was; gender segregated reports was selected by 9 respondents that is equivalent to 75%, cooperative distribution report in the country had 7 respondents that is equivalent to 58% and lastly was unaudited financial report which was selected by only 2 people.

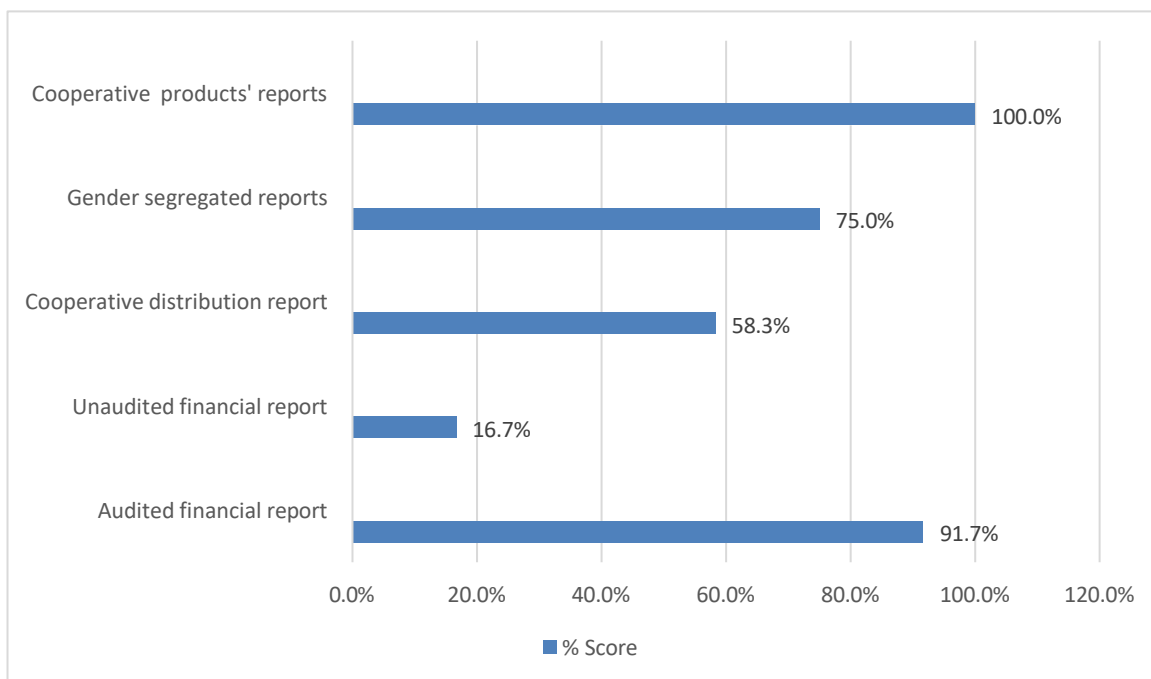


Figure 26: Reports to be generated by CRMS

On the part of interviews, the researcher wanted respondents to list the kind of reports that they would like CRMS to generate. This was just an open question where by respondents could exhaust their responses as shown in Table 24. Generally, it may be observed that respondents from the interviews also focused much on co-operative financial reports as well as membership status in co-operative societies, that is, the total number of active members in co-operative societies based on gender criterion for each co-operative society, district, region and country at large.

Table 24: Reports which interviewees wished CRMS to generate

Rombo DC	Moshi DC	Moshi Municipal	Registrar
SACCOS monthly performance reports	Performance report	Income and expenditure reports	Cooperative performance
Annual collection and sales reports for non-financial cooperatives	Annual projections on income and expenditures	Mobilization reports	Cooperative compliance
	Annual collection and sales reports for non-financial cooperatives		Cooperative membership status

(ii) Reports to be openly accessible by the public in CRMS

Here the researcher wanted to know the kind of reports respondents wished to be openly accessible on CRMS. The question was specifically pointed to those who normally process and hold co-operative data, that is, the DCOs and Registrar’s office.

Table 25: Reports to be openly accessible to the public in CRMS

Rombo DC	Moshi DC	Moshi Municipal	Registrar
Non-financial reports	Shares and loan status report Non-financial reports	Mobilization and/or non-financial reports	Co-operative membership status Co-operative performance

Table 25 shows various reports that respondents wished to be openly accessible to the public. From the responses, it is realized that co-operative performance report was of great importance for it to be accessible freely and openly. This report, as it was clarified, contains all financial data from co-operative societies. Apart from performance report, respondents also mentioned non-financial reports which had to include co-operative membership status (gender wise), distribution of co-operative societies in the country (from district level to country wise) and types of co-operatives available.

(iii) Proposed formats for reports to be generated by CRMS

The researcher wanted also to know the report formats in which respondents would wish CRMS to present. This question was specifically paused to interviewees and the responses were as seen on Table 26.

Table 26: Format for reports to be generated by CRMS

Rombo DC	Moshi DC	Moshi Municipal	Registrar
Un-editable format for the public	Un-editable format for the public	Un-editable (for public)	Un-editable format for the public
Editable format for Registrars	Editable format for Registrars	Editable (for registrars)	(for Editable format for Registrars and DCOs

Basically, all respondents wished that reports should be accessible by the public in the format that does not allow them to edit anything, while on the other hand they suggested DCOs and the registrar should be able to incorporate changes in the reports being generated by CRMS. This was due to the reason that they are the custodians of the reports.

(iv) Data visualization in the CRMS

The CRMS is meant to hold co-operative information in the country but the question comes “how will the data kept in CRMS be visually presented to the users?”. To respond to the question, the researcher had to gather the requirement from DCOs and registrar’s office. From Table 2 it may be recognized that respondents preferred various ways of viewing co-operative records from CRMS. Both DCOs and the Registrar pointed out tables, graphs as well as a mixture of tables and graphs to visualize the data kept in the CRMS.

Table 27: Responses about data visualization in the CRMS

Rombo DC	Moshi DC	Moshi Municipal	Registrar
Tabular presentation	Tabular presentation	Tabular presentation	Tabular presentation
Graphical presentation for coop performance	Graphical presentation for coop performance	Graphical presentation	Graphical presentation for coop performance
			Mixed presentation

(v) The frequency for reports’ generation by CRMS

This was an open part where respondents to the questionnaire were given a chance to express their view about the frequency of reports generation by CRMS within a year. Having seen that responses looked similar; the researcher performed data cleaning and came up with observation as seen in Table 28.

Table 28: The frequency for reports' generation

Type of report (e.g., audited financial report)	Frequency (e.g., monthly, quarterly etc.)
Audited financial report	Yearly
Unaudited financial report	Quarterly
Co-operative societies’ registration report	Daily
Gender segregated membership report	Daily
Co-operative products report	Daily

As it may be observed in Table 28 reports about registration of co-operatives, co-operative membership status which are organized in gender-wise, and products being offered by co-operative societies were suggested to be available on daily basis. Unaudited financial reports were recommended by respondents to be available in a quarterly basis while audited reports are in a yearly basis. Responses given by respondents of questionnaire were almost similar to those given by DCOs and the Registrar's office as it may be observed in Table 29.

Table 29: Responses from DCOs and Registrar on frequency for reports' generation

Rombo DC	Moshi DC	Moshi Municipal	Registrar
Quarterly for performance reports	Performance report (quarterly)	Quarterly (for Registrars)	Quarterly for performance reports
Monthly for non-financial reports	Projections on income and expenditures (annually)	Monthly (for DCO)	Monthly for non-financial reports
Annually for the projections	Non-financial report (monthly)	Annually (final accounts)	Annually for the projections

Generally, Table 29 reveals some similarity on responses about the frequency for generating different reports. Basically, in this table all respondents suggested reports to be generated in monthly, quarterly and yearly basis for non-financial reports, performance reports and projection reports respectively.

(vi) Additional suggested information on report requirements

The researcher wanted to extract more information regarding accessibility of reports in the CRMS from respondents. Unfortunately, none of the respondents reacted on the question thus leaving it blank.

4.6 Analysis and Examination of The Preliminary Prototype for a Proposed Solution

In this section, we will evaluate the preliminary prototype of the designed solution (CRMS) and examine how it addresses the expectations of its intended users. Furthermore, we will explore how it resolves the challenges that were identified during study survey. Lastly, we will analyze how this solution can pave the way for future improvements in records management systems.

4.6.1 Preliminary Prototype of the Designed Solution

This part addresses how features of the designed software solution (CRMS) meet user expectations as it was observed from the survey as well as how it resolves the identified challenges.

(i) Co-operative society's registration

The designed Co-operative Records Management System enhances primary co-operative record management and accuracy of produced reports. It also aims at automating co-operative registration, application process and management of co-operatives records. Cooperative Records Management System can be accessed through all web browsers. Figure 27 Presents a home page that consists of two menus; registration and login. A co-operative society will perform registration in order to get access to the system. After registration, the co-operative society will use email and password to login to the system to update their monthly report.

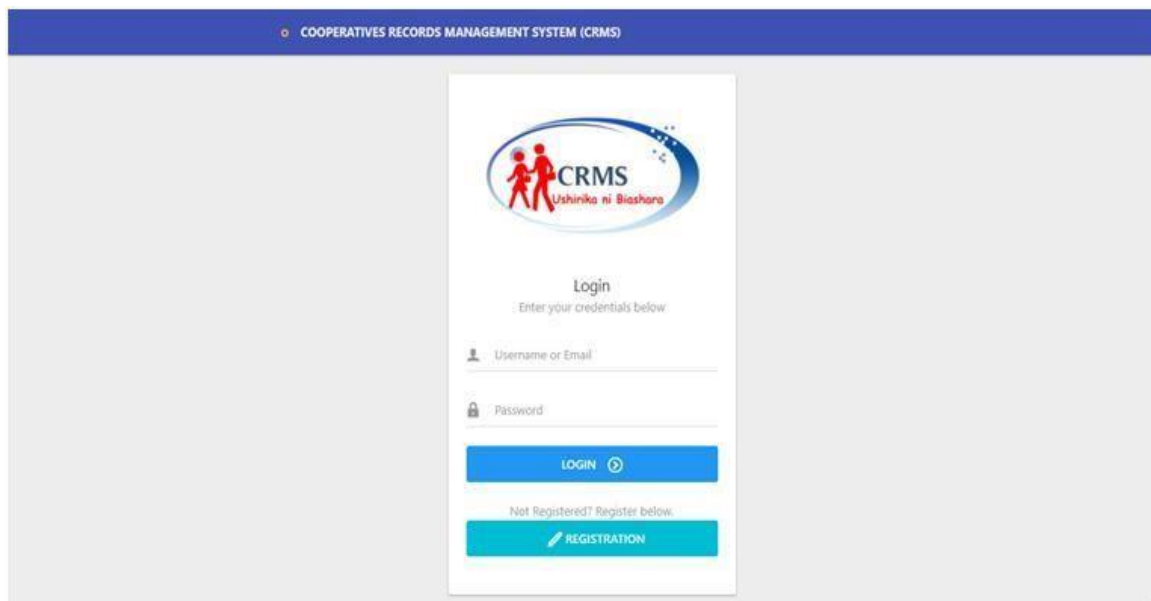


Figure 27: Login page for primary co-operative societies

During registration, co-operative societies will provide their particulars such as; coop type, coop name, Region, District, Ward, Phone Number, email and password. Figure 28 shows the required details during registration.

The image shows a web form titled "New Cooperative Registration Form" with the subtitle "Registration form for new cooperative". The form is organized into three columns and three rows of input fields. The first row contains "Coop Type" (a dropdown menu with "--Select--"), "Coop Name" (a text input), and "Region" (a dropdown menu with "--Any--"). The second row contains "District" (a dropdown menu), "Ward" (a dropdown menu), and "Phone No." (a text input). The third row contains "Email" (a text input), "Password" (a text input), and "Confirm Password" (a text input). At the bottom left, there are two buttons: "RESET" and "REGISTER". At the bottom center, there is a "LOGIN" button.

Figure 28: Co-operative societies' registration page

(ii) Co-operative Societies Application

The designed CRMS enable a co-operative society to perform application through the system which help to fasten application process compared to the existing in-house process. Figure 29 shows the Dashboard page with menus such as; Dashboard, coop. record and application. Also, CRMS enable co-operative society to view their membership trending statistics according to the gender, groups and institution. The statistics may change according to the registered members.

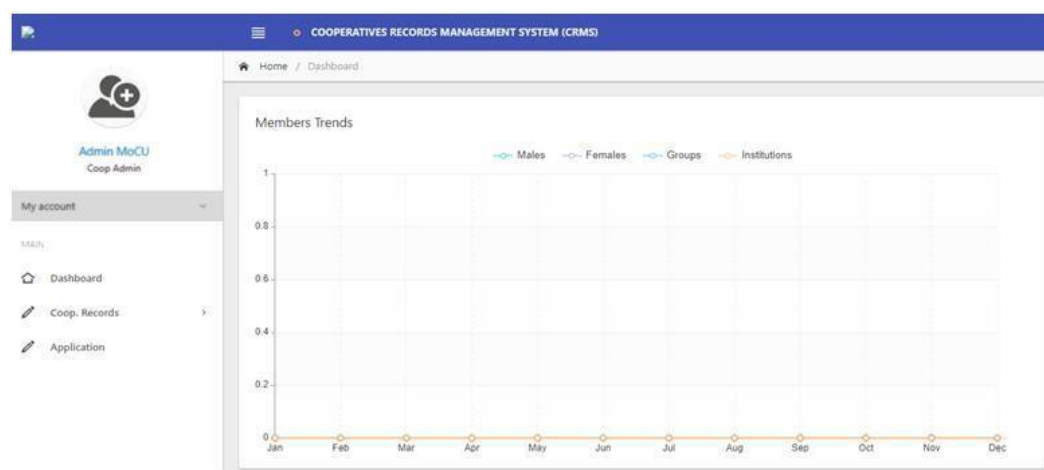


Figure 29: The CRMS dashboard

Nevertheless, a co-operative society will do application through above dashboard by using the menu of application. User will provide required attachments such as co-operative meeting minutes, co-operative by laws, economic survey report and payment slip. All this information will enable DCO, DRCO and HQ to get the reports on payment, activities conducted by the co-

operative society and economic survey reports. Figures 30 and 31 present the application process.

The screenshot shows a web form with the following sections:

- Minutes(Information Committee):** Field 2 with 'Choose File' button, 'No file chosen' text, 'UPLOAD' button, and 'Not Uploaded' status.
- Coop By-Law:** Field 3 with 'Choose File' button, 'No file chosen' text, 'UPLOAD' button, and 'Not Uploaded' status.
- Economic Survey Report:** Field 4 with 'Choose File' button, 'No file chosen' text, 'UPLOAD' button, and 'Not Uploaded' status.
- Application Form:** Field 5 with 'Choose File' button, 'No file chosen' text, 'UPLOAD' button, and 'Not Uploaded' status.
- Payment Slip:** Field 6 with 'Choose File' button, 'No file chosen' text, 'UPLOAD' button, and 'Not Uploaded' status.

At the bottom, there is a blue 'SUBMIT APPLICATION' button and a large orange box containing the text 'Application is not yet Submitted'.

Figure 30: Application phase

The screenshot shows the same web form as Figure 30, but with the following changes:

- All 'Choose File' buttons now show 'mycourse (1).pdf'.
- All 'UPLOAD' buttons are now green.
- All 'Not Uploaded' status indicators are now green and say 'Successfully Uploaded'.
- The 'SUBMIT APPLICATION' button is now green.
- A large green box at the bottom contains the text 'Application submitted successfully'.

Figure 31: Application status

(iii) Application status at the DCO, DRCO and HQ

The application process of co-operative societies starts from co-operative societies, DCO, DRCO and HQ respectively. In the due process, DCO, DRCO and HQ have been the one who approve applications submitted by primary co-operative societies. Figure 32 shows status of the application at the DRCO while Fig. 33 shows application status at the HQ.

Figure 32: Application status at the DRCO

Figure 33: Application status at the HQ

Nevertheless, approval of the co-operative society’s application is conducted through CRMS where DCO, DRCO and HQ have the access to approve or reject co-operative society application request. They first download and view application request to see if co-operative societies have submitted the required documents during application process. Figure 34 shows the rejection and approval of the co-operative society’s application.

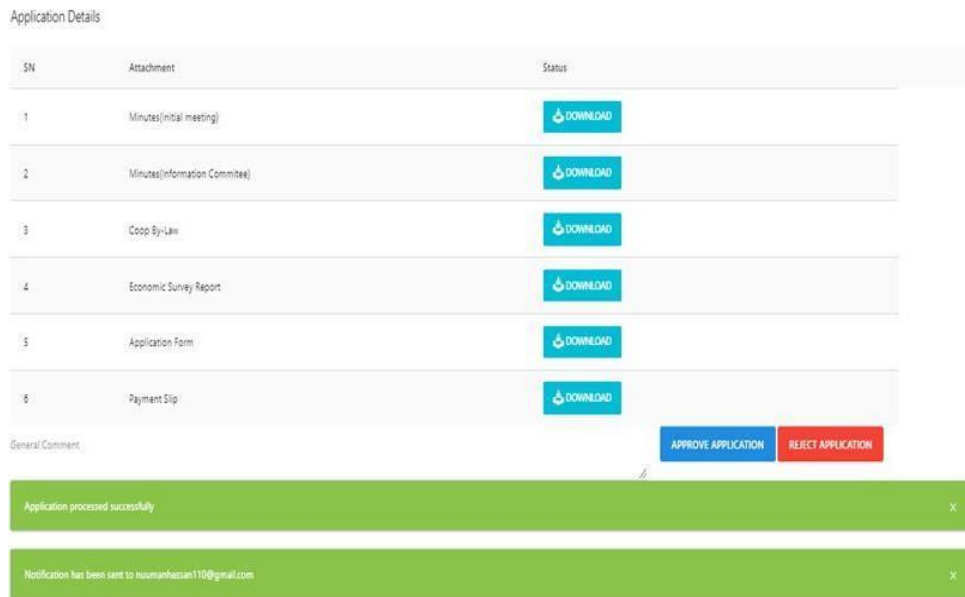


Figure 34: Application approval and rejection

(iv) Management of co-operative records

The designed system provides a platform for managing records submitted by co-operative societies where DCO, DRCO and HQ have the same menu which include; viewing statistical reports, monthly reports submitted by co-operative societies and approve co-operative society applications. Figure 35 presents menus of the dashboard and the graphical presentation of the monthly co-operatives registration trends which changes when co-operative societies submit their monthly reports.

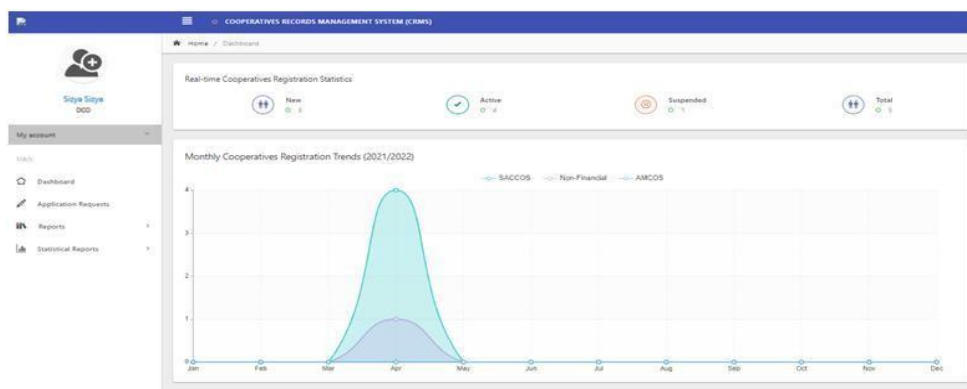


Figure 35: The DCO Dashboard

(v) Co-operative report submission

The designed CRMS provides an interface for co-operative societies to submit monthly reports to the DCOs. Figure 36 provides details required to submit reports. Co-operative society's

reports contain information on; number of members, number of shares, total saving, total amana, internal loans, internal loans balance, external loans, external loans balance, internal auditing and external auditing. The system allows submission of real time data that will synchronize to the database and allows the DCOs, DRCOs and Registrar to view and generate reports.

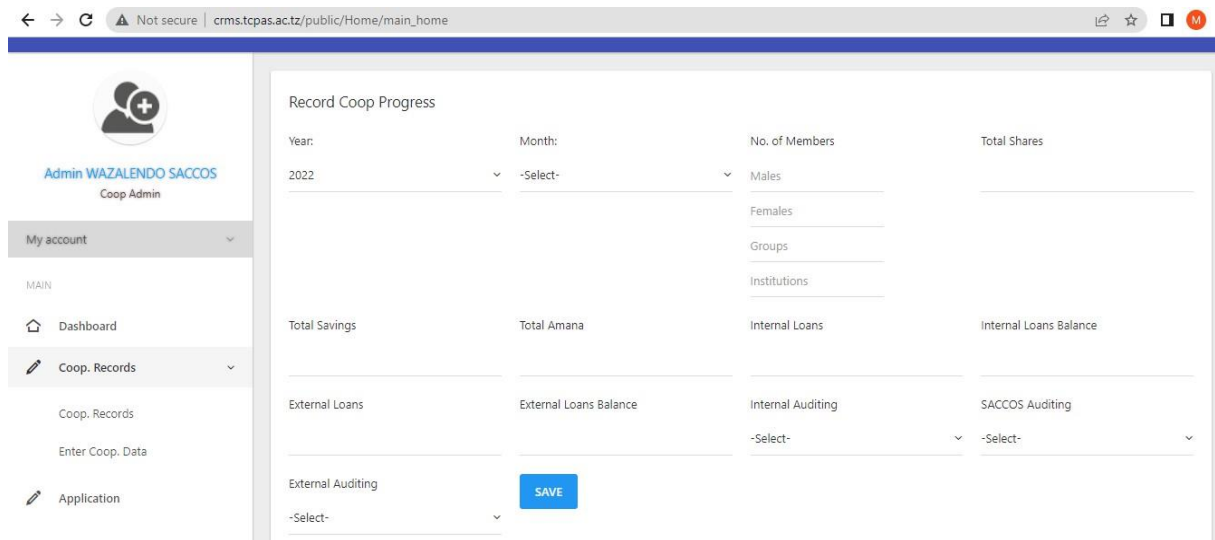


Figure 36: Report submission Dashboard

In addition, CRMS allows the DCOs, DRCOs and Registrar to view the real time report submitted by the co-operative societies. CRMS provides search options where users search for a specific co-operative society's report. It also provides options to view the report and print as shown in Fig. 37.

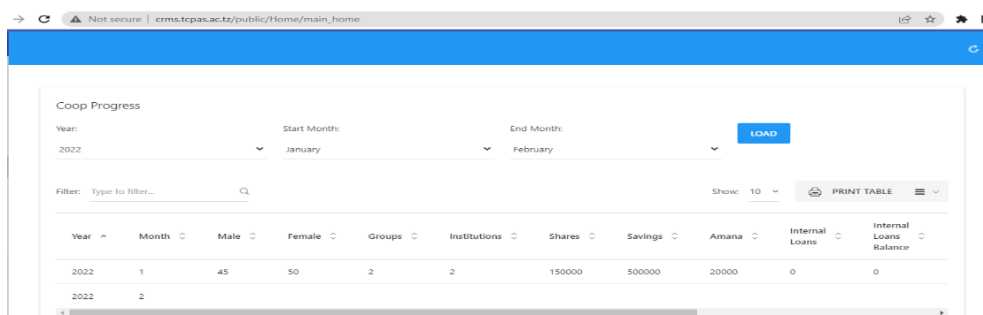


Figure 37: Report accessibility

Also, CRMS provides access to statistical reports. The graphical representation in Fig. 38 shows the statistical reports which is updated when co-operative societies submit their monthly reports. The statistical report serves as a valuable tool for various entities such as DCOs,

DRCOs, the Registrar, government officials, entrepreneurs, and researchers. It enables them to make forecasts, compare, and analyze co-operative operations as it may be seen in Fig. 38.

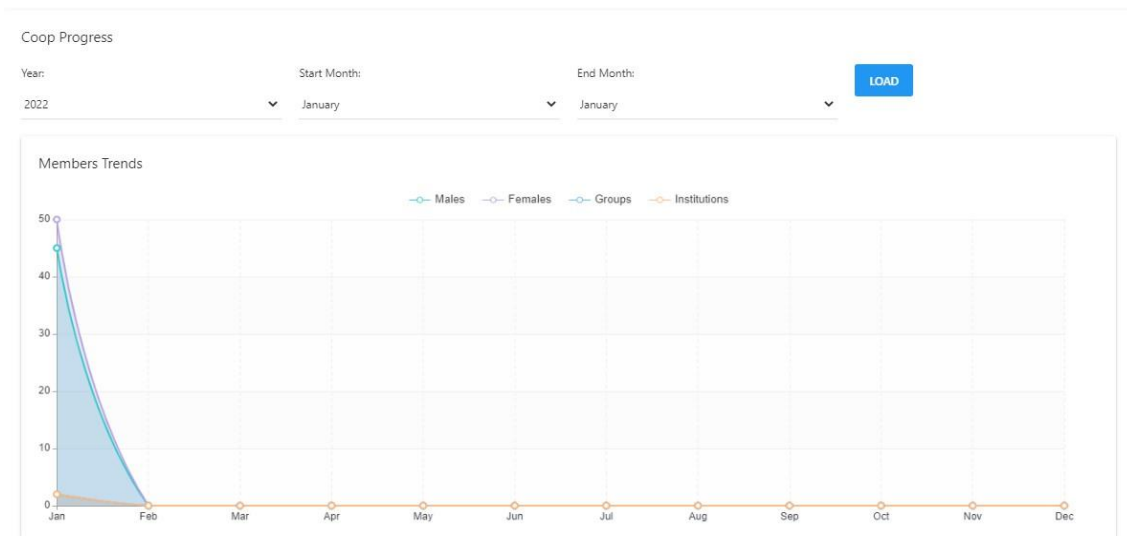


Figure 38: Statistical report

4.6.2 Areas for Future Enhancement of CRMS

Possible future enhancement for CRMS may be to incorporate a feature that enables electronic payments for co-operative transactions. This would streamline the payment process and reduce the need for manual handling of financial transactions. Additionally, it could allow for the integration of various payment methods, including mobile payments, which are increasingly popular in many parts of the world.

Another possible enhancement can be the integration of a communication platform within the system. This would facilitate communication between co-operative members and officers, allowing for more efficient sharing of information and easier collaboration. It could also provide a channel for co-operative officers to communicate with members about important updates and events.

Lastly, an additional enhancement could involve the development of a mobile application for the CRMS. This would allow for even greater accessibility and convenience, as members and officers could access the system and its features from their smartphones or tablets. It could also provide notifications and alerts to users, keeping them informed about important updates and deadlines.

CHAPTER FIVE

CONCLUSION AND RECOMMENDATIONS

5.1 Conclusion

In order to achieve the main objective of the study, the researcher segmented the entire project into four specific areas. Firstly, the researcher conducted a review of the existing record management systems for primary co-operative societies to identify the challenges faced by stakeholders as a result of using the in-house records keeping system. The primary aim was to determine the effectiveness of the in-house process of managing co-operative records, registration, and application processes. The review involved stakeholders at various levels, including the Registrar of Co-operatives at the national level, the Deputy Registrar of Co-operatives at the regional level, three District Co-operative Officers from Moshi municipal, Moshi rural, and Rombo, and thirteen respondents from MoCU's regional offices representing the general public. Secondly, the researcher identified the requirements for the co-operative records management system from the listed users of the system. Then, the researcher designed and developed a web-based system for managing the records of primary co-operative societies to fulfill the primary objective of the study. Lastly, the researcher validated the designed system to check its feasibility during application.

The implementation of CRMS can lead to significant improvements in record management practices, financial reporting, and overall records management. Additionally, it will create an online platform for co-operatives and the public, enhancing accessibility and transparency. By increasing efficiency and reducing operating costs, CRMS can have a positive impact on co-operatives and their stakeholders. The co-operative industry needs to be aware of the benefits of CRMS in accessing and communicating timely information. The implementation of this system has the potential to revolutionize the way in which co-operative officers work, providing significant benefits to the public. With CRMS, co-operative members and the general public will have online access to co-operative information. Meanwhile, DCOs will be able to send reports to DRCOs and the Registrar, generate reports from primary co-operatives, and update information of primary co-operative societies online. This transformation in the day-to-day functioning of co-operatives has the potential to benefit the industry as a whole.

5.2 Recommendations

The study recommends the adoption of a co-operative records management system to improve the performance of DCOs, DRCOs, and the Registrar's Office. Additionally, CRMS can enhance the availability of statistics and serve as a valuable source of information for policy makers, entrepreneurs, practitioners, and the public at large, while also providing a dynamic platform. The study also suggests an area for future extension, where the system can be expanded to include a module that allows users or members of co-operative societies to register and join specific co-operative societies.

REFERENCES

- Adewojo, A., Arekete, S. A., & Adewojo, A. A. (2013). Design of a Prototype Web-Based Students' Record Management System-WEBSTREMS Information and Knowledge Management Design of a Prototype Web-Based Students' Record Management System-WEBSTREMS. *Journal of Information & Knowledge Management*, 3(5).
- Anania, P., Rwekaza, G. C., & Bamanyisa, J. M. (2020). Socio-economic benefits of agricultural marketing co-operatives and their challenges: Evidence from Selected Cases in Moshi District Council (Tanzania). *Journal of Depopulation and Rural Development Studies*, 1-50. <https://doi.org/10.4422/ager.2020.07>.
- Chandra, V. (2015). Comparison between Various Software Development Methodologies. *International Journal of Computer Applications*, 131(9), 7–10.
- Dagher, G. G., Mohler, J., Milojkovic, M., & Marella, P. B. (2018). Ancile: Privacy-preserving framework for access control and interoperability of electronic health records using blockchain technology. *Sustainable Cities and Society*, 39, 283-297.
- Deslonde, V., & Becerra, M. (2018). The Technology Acceptance Model (TAM): Exploring School Counselors' Acceptance and Use of Naviance. *The Professional Counselor*, 8(4), 369–382. <https://doi.org/10.15241/vd.8.4.369>.
- International Co-operative Alliance. (2015). *Guidance Notes to the Co-operative Principles*.
- Katundu, M. (2018). The Role of Cooperative Organizations in Tanzania's Industrialization. *Financing Sustainable Development in Africa*, 397–420.
- Kanayo, U., & Nwabueze, E. (2019). Web Based Students Record Management System for Tertiary Institutions. *International Journal of Advanced Research in Science, Engineering and Technology*, 6, 9624-9631.
- Matto, G. (2011). *Designing a secure system for customer information and portfolio tracking in microfinance institutions: A case of selected SACCOS in Moshi, Tanzania* (Doctoral dissertation, University of Dar es Salaam).
- Mohammed, S., Tetteh, R., & Azumah, A. (2018). Challenges associated with records management in Sunyani Technical University. *Munich Personal RePEc Archive*, 1-14.

- Nguyen-Duc, A., Wang, X., & Abrahamsson, P. (2017). What influences the speed of prototyping? An empirical investigation of twenty software startups. *Lecture Notes in Business Information Processing*, 283, 20–36.
- Olipas, C. N., Norman, C., Olipas, P., & Gardoce, A. P. (2022). Electronic Learning Modules in Mobile Devices: A Technology Acceptance Model Approach Using PLS-SEM. *International Journal of Scientific Research in Multidisciplinary Studies E*, 8(9), 37–44. <https://www.researchgate.net/publication/364037065>.
- Rwekaza, G. C., Kayunze, K. A., & Kimaryo, L. P. (2018). Accountability of board and management to members in primary agricultural marketing cooperatives societies (amcos) in Tanzania, evidence from selected amcos of Bukoba and Moshi Districts. *European Journal of Research and Reflection in Management Sciences*, 6(2), 9-32.
- Sayaf, A. M., Alamri, M. M., Alqahtani, M. A., & Al-Rahmi, W. M. (2021). Information and communications technology used in higher education: An empirical study on digital learning as sustainability. *Sustainability (Switzerland)*, 13(13).
- Shonhe, L. (2017). A literature review of information dissemination techniques in the 21st century era. *Library Philosophy and Practice (e-journal)*, 1731.

APPENDICES

Appendix 1: Questionnaire for MoCU's Regional Programme Co-ordinators (RPCs)

**The Nelson Mandela Institution of Science and Technology (NM-AIST)
Development of a Web-based Record Management System for Primary
Cooperative Societies in Tanzania**

Questionnaire for the Public

Informed Consent:

My name is George Sizya Germinous, a Masters student at the Nelson Mandela African Institution of Science and Technology, Arusha. I am undertaking Master research titled "Development of a Web-based Record Management System for Primary Co-operative Societies in Tanzania". As part of data collection for this study, I am requesting you to fill this questionnaire. Your responses will be used for academic purposes only and will be kept confidential. This questionnaire will take no longer than 10 minutes to complete

Please feel free to ask any question you may have about this study through georgeg@nm-aist.ac.tz

PART A: Personal Information (please tick (√) where appropriate):

1. Age group
 - a) Below 25 years
 - b) 26 – 40 years
 - c) 41 – 60 years
 - d) Above 60 years
2. Sex
 - a) Male
 - b) Female
3. Education level
 - a) University
 - b) College
 - c) Secondary
 - d) Other (please mention).....
4. Occupation
 - a) Academician
 - b) Administrative staff
 - c) Other (please specify)

PART B: Reviewing current process

5. How do you access data about cooperatives in Tanzania? (select all that apply)

- () Physically visiting respective offices
- () Using online resources
- () Asking others
- () Reading books
- () Others (please specify)

6. What type of information about cooperatives do you normally look for? (select all that apply)

Current issues on cooperatives	
Partners in cooperative movement in Tanzania	
Common business activities in every cooperative society	
Share capital in each cooperative society (for financial cooperatives only ie. SACCOS)	
Campaigns related to cooperative movement (nationally and internationally)	
Events related to cooperative movement (nationally and internationally)	
Gender segregated data in cooperatives	
Cooperatives' distribution (region wise)	
Types of cooperatives in Tanzania	
Cooperative audited financial reports	
Un-audited cooperative financial reports	
Active cooperative societies in Tanzania	
In-active cooperative societies in Tanzania	
Cooperatives' performance status	
Others (please mention)	

7. What do you use for the information identified in question 6? (select all that apply)

- () research purpose
- () for policy issues
- () out of curiosity
- () just for knowledge
- () other (please specify)

8. With regard to cooperatives' information identified in question 6, do you normally get what you want when in need?

Yes

No

9. If your answer in question 8 is “yes”, advice on the best way(s) to improve the process

- i.
- ii.
- iii.
- iv.

10. If your answer in question 8 is “no”, what are the challenges/barriers do you experience? (select all that apply)

Data inaccuracy and inconsistency	
Inadequate information being provided	
Time consumption due to geographical challenges	
Increase in data acquisition costs	
Bureaucracy during physical access	
Untimely provision of the needed cooperative information	
Lack of single source of obtaining required information	
Un-updated information being provided	
Inadequate online resources	
Most cooperatives don't keep records	
Lack of transparency	
Communication barrier in the process of acquiring the information	
Improper records' keeping in available source	
Improper presentation of cooperative information being requested	
Other (please specify)	

11. How is the information you request presented to you? (select all that apply)

- in papers (hard copies)
- in excel files (
- in audio files (
- by mouth
- web format

12. How serious are the following challenges when you were acquiring information about cooperatives? (chose between 0 to 5: where 0 = Not a serious challenge and 5 = Very serious challenge; tick (√) where appropriate):

Data inaccuracy & inconsistency	0	1	2	3	4	5
Wastage of time during the process	0	1	2	3	4	5
Increased in data acquisition cost	0	1	2	3	4	5
Bureaucracy	0	1	2	3	4	5
Lack of transparency	0	1	2	3	4	5
Improper presentation (format) of requested information	0	1	2	3	4	5
Communication barrier	0	1	2	3	4	5

PART C: Experience on online resources

13. What is your experience in using online resources for acquiring information?

- a) Strongly dependent
- b) Average user
- c) Not using at all

14. Which tool/device do you use to access online resources? (select all that apply)

- smart phone
- lap top
- desk top
- tablet
- other (please specify)

15. How would you like to access cooperative information/records online? (select all that apply)

- smart phone
- lap top
- desk top
- tablet
- other (please specify)

PART D:

(i) General requirements

16. What kind of information category would you like to access from the cooperative records management system (CRMS)? (select all that apply)

Current issues on cooperatives	
Partners in cooperative movement in Tanzania	
Common business activities in every cooperative society	
Share capital in each cooperative society (for financial cooperatives only ie. SACCOS)	
Campaigns related to cooperative movement (nationally and internationally)	
Events related to cooperative movement (nationally and internationally)	
Gender segregated data in cooperatives	
Cooperatives' distribution (region wise)	
Types of cooperatives in Tanzania	
Cooperative audited financial reports	
Un-audited cooperative financial reports	
Active cooperative societies in Tanzania	
In-active cooperative societies in Tanzania	
Cooperatives' performance status	
Others (please mention)	

17. How would you like the information identified in question 16 be presented to you?

(select all that apply)

() textual method

() tabular method

() graphical method

() other (please specify)

18. Apart from the information identified in question 16, which other information (just for knowledge) would you like to see? (select all that apply)

() cooperative stakeholders

() cooperative partners

() cooperative campaigns

() projects in cooperative sector

- () other adverts (related to cooperatives)
- () related links
- () other (please specify)

19. Which features of the system do you think are important to you? (select all that apply)

Searching tool so that you can search for different information	
Sharing button to other social networks	
Cooperative library for publications and articles	
A way for requesting to view non-open data	
Direct communication with cooperative offices	
View various reports	
About button	
Language selection	
News & advertisements	
Other features (please specify)	

20. What do you think would make the system (CRMS) easy to use for you? (select all that apply)

- () support multiple languages
- () clear and intuitive user navigation
- () use of page grids for UI
- () use cards for UI
- () using breadcrumbs
- () other (please specify)

21. Which other information would you like to provide regarding the system?

- i.
- ii.
- iii.
- iv.

(iii) Reporting requirements

22. What kind of reports would you like to access from the system? (select all that apply)

- () audited financial report
- () unaudited financial report
- () cooperative distribution report

- () gender segregated reports
- () cooperative products' reports
- () other (please specify

23. In what frequency would you like the identified reports (in question 21) be updated and ready for access?

Type of report (eg, audited financial report)	Frequency (eg, monthly, quarterly etc)

24. Do you have any other information you would like to provide about reporting requirements?

- i.
- ii.
- iii.
- iv.

PART E: General knowledge

25. What objectives do you think the proposed system could accomplish with regard to cooperative industry? (select all that apply)

- () accelerate creation of cooperative awareness
- () increase publicity for cooperative societies
- () publishing cooperative information
- () increased research on cooperatives
- () secure place to store cooperative information/records
- () other (please specify)

Appendix 2: Interview Guide Questions for DCO's

The Nelson Mandela Institution of Science and Technology (NM-AIST) Development of a Web-based Record Management System for Primary Co-operative Societies in Tanzania

Interview Guide Questions for DCO's

Informed Consent:

My name is George Sizya Germinous, a Masters student at the Nelson Mandela African Institution of Science and Technology, Arusha. I am undertaking Master research titled “Development of a Web-based Record Management System for Primary Co-operative Societies in Tanzania”. As part of data collection for this study, I am requesting you to fill this questionnaire. Your responses will be used for academic purposes only and will be kept confidential. This interview will take no longer than 15 minutes to complete

Please feel free to ask any question you may have about this study through georgeg@nm-aist.ac.tz

PART 1: System review

1. What tools do you use for keeping co-operative records/information?
2. What kind of information do you normally keep?
3. In what format do you keep co-operative records/information? State the tool used and the format (eg; file cabinet – clip files)
4. How do you process the information received from co-operative societies?
5. How do you disseminate the processed information to those in need (ie, the public)?
6. What information is normally allowed to be openly accessible by the public?
7. What information from your office is not openly allowed to be accessed by the public?
8. Explain the procedure to access the information mentioned in question 7
9. What information do you share with DRCo and Registrar's offices?
10. How do you report to DRCo and Registrar's offices?
11. How do you get feedback from DRCo and Registrar's offices?
12. How do you give feedback to co-operative societies
13. What challenges do you experience as a result of feedback process?
14. What are the challenges experienced in the existing system of handling co-operative information?
15. What will happen if we don't change the way things are done today?

PART 2:

(a) CRMS general requirements

- 16. What kind of information would you like to keep and process in CRMS?
- 17. Do you have any specific template of how data from co-operative societies are presented at your office? If NO, provide suggestions on the format of how co-operative societies should present required data at your office
- 18. Please provide any UPLOAD options (eg, allow scanned document or allow a softcopy of a specific format)
- 19. Which features of the system do you think are important to you? (select all that apply)

Searching tools	
Upload forms from co-operative societies	
Download various documents	
Sharing button	
News board	
DCO account for personalize dspace	
Generate reports	
Feedback mechanism from DRCo and Registrar’s offices	
Feedback mechanism to co-operative societies	
Post announcement related to your district	
Avenue for the public to request for non-open data/information	
19b) Other features you may find relevant (please explain)	
.....	
.....	

- 20. Are there any other systems in your office you would like CRMS to link with? If YES, mention them and state the reason(s)
- 21. Will you need the public to download certain information in the system? If YES, what information would you like them to download?
- 22. What forms and/or information that your office must share with DRCo and Registrar’s offices?
- 23. How would you suggest the procedure for requesting non-open data/records when requested by the public?

24. What do you think shall be security concerns for the CRMS?

(b) Reporting requirements

25. What kind of reports would you like CRMS to generate?

26. Which report(s) would you like to be openly accessible and downloadable by the general public and why?

27. In what format would you prefer the reports to be? (eg, text file, PDF, or image)

28. How would you like the reports be presented? State the type of report and how you would like to present the content (eg; audited financial report – tabular and graph presentation)

29. In what frequency are the reports generated? State the type of report and the frequency (eg; audited financial report – annually)

30. Do you have any other information you would like to provide about reporting requirements?

Appendix 3: Interview Guide Questions for the Registrar's Office

THE NELSON MANDELA AFRICAN INSTITUTION OF SCIENCE & TECHNOLOGY (NM-AIST)

Development of a Web-based Record Management System for Primary Co-operative Societies in Tanzania

Interview Guide Questions for the Registrar's Office

Please feel free to ask any question you may have about this study through

georgeg@nm-aist.ac.tz

PART 1: System review

1. What tools do you use for keeping co-operative records/information?
2. What kind of information do you normally keep?
3. In what format do you keep co-operative records/information? State the tool used and the format (eg; file cabinet – clip files)
4. How do you acquire and process information from DCOs?
5. How do you disseminate the acquired and processed information to those in need (ie, the public)?
6. What information is normally allowed to be openly accessible by the public from your office?
7. What information from your office is not openly allowed to be accessed by the public?
8. Explain the procedure to access the information mentioned in question 7
9. How does your office communicate directives to DRCo's and DCOs?
10. How do you give feedback to DRCo's and DCOs?
11. What are the challenges experienced in the existing system of handling co-operative information?
12. What will happen if we don't change the way things are done today?

PART 2:

(a) CRMS general requirements

13. Who do you think may be key users of CRMS?
14. What kind of information would you like to keep and process in CRMS?
15. Do you have any specific template of how data from DCOs are presented at your office?
If NO, provide suggestions on the format of how DCOs should present required data at your office

16. Please provide any UPLOAD options for DCOs, DRCOs, and Registrar’s office respectively (eg, allow scanned document or allow a softcopy of a specific format)

17. Which features of the system do you think are important to you? (select all that apply)

Searching tools	
Create accounts for DCOs and DRCOs	
Assign privileges to personal accounts	
Revoke privileges	
Upload forms from DCOs and DRCOs	
Download various documents	
Sharing button	
News board	
Generate reports	
Feedback mechanism to DRCOs and DCOs	
Post announcements	
Avenue for the public to request for non-open data/information	
Other features you may find relevant (please explain)	
.....	
.....	

18. Are there any other systems in your office you would like CRMS to link with? If YES, mention them and state the reason(s)

19. Will you need the public to download certain information in the system? If YES, what information would you like them to download?

20. How would you suggest the procedure for requesting non-open data/records when requested by the public?

21. What do you think shall be security concerns for the CRMS?

(b) Reporting requirements

22. What kind of reports would you like CRMS to generate?

23. Which report(s) would you like to be openly accessible and downloadable by the general public and why?

24. In what format would you prefer the reports to be? (eg, text file, PDF, or image)

25. How would you like the reports content to be presented? State the type of report and how you would like to present the content (eg; audited financial report – tabular and graph presentation)
26. In what frequency are the reports generated? State the type of report and the frequency (eg; audited financial report – annually)
27. How would you like DRCOs and DCOs get reminded about submission of different reports?
28. Do you have any other information you would like to provide about reporting requirements?

RESEARCH OUTPUTS

(i) Research Paper

Germinous, G.S., Dida, M.A. (2024). Evidence-Based Practices on Co-operative Societies Information Record Management. In: Marx Gómez, J., Elikana Sam, A., Godfrey Nyambo, D. (eds) *Artificial Intelligence Tools and Applications in Embedded and Mobile Systems*. ICTA-EMOS 2022. Progress in IS. Springer, Cham. https://doi.org/10.1007/978-3-031-56576-2_2

(ii) Manuscript

A manuscript with a title “*Enhancing Cooperative Records Management with Web-mobile Solution: Evidence from Kilimanjaro, Tanzania*” has been accepted with an acceptance letter attached and waiting for publication in the MC Engineering Themes (ISSN: 2834-7218) Journal from Medicon Open Access International Library.

(iii) Poster Presentation

Poster Presentation



Development of a Web-Based Record Management System for Primary Cooperative Societies in Tanzania: A Case of Kilimanjaro

1. George Sizya Germinous, 2. Dr. Mussa Ally Dida, and
3. Dr. Edith T. Luhanga

Introduction

Primary co-operative societies are groups of people who work together voluntarily to meet their common economic, social, and cultural needs through a jointly owned and democratically controlled enterprise, example SACCOS and AMCOS. Establishing a primary co-operative society involves various processes which require the involvement of DCOs, DRCOs and Registrar of co-operatives. These processes bring about the issue of documentation and records keeping.

Methodology

CRMS requirements were gathered using semi-structured questionnaire from Rombo, Moshi DC and Moshi Municipal districts. Development of the system incorporated HTML5 and CSS3 for front end; PHP, JavaScript and MySQL for back end. Performance testing was done using automated tool of Google Speed Insight where test scores were 89%, 80%, and 85% for computer, mobile device and tablet respectively

Problem Statement

Lack of transparency and inefficiency are the product due to in-house records keeping in primary co-operative societies. Also, obtaining up-to-date data for assessing co-operatives' performance and understanding the current state of co-operatives is a challenge. To address noted challenges a web-based record management system was developed to enhance records management practices and improve the accessibility, accuracy, and efficiency of co-operative data for primary co-operative societies.

Objectives

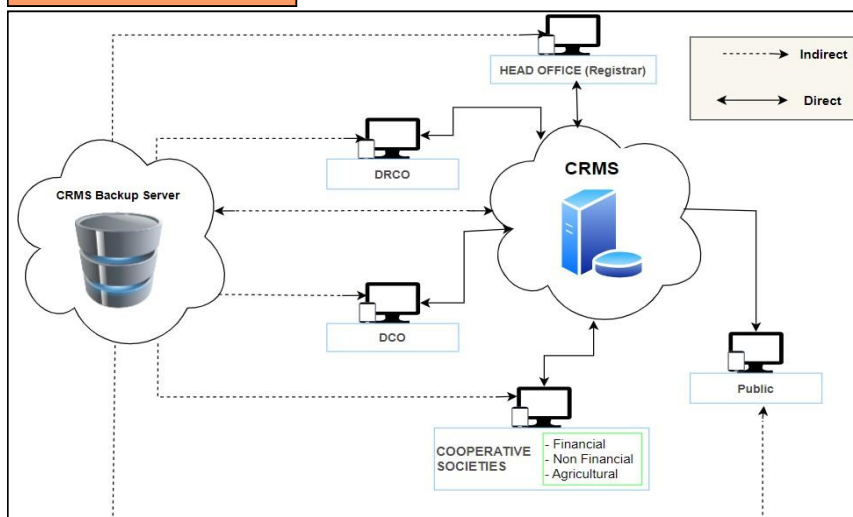
General Objective:

To develop a Web-based Record Management System software for primary co-operative societies in Kilimanjaro region, Tanzania.

Specific Objectives:

1. To gather requirements for a web-based records management system for primary co-operative societies.
2. To develop the web-based record management system for primary co-operative societies.
3. To validate the developed software solution.

System Framework



Conclusion

CRMS implementation revolutionizes co-operative operations by improving record management, financial reporting, and overall efficiency. The online platform enhances accessibility, transparency, and reduces operating costs, positively impacting stakeholders. Co-operative officers' benefit from streamlined workflows, providing public access to co-operative information.