



**PROJECT DESIGN AND IMPLEMENTATION OF COOPERATIVE
MANAGEMENT SYSTEM (CMS) SOFTWARE AND ITS IMPACT ON
THE EFFICIENCY AND PRODUCTIVITY OF COOPERATIVES IN
RWANDA**

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Abstract

This research analyzed “Project design and implementation of cooperative management system (CMS) software and its impact on the efficiency and productivity of cooperatives in Rwanda” on 146 cooperatives using Cooperative Management System (CMS) across 19 districts of 4 Provinces of Rwanda (Eastern, Western, Northern, and Southern). The study used a sample of 750 respondents including 730 cooperative members from a total population of 61,320 members of 146 cooperatives plus 19 District Cooperatives Officers and 1 Director of Cooperatives Promotion and Capacity Building Unit in Rwanda Cooperative Agency (RCA). A questionnaire designed in form of five levels Likert scale was used and data was collected and analyzed through KoBo Toolbox and SPSS. The results of the research indicated that CMS has an impact on productivity and efficiency of cooperatives ($\bar{x}= 4.7$; $\sigma =.220$). CMS Membership management module impacts on productivity and efficiency of cooperatives through accurate data about the members that promotes effective planning ($\bar{x}= 4.9$; $\sigma =.200$); CMS Payments management module impacts on productivity and efficiency of cooperatives through promoting stakeholders’ satisfaction ($\bar{x}= 4.6$; $\sigma =.200$); CMS Accounting module impacts on productivity and efficiency of cooperatives through updated, easy and quick financial reporting ($\bar{x}= 4.7$; $\sigma =.190$); CMS Human resource management module impacts on productivity and efficiency of cooperatives through employee motivation and satisfaction ($\bar{x}= 4.8$; $\sigma =.200$); CMS Credit management module impacts on productivity and efficiency of cooperatives through accurate and updated

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information about the debt owed and timely payment ($\bar{x}= 4.5$; $\sigma =.300$). The main CMS challenges are the following: CMS is not free. It requires additional contribution of members to cover the cost of its installation and maintenance ($\bar{x}= 5.0$; $\sigma =.000$); CMS requires the cooperatives to have among members those with advanced education level yet there are pure rural cooperatives where none have attended secondary school ($\bar{x}= 4.3$; $\sigma =.080$); CMS has issue of confidentiality of the data: the data of the cooperatives are managed by the government which hosts the CMS system ($\bar{x}= 5.0$; $\sigma =.000$); CMS use requires internet which incurs additional operational cost ($\bar{x}= 4.1$; $\sigma =.351$); Most of cooperative managers prefer the ordinal routine of cooperative management due to low level of understanding and flexibility to change their routine services for adopting CMS ($\bar{x}= 5.0$; $\sigma =.000$). Corresponding solutions proposed by the respondents are the following: Support of the RCA on installation cost and the cooperatives should cover maintenance costs ($\bar{x}= 4.8$; $\sigma =.070$); More training on even members with good primary education on the use of CMS ($\bar{x}= 4.3$; $\sigma =.380$); Confederations should play important role in the management of CMS and the role of the government should be reduced with the time ($\bar{x}= 4.9$; $\sigma =.290$); The government should reduce the cost of internet to be affordable for all including cooperatives using CMS system ($\bar{x}= 4.7$; $\sigma =.151$); More capacity building is required for cooperative managers to open their mind on the use of ICT for the development. Also the experience of successful cooperatives in the use of CMS should be shared among cooperatives ($\bar{x}= 4.6$; $\sigma =.400$).

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1. BACKGROUND TO THE STUDY

Globally, (International Cooperative Alliance, 2014) defines a cooperative as an autonomous association of persons united voluntarily to meet their common economic, social and cultural needs and aspirations through a jointly owned and democratically controlled enterprise. The members of cooperatives can be natural persons or corporate bodies. They are an alternative to the capitalist approach of most businesses: a type of economic-social cooperation. As a result, the cooperative, which aims to apply the social well-being of the work world to a business level, is a non-profit-making service enterprise whose objective is to free its members from any exploitation they are suffering by strengthening them in their economic role as purchasers, workers, produce sellers, borrowers, housing applicants, tenants, etc (International Cooperative Alliance, 2014). According to (Henry, H., 2021) cooperatives are based on the values of self-help, self-responsibility, democracy, equality, equity, and solidarity. In the tradition of their founders, cooperative members believe in the ethical values of honesty, openness, social responsibility and caring for others. The

cooperative principles are guidelines by which cooperatives put their values into practice. These principles are the following: Cooperatives are voluntary organisations, open to all persons able to use their services and willing to accept the responsibilities of membership, without gender, social, racial, political or religious discrimination. Cooperatives serve their members most effectively and strengthen the cooperative movement by working together through local, national, regional and international structures. Cooperatives work for the sustainable development of their communities through policies approved by their members (Henry, H., 2021). According to (European Parliamentary Research Service, 2019), there are 3 million cooperatives worldwide; together, they provide employment for 280 million people, equating to 10% of the world's employed population. The 300 largest cooperatives and mutuals in the world had a total turnover of US\$2.018 trillion in 2016. In the EU there are some 131,000 cooperatives, with more than 4.3 million employees and an annual turnover of €992 billion.

For Africa, the cooperatives have played important role in the development of African countries. (Wanyama, F. O., 2019) indicated that promotion of these organizations to champion development has seen the history of cooperative development in independent Africa generally phased into two eras: the first era running from the immediate post-colonial period in the 1960's to the mid-1990s and the second era occurring during the global economic reforms from the mid 1990's to the present, which has been characterized liberalization of the economy. Whereas the first era was characterized by stringent government control over cooperative development through enactment of policies, legislation and programmes that promoted cooperatives as vehicles for accelerating national economic development, the second era has been the sphere of freeing cooperatives from the state to enjoy autonomy and operate like business ventures responding to market demands (Wanyama, F. O., 2019).

In Rwanda, (Mukarugwiza, S., 2010) showed that like in most African countries, cooperatives were first introduced in Rwanda by the Belgians in the colonial period as instruments for driving the agenda of the government's socio-economic goals. Due to the paternalistic approach of the colonial administration that sought to keep Africans in underprivileged positions, cooperatives were not considered to be attractive to Africans, as they restricted their activities to the social and agricultural sectors. Even in the agricultural sector, African cooperatives were strictly controlled by the colonial administration to the point of fixing the prices that cooperatives could pay their members for their produce, which was lower than what private European entrepreneurs paid (Wanyama, F., Develtere, P. and Pollet, I. , 2009). The end result of this scenario was that the cooperative movement witnessed little growth during the colonial period. However, the growth of the movement picked up at independence, following the support of the movement by the new government. According to (Ntavyohanyuma. P., 1987) there were only 4 cooperatives in Rwanda before 1962. The number increased to 36 between 1963 and 1966; it reached 423 between 1967 and 1973. It increased to 1203 between 1974 and 1980 and it reached 1523 between 1981 and 1983. From 2008 to 2023, cooperatives increased from 2500 (2008) to 10,408 cooperatives (Dec 2022). From 2018 to 2019, there was an increase of 8% (from 8,724 to 9,423) but from December 2019 to December 2020, the increase was 0.8%. In 2023, the statistics indicated that there are 11,019 cooperatives in Rwanda with 5,290,717 members. Those cooperatives pooled together more than fifty-four billion Rwanda francs (54,202,032,542 frw) as the total share capital of cooperative members (RCA, 2023).

Cooperatives play important role in the development of Rwanda. (Harelimana, J.B & Mukarukaka, B, 2021) Cooperatives are instruments used to alleviate poverty and to accelerate agricultural production in Rwanda. Similarly, cooperatives contribute to the achievement of the Millennium Development Goals, Vision 2020 and the Economic Development and Poverty Reduction Strategy (EDPRS) programme that focuses on rural economic transformation, human resource development, development and promotion of the private enterprises and poverty alleviation. Cooperatives engaged in cash crop production, such as tea and coffee, play a major role in organizing producers to earn the country foreign exchange, which is an important contribution to the economy of the country. In 2007, agriculture's share of the GDP was approximately 37 per cent and the contribution of cooperatives to agricultural productivity was significant. Beside the above macro-economic role, cooperatives create decent employment for their members, especially in the handicraft

and artisanal sector. Different crafts such as baskets are made across the country and are marketed by a large number of women's cooperatives. Different organizations, including ILO, GTZ and PPPMER have supported artisans in the informal economy and most of such artisans are organized into cooperatives. The union called "Kora" is one example of such a cooperative. Cooperatives create jobs not only for their members but also for their staff. According to the taskforce on promotion of cooperatives, each SACCO creates seven and half jobs, while other cooperatives create four jobs on average. From visits to unions and federations, it was established that each employs at least four individuals. Finally, cooperatives play an important role in financial intermediation in Rwanda. The National Bank that regulates 439 SACCOs as of 31-July-2022 including 23 non-Umurenge SACCOs and 416 Umurenge SACCOs in the country (National Bank of Rwanda, 2022).

Cooperative management in digital society: (Cousin, L. & Audebrand, L. K, 2019) showed that the beginning of 21st century has been marked by a rapid development of digital technologies, whose disruptive effects are affecting all economic sectors. The emergence of a collaborative economy has a particularly pressing effect on the cooperative movement: cooperative businesses, as democratic economic organizations, feel challenged by digital platforms able to connect distributed groups of people and enabling the exchange and sharing of resources in a cheap and efficient way (Cousin & Audebrand, 2019).

2. RESEARCH PROBLEM

(Ministry of Trade and Industry, 2018) outlined a series of issues of management in cooperatives in Rwanda namely: (i) Non-transparent decision-making process within cooperatives which lead to monopolization of decision by leaders, which can result into conflicts and misunderstanding between members and leaders on one hand and between members themselves on the other hand. (ii) Mismanagement of cooperative resources, due to poor financial management capacity, embezzlement of some cooperative leaders and employees, lack of transparency and limited accounting skills. (iii) Limited leadership, managerial, technical, IT and other soft skills required for effective management of cooperatives. This is mainly due to the low level of education on the side of cooperative leaders and managers of Cooperatives, which negatively impact the production capacity and growth of the cooperatives. (iv) Limited information and awareness of existing policies, laws and internal rules and regulations and decisions made within the cooperative movement (Confederation, Federations, Unions), creating disconnects between the leadership and the membership base. (v) Lack of limitation in terms of members of a single family allowed to participate in one Cooperative, especially in decision-making committees. This needs to be addressed by the revised cooperative law. In addition, (Ministry of Trade and Industry, 2018) found limited use of ICT by cooperatives and yet ICT adoption as having the potential to have a significant impact on cooperatives' success in terms of access to information, extension services, markets, and finance. The overriding objective of National Policy on Cooperatives in Rwanda is to enable the cooperative movement play its vital role towards the transformation of the national adoption of ICT: Increase the efficiency of the service delivery by the cooperative movement through automated services using ICT-based models and Cooperative Information Management System (CIMS); Improve the current management and accountability system in the overall structure of cooperative movement. MNK DIGITAL GROUP LTD, is a software developer and seller, which developed an IT Solution for the entire management (Cooperative Management System "CMS") of various cooperatives across the country and in different value chains. The software referred to here is called "Cooperative Management System (CMS)". Upon presentation, analysis and vulnerability study carried by Rwanda Information Society Authority (RISA), MNK system (CMS) got approved. RCA, as an entity overseeing cooperatives in Rwanda and referring to the law that requires all cooperatives to use IT solutions in their daily operations, recommended cooperatives to use the CMS in their business management. Since the software is approved by Rwanda Information Society Authority (RISA) and Rwanda Cooperative Agency (RCA), its adoption is challenging: the cooperatives may adopt it just to please the government that they are integrating ICT in their business and continue their routine of activities. This because the software was developed by the private company as a business and approved by the government for good functionality but it has not been proposed by the cooperatives as needed. The sustainability of this project is therefore

challenging. All ICT systems do not satisfy the needs of the customers and end by being abandoned. The example is Windows Vista which did not last time in execution. Other home-made software serve for a time and end by being ineffective. CMS was introduced in 2019, and currently it is used by 146 Cooperatives in Rwanda. On the side of independent variable which is “Cooperative Management System (CMS)”, the research would like to assess the extent to which the users appreciate the platform in terms of Information it contents, Career development process, user interaction, Technical aspects of the software and materials, and Support services it provides. On the side of dependent variable, which is “Efficiency and productivity of cooperatives”, the research would like to assess the extent to which CMS contribute to the efficiency and productivity of cooperatives in Rwanda.

3. OBJECTIVES OF THE STUDY

The general objective of the research is to assess the Cooperative Management System (CMS) software and its impact on the efficiency and productivity of cooperatives in Rwanda. Specific objectives of the study are: (1) to evaluate the extent to which cooperative managers appreciate the design and functionality of Cooperative Management System (CMS); (2) to analyse the level of impact of CMS Membership management module on productivity and efficiency of cooperatives in Rwanda; (3) to assess the level of impact of CMS Payments management module on productivity and efficiency of cooperatives in Rwanda; (4) to find out the level of impact of CMS Accounting module on productivity and efficiency of cooperatives in Rwanda; (5) to determine the level of impact of CMS Human resource management module on productivity and efficiency of cooperatives in Rwanda; (6) to assess the level of impact of CMS Requisitioning module on productivity and efficiency of cooperatives in Rwanda; (7) to analyse the level of impact of CMS Credit management module on productivity and efficiency of cooperatives in Rwanda; and (8) to identify the challenges of Cooperative Management System (CMS) and provide recommendations.

4. THEORETICAL REVIEW

General Systems Theory by Ludwig von Bertalanffy (in the 1940s)

According to (Chen, D & Stroup, W. M., 2021), General systems theory (GST; German: allgemeine Systemlehre) was coined in the 1940s by Ludwig von Bertalanffy, who sought a new approach to the study of living systems. Bertalanffy developed the theory via lectures beginning in 1937 and then via publications beginning in 1946. According to the theory, system management is the combination of four key elements which are all needed to manage a system efficiently and effectively: Inputs (Raw Materials, Human Resources, Capital, Information, Technology), process, output, feedback (Chen & Stroup, 2021). An organization’s input includes human resources, raw materials, physical resources, financial resources, equipment, technology, and information. The organizational process consists of processing inputs to make them the desired outputs. The process may include transformation, operation, planning, leadership, and management control. Output is the product of an organization. After successful processing, the output of an organization may be the desired product, service, employee behavior, productivity, profitability, loss, job satisfaction, etc. Organizational outputs are that customers consume perceive and provide feedback (Chih-Hui & Sapphire, 2017). In this line, (Adams, K., M., 2012) indicated that an organization as a system has various sub-systems such as its different business units, functional departments, employee groups, etc. They all are interconnected and interrelated to each other. Synergy describes the efforts of the whole as greater than the efforts of individual parts. The system approach ensures synergy in the organization. This approach suggests to management that an organization’s subsystems should coordinate in such a way that the output should be always greater than the sum of the output of the individual subsystems. Feedback is an essential component of the management system to provide information regarding output. This is required for taking corrective actions in the organization if the results deviate from standard results (Adams, 2012).

Application of the theory to this research: A cooperative system is defined to be a system of multiple dynamic entities that share information or tasks to accomplish a common, though perhaps not singular, objective. A cooperative system is an integration of physical, biological, and social factors; its purpose is to

overcome the limitations. As a cooperative system is established, it develops its own purpose and special organ to maintain itself. The purpose of a cooperative system is different from that of an individual's motives; a cooperative system becomes an independent entity and acquires its autonomy through having its own purpose. The conditions of survival for a cooperative system are effectiveness and efficiency, that is, to attain its purpose and satisfy individuals' motives respectively.

Cooperative Inputs: Inputs into cooperative consist of human resources (such as members, employees), raw materials (whatever the cooperative processes such as agricultural seed, fertilisers, land for the case of agricultural cooperative), physical resources (such as land and any other materials used), financial resources (such as members contribution, loan, donation), equipment (such as office equipment and operational equipment), technology (the use of ICT in modern society), and information (all systems used to share information about the day- to- day activities of the cooperative).

Process: This level consists of transformation of inputs into outputs which are desired results. Process consists of running a series of operations such as human resource management, suppliers' management, and effective usage of raw materials. This become successful if there is good planning, leadership, and management control.

Outputs: Cooperative's output may be the desired product depending on the activities of the cooperative, the service provided by the cooperative, employee or members' behavior, productivity, profitability, job satisfaction, etc. Cooperative's outputs are that customers consume perceive and provide feedback.

Cooperative Management System (CMS) and System Theory: CMS contributes fulfil the four key elements which are all needed to manage a system efficiently and effectively namely: Inputs (raw materials, human resources, capital, information, and technology), process, output, feedback. The user of CMS requires to input data from operation (such as information about the staffs, the vendors, the suppliers, the debt, the harvest, etc). CMS is made of database technology. The CMS process such data and provide information (output) timely in form of feedback.

5. EMPIRICAL REVIEW

(Teodosio, V., 2017) in a study titled "Agricultural Cooperatives and Information Communication Technology in an Emerging Asia" posited that technology is playing an increased role in agricultural cooperatives which exist in almost all the countries in Asia and enjoy legal recognition, through the interface of Internet and telecommunications to increase the amount of information available to cooperatives and their members. Nonetheless, their capacity to access and manage the data, information and knowledge differs from the level of information systems available and critical State support. The study highlighted that ICT applications from business to consumer have enabled cooperatives to identify products and marketing opportunities in the context of WTO implications while stressing that Asia has both very successful and those in dire trouble agricultural cooperatives. However, the study pointed out that there is a lot of knowledge sharing in the movement and this has helped tear down barriers between and among cooperatives. Many cooperatives which have their own customized systems, standard procedures and particular innovation have brought to life a wide range of good practices in agricultural cooperatives. The study discovered that Information communication technologies (ICTs) afford opportunities for a knowledge management system that proved sustainable for agricultural cooperatives. The study stated that the world has 800 million cooperatives members and highlighted a number of successful agricultural cooperatives. In conclusion, the study stated that the cooperative sector in Japan has 30 million members; India with 236 million; South Korea, 5 million farmers, Thailand has 6 million members; Philippines, 5.6 million and Malaysia, 5.5 million and these countries have all added new sophistication in terms of a global projection for agricultural cooperatives because of communication technology (Teodosio, 2017).

(Ashrafi, R., & Murtaza, M., 2018) in their paper titled "Use and Impact of ICT on SMEs in Oman" conducted an exploratory study to learn about the use and impact of Information and Communication Technologies (ICT) on Small and Medium Sized Enterprises (SMEs) in Oman. They investigated ICT

infrastructure, software used, driver for ICT investment, perceptions about business benefits of ICT and outsourcing trends of SMEs while providing an insight on the barriers for the adoption of ICT. Data on these aspects of ICT was collected from 51 SMEs through a survey instrument. They discovered that only a small number of SMEs in Oman are aware of the benefits of ICT adoption and that the main driving force for ICT investment was the need to provide better and faster customer service and to stay ahead of the competition. The study highlighted that majority of surveyed SMEs have reported a positive performance and other benefits by utilizing ICT in their businesses. Majority of SMEs outsource most of their ICT activities. Lack of internal capabilities, high cost of ICT and lack of information about suitable ICT solutions and implementation were some of the major barriers in adopting ICT (Ashrafi & Murtaza, 2018).

(International Cooperative Alliance- Africa, 2018) conducted a Review of the existing Information Communication Technologies (ICT) in co-operatives in Africa for the purpose of establishing a flexible, user-friendly Integrated Management Information System. On assessment of prevailing Record keeping System across the cooperatives, Findings show that manual operation is rife in cooperative administration across the study area. For instance, the highest incidence of manual record keeping obtains at the Secondary/Union tier at 48.62% hardcopy ledger-entry. Following close, in manual record keeping still, is the primary Tier at 23.03% incidentally, the mass of members who require timely services are within the Primary and Secondary cluster. The use of Ledger for record-keeping is relatively widespread at the sub-Apex federation level where the State/ Regional Federation practice 16.21% manual entries and National Federation tend to fare better at 12.15%. The highest application of computer as a record keeping tool is seen at the National Federation/Country Apex Tier at 32.45%. Primary, Secondary and State/ Provincial/ Regional Federation Tiers make 23.35%, 22.57% and 21.63% application in record keeping, respectively. Remarkably, across the spectrum of cooperative Tiers, there is a growing size of trend blazers who keep records on online real-time basis on clouds. 26.54%, 18.95%, 27.25% and 27.25% are the cloud-based records for Primary, Secondary and State/Provincial/Regional Federation, respectively. These mix of record keeping system still allow flexibility for a 'hybrid' which shows cooperative in the continent practicing a motley of record keeping system. The conclusion on the current record keeping system is; there are common record keeping trends across the study area. The trend speaks to the fact that these cooperatives are in a transitory mode; from predominantly manual mode towards automation and ICT. It can still be better as there is room for improvement (International Cooperative Alliance- Africa, 2018).

On Data Automation System, while gauging the type of application used by cooperatives, a common, trend was observed. There is a high rate of 'undisclosed'. The lack of disclosure or inability to volunteer software name is suggestive of cooperative administrative system without an Accounting Application, or Information Management Application. The research found that there was a 69.30%, 58%, 55.56% and 15.87% 'undisclosed' feedback for Primary, Secondary and State/Provincial/Regional Federation, respectively. The highest occurrence for Accounting Application is seen at the National Federation (at 84.13%). State/Regional Federations makes use of Accounting application more than Information Management Application at 33.33% to 11.11%. The Conclusion; Accounting Application lacks the depth and flexibility to provide solution-as-service to manage members records. Interestingly, it ranks second in percentile frequency to undisclosed. Information Management Application are better tuned to serve MIS- Management Information System role (International Cooperative Alliance- Africa, 2018).

(Oyebanjo, O., 2020) examined factors affecting information technology (IT) adoption and its effect on cooperative performance in Egba Division, Ogun State, Nigeria. Primary data were collected from 122 respondents by multi-stage sampling techniques through questionnaire. Data were analysed by descriptive statistics, Binary Logit and Cobb-Douglas function. The result shows that average respondent was 32.8 years old. Male (80.3%) dominated cooperative management, 64.8% were married, 31.2% had maximum of secondary education. Cooperative membership was 10 – 58 persons. The factors determining the use of Information technology (IT) among cooperatives in the study area were examined by the Binary Logit model. The dependent variable in this analysis is adoption status of computer system (i.e. adopted or non-adopted) being the major information technology i.e. hardware that is used to operate the software, internet

and social media. The estimates of the analysis are presented in Table 4. The model parameters i.e. chisquare and log likelihood values were significant at ($P < 0.01$) probability level showing that the model has significant explanatory power of the data. The value of pseudo-R² (0.7497) shows a good fit of the model. The value means that 74.9% of the variation in information technology (IT) adoption among the cooperatives was caused by the explanatory variables in the analysis while remaining 25.1% could be attributed to unknown factors. The estimated coefficient of age (-0.0337) of the cooperative manager had a significant negative relationship with IT adoption at $p < 0.01$. This implies that age of the managers does not support the use of IT facilities. This may be due to their unwillingness to go back to class for computer training. Thus, youthful managers are likely to be willing for new training which will favour IT adoption in cooperative. Educational level of the managers had a positive and significant coefficient (0.2956) at $p < 0.01$ indicating that higher level of education will promote adoption of IT facilities among the cooperatives. The coefficient of membership (0.0358) significantly influenced adoption of IT facilities at $p < 0.01$. The positive sign indicates that an increase in membership will enhance the use of IT facilities by the cooperatives through additional funds. The coefficient of gender (0.4324) is positive and significant at $p < 0.05$. The coefficient value is significantly not different from zero implying that female managers contributed more to the use of IT facilities by the cooperatives. This finding supports the fact that female dominates secretariat job than male workers. Experience has a positive and significant coefficient (0.0607) at $p < 0.01$, implying that appreciable years in cooperative management will encourage effective use of IT facilities. However, the coefficient of manager's computer literacy (0.9399) shows a positive and significant relationship with IT adoption. Thus, adequate knowledge in computer operation is a prerequisite for adoption and effective use of computer system and other related facilities (Oyebanjo, 2020).

In Kenya, several researchers indicated how poor adoption of ICT led cooperatives to decline in favour of banks. (Onduko, G., 2013) indicated that SACCOs and other MFIs in the financial sector in Kenya risk closure and redundancy if they are not able to embrace innovative technology to counter the ever-rising competition from the commercial banks. The Savings and credit cooperative societies are faced with challenges of survival due to decline of members despite their geographical spread compared to other financial providers in the country (Onduko, 2013). (Mabrouk, A., & Mamoghli, C, 2015) showed that this trend in loss of customers is attributed to the competition from banks, which have embraced financial innovations thus being able to offer better services like easy access transaction accounts and consumer loans through mobile and internet platforms. This scenario has sparked off stiff competition for customers between Savings and credit cooperative society and these other Financial Institutions (Mabrouk & Mamoghli, 2015). In the same line, (Otieno, D. J., 2016) found that deposits taking SACCO's in Kenya have always straggled to keep pace with this ever-changing technology with some of the SACCOs collapsing and others operating under losses. Long lines due to increased membership, transaction error, and insecurity and network failures are the common challenges in the financial markets. This has highly lowered customer's perception on the quality of service offered, reducing credibility in the banks and microfinance. Majority of Savings and credit cooperative societies' growth in Kenya is decimal. Many of them still do not have Front Office Services Activity. How to strategize for financial innovation basing on the available resources to attain growth has become a great challenge. There is clear inadequacy of financial innovation among Savings and credit cooperative societies in Kenya (Otieno, 2016).

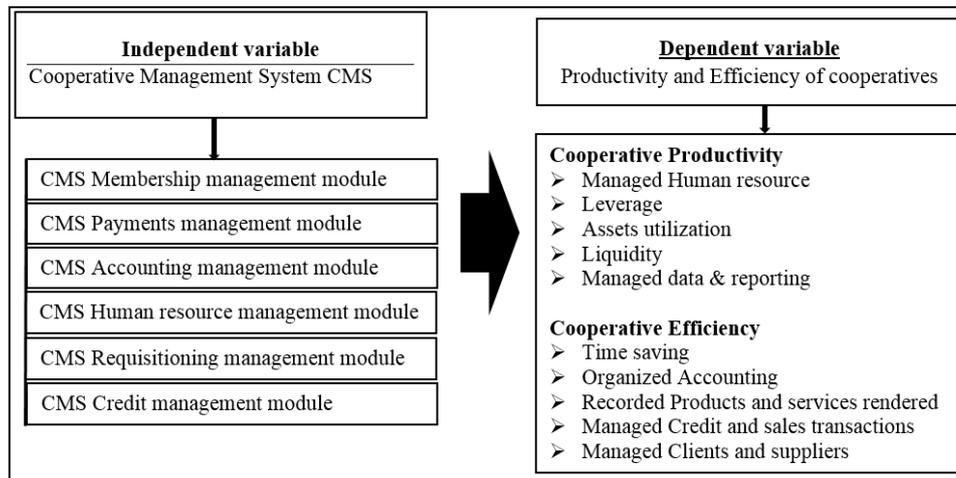
(Wachira, D., Muturi, P., & Sirma, J., 2014) in their study titled "An Evaluation of the Perceived Effect of ICT's on the Performance of Savings and Credit Co-operatives (SACCOs) in Kenya", they explained that competitiveness of firms in the context of the current economic challenges requires effective management activities and a strategic importance directed towards a better administration of knowledge and the impact of Information and Communication Technology on organizational structures. The study sought to evaluate the perceived effects of ICT on performance of Sacco's in Kenya through a census survey of 34 licensed Sacco's in Nairobi County. The study specifically evaluated the prospects of ICT in Sacco's in meeting their stated objectives, the level of awareness in Kenya, the levels of innovations, existing infrastructure, integration of the cooperative processes and the perception amongst the stakeholders. Their study focused on

the perceived ICT factors towards performance such as innovations, infrastructure, awareness and policies. They did a comparative case study selected from different social economic settings and employed a survey research design. Data was collected using questionnaires to provide an insight into the phenomena. They concluded that Sacco's should combine their 'hard' ICT investments (i.e. acquisition of new hardware, software and networks), with appropriate 'soft actions', in order to achieve higher levels of benefits and impact on business performance from them. One of these necessary 'soft actions' is the alignment of ICT investment to business strategy, which results in the selection of the most appropriate ICT investments that support to the highest possible extent the selected business strategy and action plan of the firm, and therefore leads to a higher level of ICT benefits and business impact. Firms who perceive use of ICT as beneficial, non-complex, compatible and of low risk to use are more likely to adopt ICT in day to day business. This is compatible with previous studies illustrating that the main barriers to ICT adoption are simply the concern that the ICT would not lead to more efficiency, lower costs or more revenues. Consistent with previous research, the study also revealed that ICT skills and knowledge can crucially increase its adoption. They recommended that SACCO should conduct a thorough strategic Plan to illustrate how market forces can compel the Sacco's to make radical shifts in their organizational environment and culture; that Sacco should align ICT Plans with Business Plans and conduct reengineering studies and develop strategic ICT plans to align key ICT needs with those of the business (Wachira, Muturi & Sirma, 2014).

6. CONCEPTUAL FRAMEWORK

(Kapoor, R., 2022) referred to the definition of Merriam-Webster Dictionary, according to which a paradigm is "a philosophical and theoretical framework of a scientific school or discipline within which theories, laws, and generalizations and the experiments performed in support of them are formulated."¹ As applied in the context of research, a research paradigm is a worldview or philosophical framework, including ideas, beliefs, and biases, that guides the research process. The research paradigm in which a study is situated helps determine the manner in which the research will be conducted. The research paradigm is the framework into which the theories and practices of your discipline fit to create the research plan. This foundation guides all areas of your research plan, including the aim of the study, research question, instruments or measurements used, and analysis methods. The research paradigm framework is supported by three pillars: ontology, epistemology, and methodology. The one applied in this research is Methodology which is the study of how one investigates the environment and validates the knowledge gained. It attempts to answer the question "how to go about discovering the answer/reality." Addressing this pillar leads to specific data collection and analysis plans (Kapoor, 2022). In this line, the variables of the research and their relationship are schematised as by the figure 51. Independent variable is Cooperative Management System under which the research assessed six core modules namely: Membership management, Payment management, Accounting management, Human resource management, Requisitioning management, and Credit management. Depending variables is Productivity and efficiency of cooperative where under Productivity the research analysed variables such as Time saving, Risks reduction, Easy reporting, Loss mitigation, and Quality data management. Under Efficiency, the research assessed variables such as Human resource management, Organized Accounting, Products and services rendered records, Credit and sales transactions management, and Clients and suppliers management.

Figure 1: Research Framework



Source: Author, 2022.

7. RESEARCH METHODOLOGY

Research design

This research is descriptive and it mixes qualitative and quantitative approaches. (Nassaji, H., 2019) defines descriptive research design as a type of research design that aims to obtain information to systematically describe a phenomenon, situation, or population. It answers the what, when, where, and how questions regarding the research problem, rather than the why; it measures data trends by measuring changes in variables over a period of time, allowing trends to be identified and analysed; it compares variables as well as how different demographics respond to different variables; it define the characteristics of subjects such as opinions, traits, and behaviour; it verifies or validates existing conditions when conducting an in-depth analysis of every variable before drawing conclusions. Descriptive research can utilize elements of both quantitative and qualitative research methodologies, often within the same study (Nassaji, 2019). As qualitative research, this research gathered the opinions of respondents about research variables using a questionnaire designed in form of five levels Likert scale where the scale of measurement was 1= Unsatisfactory; 2= Poor; 3= Satisfactory; 4= Good; and 5= Outstanding.

Research population

The total population of this research is 61,320 members of 146 cooperatives using Cooperative Management System (CMS) in the following districts by Province of Rwanda: Eastern province (Bugesera, Gatsibo, Kayanza, Kirehe, Ngoma, Nyagatare and Rwamagana districts); Western province (Nyabihu, Rusizi, Ngororero, Nyamasheke districts); Northern province (Rulindo district); Southern province (Huye, Ruhango, Gisagara, Kamonyi, Nyanza districts); and City of Kigali (Kicukiro, Gasabo districts). At these members, the research involved 19 District Cooperatives Officers and the Director of Cooperatives Promotion and Capacity Building Unit in Rwanda Cooperative Agency (RCA) (1). Therefore, the total population of the study is 61340.

Sample size

At cooperative level, the research was conducted on 5 persons because they are the one having information about the CMS. These are: the president (1), the manager (or accountant) (1), supplier (1), members (2). In sum, the individual respondents to the research totalised 730. These respondents answered to the questionnaire. Other people involved in the research are the District Cooperatives Officers (19) and Director of Cooperatives Promotion and Capacity Building Unit in Rwanda Cooperative Agency (RCA) (1). These 20 leaders were interviewed. Therefore, the sample population of the research was 750 respondents.

Data collection procedures

For collecting the data, the researcher prepared a questionnaire as well as the interview guide. The research prepared an application letter to the Mayors of the districts requesting the authorisation to reach the target population. The questionnaire was attached to the letter and deposited to the reception waiting for the approval. Once the approval was accepted, a call was received from the receptionists and the researcher responded by attending to the office of the Mayors of the districts who connected the researcher to the District Cooperatives Officers for smooth research process. The survey was then conducted and the data was collected.

Data collection instruments

Questionnaire: (Roopa, S. & Satya, R. M., 2017) define a questionnaire as a research instrument consisting of a series of questions for the purpose of gathering information from respondents (Roopa & Satya, 2017). This research used a questionnaire designed in form of five levels Likert scale where the scale of measurement was: 1 = Unsatisfactory; 2 = Poor; 3 = Satisfactory; 4 = Good; 5 = Outstanding.

KoBo Toolbox: (Joe, A., 2022) describes KoBo Toolbox as a free open-source tool for mobile data collection, available to all. It allows you to collect data in the field using mobile devices such as mobile phones or tablets, as well as with paper or computers. Acknowledging that many agencies are already using ODK, a de facto open-source standard for mobile data collection, KoBo Toolbox is fully compatible and interchangeable with ODK but delivers more functionality such as an easy-to-use form builder, question libraries and integrated data management. It also integrates other open-source ODK-based developments such as form hub and Enketo. All humanitarian actors can create accounts on the dedicated server and use them without limitations on data or time. Organisations can also install it on their own servers or directly contribute to its further development (Joe, 2022). In this research, KoBo Toolbox was used by collecting data using tablets. The tool provides reports of analysis and data can be exported into SPSS for further analysis.

Validity and reliability

Validity consists of the extent to which an instrument measures what it is supposed to measure and performs as it is designed to perform. Reliability, on the other side, consists of the consistency, stability and repeatability of the results. These tests aim at showing the validity and the reliability of the research instrument (the questionnaire) before administrating it to the target population. Therefore, this research used piloting (Teijlingen, E. R. V. & Hundley, V. , 2018) by administrating the questionnaire to a sample of 3 cooperatives of Nyagatare districts and the results were tested for validity and reliability. For validity, the research used content validity test recommended by (Yaghmale, 2013) Yaghmale (2003) and analysed four key elements namely: relevance, simplicity, clarity, and ambiguity using a checklist outlined in table1.

Table 1: Validity test checklist

1. Relevance		3. Simplicity	
1	Not relevant	1	Not simple
2	Item need some revision	2	Item need some revision
3	Relevant but need minor revision	3	Simple but need minor revision
4	Very relevant	4	Very clear
2. Clarity		4. Ambiguity	
1	Not clear	1	Doubtful
2	Item need some revision	2	Item need some revision
3	Clear but need minor revision	3	No doubt but need minor revision
4	Very clear	4	Meaning is clear

Source: Yaghmale (2013).

For testing the reliability, the researcher computed the Cronbach's Alpha coefficient using SPSS and as indicated by the table 3. 2 and the results was 81.7% indicating that the tool is reliable. In fact as indicated by (Teijlingen, E. R. V. & Hundley, V. , 2018), Cronbach's Alpha (α) ≥ 0.9 indicates excellent reliability; $0.89 > \alpha \geq 0.80$ indicates good reliability; $0.79 > \alpha \geq 0.70$ indicates acceptable reliability; $0.69 > \alpha \geq 0.60$ indicates a questionable reliability; $0.59 > \alpha \geq 0.50$ indicates poor reliability; while $\alpha < 0.50$ indicates unacceptable reliability (Teijlingen & Hundley, 2018).

Table 2: Reliability Statistics

Cronbach's Alpha (α)	N of Items
.817	5

Source: Field data (2022).

Data analysis

The data processing lead to analysis of data. This research used KoBo Toolbox and IBM SPSS Statistics Version 23. Two types of statistics were applied namely descriptive statistics and inferential statistics.

Descriptive statistics

According to (Yellapu, V. , 2018) and (Fatih, O., 2022) descriptive statistics are used to describe the basic features of the data in a study. They are used to present quantitative descriptions in a manageable form. They include: measures of frequency such as frequency and percentage; measures of central tendency such as mean; measures of dispersion or variation such as standard deviation; and measures of variability such as kurtosis, and skewness (Yellapu, 2018; Fatih, 2022). This research used descriptive statistics in analysing independent variable (CMS) (while assessing its appreciation by the users) as well as analysing Productivity and efficiency of cooperatives through CMS. The results are presented in form of frequency, percentages, minimum, maximum, mean, and standard deviation. The interpretation is based on the mean and standard deviation. As indicated by (Warmbrod, J. P., 2014) and (Lee, D. K., Junyong, I. & Sangseok, L. , 2015), the mean between 1 and 1.80 represents (strongly disagree), the mean between 1.81 until 2.60 represents (do not agree), the mean between 2.61 and 3.40 represents (true to some extent), the mean between 3:41 and 4:20 represents (agree), and the mean between 4:21 and 5:00 represents (strongly agree). Considering the standard deviation, a standard deviation close to zero indicates that data points are close to the mean, whereas a high or low standard deviation indicates data points are respectively above or below the mean (Warmbrod, 2014; Lee, Junyong, Sangseok, 2015). In this study, the distributions with a coefficient of variation higher than 1 are considered to be high variance whereas those with a coefficient of variation lower than 1 are considered to be low-variance and they indicate homogeneity of answers.

8. DATA ANALYSIS AND INTERPRETATION

Considering sex category, the table 3 indicates that the majority of cooperative members are women representing 62.5%. This predominance of women in cooperatives is justified by the fact that women are greater than men in Rwanda. The data from National Institute of Statistics of Rwanda and the World Bank indicated that female (% of total population) in Rwanda was reported at 51.07 % in 2022, according to the World Bank collection of development indicators, compiled from officially recognized sources (the World Bank, 2023). Research of International Labor Organisation (ILO, 2022) on "How women fare in East African cooperatives: the case of Kenya, Tanzania and Uganda" indicated that for women, who due to gender-based norms often have lower access to and control over economic and social resources and opportunities, cooperatives present distinct advantages. As group-based ventures, cooperatives bring to their members the benefits of joining forces with others. Apart from being able to access economies of scale as providers of services, producers or as consumers, participating in a cooperative as a member, elected leader or manager also brings with it enhanced status and voice in the community and society in general. Furthermore, due to the values, including equality and equity, solidarity, social responsibility, and caring for others, on which they are based and principles that they embody - voluntary and open membership,

democratic control, economic participation, education, and concern for the community - their mandate places cooperatives in a unique position to not only further decent work overall, but also to ensure and promote gender equality (ILO, 2022).

Table 3: Respondents by sex

Sex	Frequency (f)	Percent (%)
Female	456	62.5
Male	274	37.5
Total	730	100.0

Source: Field data (2022).

Concerning membership duration, the table 4 indicates that the cooperatives members have a good experience in cooperative: 3 years and above. They have also experience with CMS system which was initiated 3 years ago.

Table 4: Respondents by membership duration

Membership duration	Frequency	Percent
3 years	25	3.4
4 years	100	13.7
>= 5 years	605	82.9
Total	730	100.0

Source: Field data (2022).

8.1. Appreciation of CMS by cooperative managers

The first objective of the research was to evaluate the extent to which cooperative managers appreciate the design and functionality of Cooperative Management System (CMS). The research applied the software evaluation criteria defined by (Belyk, D & Feist, D., 2022). These criteria are: information of the system, Career development process, User interaction, Technical aspects of the software and materials, and Support services (Belyk & Feist, 2022). At each criteria, the researcher proposed a series of questions in form of five levels Likert scale where the scale of measurement was: 1= Unsatisfactory; 2= Poor; 3= Satisfactory; 4= Good; and 5= Outstanding. The interpretation of the results in this section is based on the mean and standard deviation. The mean between 1 and 1.80 represents (Unsatisfactory), the mean between 1.81 and 2.60 represents (Poor), the mean between 2.61 and 3.40 represents (Satisfactory), the mean between 3.41 and 4.20 represents (Good), and the mean between 4.21 and 5.00 represents (Outstanding). Considering the standard deviation, the distributions with a coefficient of variation higher than 1 are considered to be high variance (heterogeneity) whereas those with a coefficient of variation lower than 1 are considered to be low-variance and they indicate homogeneity of answers. The level of overall appreciation of CMS by cooperative managers is “Good” (\bar{x} = 3.8; σ = .270). Information in CMS is good (\bar{x} =4.0; σ =.440); Career development process through CMS (\bar{x} =3.2; σ =.280); CMS user interaction (\bar{x} =4.5; σ =.320); CMS Technical aspects of the software and materials (\bar{x} =3.1; σ =.260); CMS Support services (\bar{x} =4.1; σ =.060).

Table 5: Overall respondents' appreciation of CMS

CMS Evaluation criteria	N	Min	Max	\bar{x}	σ
Information in CMS	730	2.8	4.4	4.0	.440
Career development process through CMS	730	2.2	3.6	3.2	.280
CMS user interaction	730	3.8	5	4.5	.320
CMS Technical aspects of the software and materials	730	2.6	3.2	3.1	.260
CMS Support services	730	3.8	4.4	4.1	.060
Valid N (listwise)	730	3.04	4.12	3.8	.27

Source: Field data (2022).

8.2. CMS Membership management module and cooperatives productivity and efficiency

The second objective of the research was to analyze the level of impact of CMS Membership management module on productivity and efficiency of cooperatives in Rwanda. Respondents were asked to express their opinion of proposed statement in the following order: 1= Strongly Disagree; 2= Disagree; 3= Uncertain; 4= Agree; and 5= Strongly Agree. The results presented in table 14 indicate that Membership management module promotes cooperatives productivity and efficiency ($\bar{x}=4.6$; $\sigma =.100$). The respondents indicated that CMS Membership management module provides accurate data on members ($\bar{x}= 5.0$; $\sigma =.000$); CMS Membership management module allows harvest collection and engagements ($\bar{x}=4.7$; $\sigma =.100$); CMS Membership management module facilitates members’ payroll ($\bar{x}=4.8$; $\sigma =.050$); CMS Membership management module facilitates members’ debt and liability management ($\bar{x}=4.6$; $\sigma =.136$); CMS Membership management module facilitate members registration report ($\bar{x}= 3.8$; $\sigma =.215$).

Table 6: Membership management module and cooperatives productivity and efficiency

CMS Membership management module and cooperatives productivity and efficiency	N	Min	Max	\bar{x}	σ
CMS Membership management module provides accurate data on members	730	5	5	5.0	.000
CMS Membership management module allows harvest collection and engagements	730	4	5	4.7	.100
CMS Membership management module facilitates members’ payroll	730	4	5	4.8	.050
CMS Membership management module facilitates members’ debt and liability management	730	4	5	4.6	.136
CMS Membership management module facilitate members registration report	730	3	4	3.8	.215
Valid N (listwise)	730	4	4.8	4.6	.100

Source: Field data (2022).

8.3. CMS Payments management module and cooperatives productivity and efficiency

The third objective of the research was to assess the level of impact of CMS Payments management module on productivity and efficiency of cooperatives in Rwanda. Respondents were asked to express their opinion of proposed statement in the following order: 1= Strongly Disagree; 2= Disagree; 3= Uncertain; 4= Agree; and 5= Strongly Agree. The results presented in table 7 indicate that Payments management module promotes cooperatives productivity and efficiency ($\bar{x}=4.7$; $\sigma =.070$). The respondents indicated that CMS Payments management module facilitates debtors’ payment ($\bar{x}= 5.0$; $\sigma =.000$); CMS Payments management module facilitates creditors’ payment ($\bar{x}= 5.0$; $\sigma =.000$); CMS Payments management module allows direct debit bank account ($\bar{x}=4.4$; $\sigma =.250$); CMS Payments management module allows online and mobile payment ($\bar{x}=4.1$; $\sigma =.106$); CMS Payments management module cuts off transports and payment follow- up costs ($\bar{x}= 5.0$; $\sigma =.000$).

Table 7: Payments management module and cooperatives productivity and efficiency

Payments management module and cooperatives productivity and efficiency	N	Min	Max	\bar{x}	σ
CMS Payments management module facilitates debtors’ payment	730	5	5	5.0	.000
CMS Payments management module facilitates creditors’ payment	730	5	5	5.0	.000
CMS Payments management module allows direct debit bank account	730	4	5	4.4	.250

CMS Payments management module allows online and mobile payment	730	4	5	4.1	.106
CMS Payments management module cuts off transports and payment follow- up costs	730	5	5	5.0	.000
Valid N (listwise)	730	4.6	5	4.7	.070

Source: Field data (2022).

8.4. CMS Accounting module and cooperatives productivity and efficiency

The fourth objective of the research was to find out the level of impact of CMS Accounting module on productivity and efficiency of cooperatives in Rwanda. Respondents were asked to express their opinion of proposed statement in the following order: 1= Strongly Disagree; 2= Disagree; 3= Uncertain; 4= Agree; and 5= Strongly Agree. The results presented in table 8 indicate that Accounting module promotes cooperatives productivity and efficiency ($\bar{x}=4.3$; $\sigma =.100$). CMS Accounting module facilitates recording financial transactions ($\bar{x}= 5.0$; $\sigma =.000$); CMS Accounting module allow easy retrieval of individual financial status ($\bar{x}=4.4$; $\sigma =.400$); CMS Accounting module facilitates financial reporting ($\bar{x}= 5.0$; $\sigma =.000$); CMS Accounting module facilitates accounting online without necessarily going to the office ($\bar{x}= 5.0$; $\sigma =.000$).

Table 8: Accounting module and cooperatives productivity and efficiency

Accounting module and cooperatives productivity and efficiency	N	Min	Max	\bar{x}	σ
CMS Accounting module facilitates recording financial transactions	730	5	5	5.0	.000
CMS Accounting module allow easy retrieval of individual financial status	730	4	5	4.4	.400
CMS Accounting module facilitates financial reporting	730	5	5	5.0	.000
CMS Accounting module reduces fraud	730	2	3	2.3	.106
CMS Accounting module facilitates accounting online without necessarily going to the office	730	5	5	5.0	.000
Valid N (listwise)	730	4.2	4.6	4.3	.100

Source: Field data (2022).

8.5. CMS Human resource management module and cooperatives productivity and efficiency

The fifth objective of the research was to determine the level of impact of CMS Human resource management module on productivity and efficiency of cooperatives in Rwanda. Respondents were asked to express their opinion of proposed statement in the following order: 1= Strongly Disagree; 2= Disagree; 3= Uncertain; 4= Agree; and 5= Strongly Agree. The results presented in table 9 indicate that CMS Human resource management module promotes cooperatives productivity and efficiency ($\bar{x}= 3.9$; $\sigma =.070$). CMS Human resource management module allows employees records keeping both permanent and casual labor ($\bar{x}= 5.0$; $\sigma =.000$); CMS Human resource management module generates accurate employees’ payroll ($\bar{x}= 4.1$; $\sigma =.109$); CMS Human resource management module keeps employees’ accurate data ($\bar{x}= 5.0$; $\sigma =.000$).

Table 9: Human resource management module and cooperatives productivity and efficiency

Human resource management module and cooperatives productivity and efficiency	N	Min	Max	\bar{x}	σ
CMS Human resource management module allows employees records keeping both permanent and casual labor	730	5	5	5.0	.000
CMS Human resource management module generates accurate employees’ payroll	730	3	4	4.1	.109

CMS Human resource management module facilitates recording employees' attendance, and absence justification	730	2	3	2.9	.090
CMS Human resource management module allows recording of incentives	730	2	3	2.3	.156
CMS Human resource management module keeps employees' accurate data	730	5	5	5.0	.000
Valid N (listwise)	730	3.4	4	3.9	.070

Source: Field data (2022).

8.6. CMS Requisitioning module and cooperatives productivity and efficiency

The sixth objective of the research was to assess the level of impact of CMS Requisitioning module on productivity and efficiency of cooperatives in Rwanda. Respondents were asked to express their opinion of proposed statement in the following order: 1= Strongly Disagree; 2= Disagree; 3= Uncertain; 4= Agree; and 5= Strongly Agree. The results presented in table 10 indicate that Requisitioning module promotes cooperatives productivity and efficiency (\bar{x} = 3.5; σ =.250). CMS Requisitioning module facilitates the requisition of goods and services (\bar{x} = 3.0; σ =.000); CMS Requisitioning module allows the modification of the initialized requisition (\bar{x} = 3.2; σ =.419); CMS Requisitioning module allows the approval of the requisition (\bar{x} = 3.9; σ =.390); CMS Requisitioning module allows printing requisition report (\bar{x} = 3.5; σ =.256); CMS Requisitioning module facilitates the process of requisition using online system without coming to the office (\bar{x} = 4.1; σ =.200).

Table 10: Requisitioning module and cooperatives productivity and efficiency

Requisitioning module and cooperatives productivity and efficiency	N	Min	Max	\bar{x}	σ
CMS Requisitioning module facilitates the requisition of goods and services	730	3	3	3.0	.000
CMS Requisitioning module allows the modification of the initialised requisition	730	3	4	3.2	.419
CMS Requisitioning module allows the approval of the requisition	730	3	4	3.9	.390
CMS Requisitioning module allows printing requisition report	730	3	4	3.5	.256
CMS Requisitioning module facilitates the process of requisition using online system without coming to the office	730	3	5	4.1	.200
Valid N (listwise)	730	3	4	3.5	.250

Source: Field data (2022).

8.7. CMS Credit management module and cooperatives productivity and efficiency

The seventh objective of the research was to analyse the level of impact of CMS Credit management module on productivity and efficiency of cooperatives in Rwanda. Respondents were asked to express their opinion of proposed statement in the following order: 1= Strongly Disagree; 2= Disagree; 3= Uncertain; 4= Agree; and 5= Strongly Agree. The results presented in table 11 indicate that Credit management module promotes cooperatives productivity and efficiency (\bar{x} = 4.1; σ =.130). CMS Credit management module allows the recording of creditors (\bar{x} = 5.0; σ =.000); CMS Credit management module allows the recording of debtors (\bar{x} = 5.0; σ =.000); CMS Credit management module facilitates quick loans reporting (\bar{x} = 3.4; σ =.390); CMS Credit management module allows updating accurately the loan repayment (\bar{x} = 3.1; σ =.256); CMS Credit management module provides accurate data on loan and receivables (\bar{x} = 4.0; σ =.000).

Table 11: Credit management module and cooperatives productivity and efficiency

Credit management module and cooperatives productivity and efficiency	N	Min	Max	\bar{x}	σ
CMS Credit management module allows the recording of creditors	730	5	5	5.0	.000
CMS Credit management module allows the recording of debtors	730	5	5	5.0	.000
CMS Credit management module facilitates quick loans reporting	730	3	4	3.4	.390
CMS Credit management module allows updating accurately the loan repayment	730	3	4	3.1	.256
CMS Credit management module provides accurate data on loan and receivables	730	4	4	4.0	.000
Valid N (listwise)	730	4	4.4	4.1	.130

Source: Field data (2022).

8.8. Overall impact of CMS on productivity and efficiency of cooperatives

The research found that in overall, CMS has an impact on productivity and efficiency of cooperatives ($\bar{x}=4.7$; $\sigma=.220$). CMS Membership management module impacts on productivity and efficiency of cooperatives through accurate data about the members that promotes effective planning ($\bar{x}=4.9$; $\sigma=.200$); CMS Payments management module impacts on productivity and efficiency of cooperatives through promoting stakeholders' satisfaction ($\bar{x}=4.6$; $\sigma=.200$); CMS Accounting module impacts on productivity and efficiency of cooperatives through updated, easy and quick financial reporting ($\bar{x}=4.7$; $\sigma=.190$); CMS Human resource management module impacts on productivity and efficiency of cooperatives through employee motivation and satisfaction ($\bar{x}=4.8$; $\sigma=.200$); CMS Credit management module impacts on productivity and efficiency of cooperatives through accurate and updated information about the debt owed and timely payment ($\bar{x}=4.5$; $\sigma=.300$).

Table 12: Overall impact of CMS on cooperatives productivity and efficiency

Overall impact of CMS on Productivity and efficiency of cooperatives	N	Min	Max	\bar{x}	σ
CMS Membership management module impacts on productivity and efficiency of cooperatives through accurate data about the members that promotes effective planning.	730	4	5	4.9	.200
CMS Payments management module impacts on productivity and efficiency of cooperatives through promoting stakeholders' satisfaction.	730	4	5	4.6	.200
CMS Accounting module impacts on productivity and efficiency of cooperatives through updated, easy and quick financial reporting.	730	4	3	4.7	.190
CMS Human resource management module impacts on productivity and efficiency of cooperatives through employee motivation and satisfaction.	730	4	5	4.8	.200
CMS Credit management module impacts on productivity and efficiency of cooperatives through accurate and updated information about the debt owed and timely payment.	730	4	5	4.5	.300
Valid N (listwise)	730	4	4.6	4.7	.220

Source: Field data (2022).

8.9. Challenges of Cooperative Management System (CMS)

The eighth objective of the research was to identify the challenges of Cooperative Management System (CMS) and provide recommendations. The challenges are outlined by the table 21 while the recommendations are provided by the table 13. The challenges are the following: CMS is not free. It requires additional contribution of members to cover the cost of its installation and maintenance ($\bar{x}= 5.0$; $\sigma =.000$); CMS requires the cooperatives to have among members those with advanced education level yet there are pure rural cooperatives where none have attended secondary school ($\bar{x}= 4.3$; $\sigma =.080$); CMS has issue of confidentiality of the data: the data of the cooperatives are managed by the government which hosts the CMS system ($\bar{x}= 5.0$; $\sigma =.000$); CMS use requires internet which incurs additional operational cost ($\bar{x}= 4.1$; $\sigma =.351$); Most of cooperatives managers prefer the ordinal routine of cooperative management due to low level of understanding and flexibility to change their routine services for adopting CMS ($\bar{x}= 5.0$; $\sigma =.000$).

Table 13: Challenges of Cooperative Management System (CMS)

CMS Challenges	N	Min	Max	\bar{x}	σ
CMS is not free. It requires additional contribution of members to cover the cost of its installation and maintenance	730	5	5	5.0	.000
CMS requires the cooperatives to have among members those with advanced education level yet there are pure rural cooperatives where none have attended secondary school.	730	4	5	4.3	.080
CMS has issue of confidentiality of the data: the data of the cooperatives are managed by the government which hosts the CMS system.	730	5	5	5.0	.000
CMS use requires internet which incurs additional operational cost.	730	4	5	4.1	.351
Most of cooperatives managers prefer the ordinal routine of cooperative management due to low level of understanding and flexibility to change their routine services for adopting CMS.	730	5	5	5.0	.000
Valid N (listwise)	730	4.6	5	4.7	.100

Source: Field data (2022).

The issue of CMS mentioned by cooperatives managers are shared with other researchers who identified common Problems in Management Information Systems. Today’s businesses run on technology. According to (Al-Shattarat, B., Hussainey, K., & Al-Shattarat, W., 2022), every client interaction and internal process relies heavily on the computer systems that power everything. Management information systems (MIS) is a general term to encompass the various technologies that exist in organizations today, as well as the personnel necessary to manage it all. Common problems include failure to strategize, meeting organizational needs, hiring and retaining good employees, staying current and integrating all your technologies (Al-Shattarat, Hussainey & Al-Shattarat, 2022).

Lack of Strategy: (Azim, M. R. , 2022) showed that many of the most common MIS issues can be traced back to a lack of a solid strategy. Information systems leaders are well aware of the many tools available to gather data on their network. But putting that information to use is often a challenge. At one time, technology departments served as a separate operation, providing tech support and keeping an organization’s server equipment running. Today, MIS leadership often sits alongside other business leaders, working together to ensure that the technology being used supports the overall mission of the company moving forward (Azim, M. R. , 2022).

Meeting Organizational Needs: (Aziz, A., Zamri, S. M. M., & Ariffin, S. A., 2022) showed that MIS plays an ever-increasing role in organizations, with professionals relying on technology for every aspect of operations. Sales and marketing rely heavily on customer relationship software to track client interactions, for instance, while accounting needs its own software for billing, invoicing and financial tracking. With more than half of all companies now relying on big data analytics, MIS is playing an even more important role. Before making a decision, today's management teams are likely to pull reports on existing activity to ensure they use facts rather than make educated guesses (Aziz, Zamri & Ariffin, 2022).

Attracting and Retaining Top Talent: According to (Habiba, Y., Azhar, M. N., Annuar, B. M.N. & Mastora, Y., 2019), for at least the past couple decades, the growth in technology has outpaced the number of people entering the field. Over the past seven out of 10 years, IT positions have been in the top 10 of jobs with the most hiring challenges, as documented by ManpowerGroup. The professionals most in demand include developers and programmers, database administrators and IT leaders and managers. Even as an increasing number of businesses shift to cloud software, the IT shortage continues to affect businesses. If cloud technology providers have difficulty finding professionals to support the applications their clients use, the businesses will see issues. Even with cloud technology, though, many organizations find they still need to have an MIS specialist on staff to ensure the business meets its goals (Habiba, Azhar, Annuar & Mastora, 2019).

Keeping Up with Change: (Khan, A., 2017) indicated that if one thing is for certain in information technology, it's that nothing will remain the same for long. From one year to the next, innovations mean that software needs to be upgraded and even replaced. In order to remain competitive, businesses have to keep up with this, investing in software that will give them an edge. As businesses respond to those changes, though, they face a challenge in getting employees on board with adjusting what they do. At one time this was simply training employees to go from old paper-based processes to using computers in the first place. Today, managers have to onboard new systems while ensuring they provide employees what they need to be productive (Khan, 2017).

Integrating New Technologies: According to (Khan, Y., Afridi, F., Mumtaz, M., Shad, F. & Iqbal, A., 2022), although there are plenty of comprehensive solutions, businesses will inevitably find that they have multiple types of software operating at once. This includes general administrative tools like Microsoft Office, as well as specialized tools for accounting, customer relationship management and project-management tools, among many others. Ensuring all these tools work together is essential since otherwise, employees will find they have to duplicate processes. Complicating matters is the fact that employees no longer work using just one dedicated computer on a desk in an office space. Many employees work in the field, using laptops and tablets. You'll also have numerous cellphones in addition to the laptop and desktop computers your employees use, bringing challenges to providing support without risking security (Khan et al., 2022).

8.10. Proposed solutions

On the listed CMS challenges the respondents proposed a series of responses indicated in the table 14 such as Support of the RCA on installation cost and the cooperatives should cover maintenance costs ($\bar{x}= 4.8$; $\sigma =.070$); More training on even members with good primary education on the use of CMS ($\bar{x}= 4.3$; $\sigma =.380$); Confederations should play important role in the management of CMS and the role of the government should be reduced with the time ($\bar{x}= 4.9$; $\sigma =.290$); The government should reduce the cost of internet to be affordable for all including cooperatives using CMS system ($\bar{x}= 4.7$; $\sigma =.151$); More capacity building is required for cooperative managers to open their mind on the use of ICT for the development. Also the experience of successful cooperatives in the use of CMS should be shared among cooperatives ($\bar{x}= 4.6$; $\sigma =.400$).

Table 14: Respondents’ proposed solutions face challenges of CMS

Solutions to Challenges	N	Min	Max	\bar{x}	σ
Support of the RCA on installation cost and the cooperatives should cover maintenance costs.	730	4	5	4.8	.070
More training on even members with good primary education on the use of CMS.	730	4	5	4.3	.380
Confederations should play important role in the management of CMS and the role of the government should be reduced with the time	730	4	5	4.9	.290
The government should reduce the cost of internet to be affordable for all including cooperatives using CMS system	730	4	5	4.7	.151
More capacity building is required for cooperative managers to open their mind on the use of ICT for the development. Also the experience of successful cooperatives in the use of CMS should be shared among cooperatives.	730	4	5	4.6	.400
Valid N (listwise)	730	4	5	4.7	.260

Source: Field data (2022).

8.11. Overall impact of CMS on Efficiency of cooperative

Respondents to the research indicated that the overall impact of CMS on Efficiency of cooperative is Outstanding as justified by the overall $\bar{x} = 4.3 > 4.21$ and $\sigma = .280 < 1.0$ (table 15). With an average mean greater than 4.0, respondents affirmed that through CMS, the time spent on transport and follow-up calls as well as reporting time is saved ($\bar{x} = 4.10$; $\sigma = 0.170$); Through CMS Accounting is well organized ($\bar{x} = 4.70$; $\sigma = 0.280$); Through CMS Products and services rendered are recorded and secured ($\bar{x} = 4.30$; $\sigma = 0.090$); Through CMS credit and sales transactions are well managed ($\bar{x} = 4.40$; $\sigma = 0.451$); Managed CMS Clients and suppliers are well managed ($\bar{x} = 4.20$; $\sigma = 0.420$).

Table 15: Overall impact of CMS on Efficiency of cooperative

Impact of CMS on Efficiency of cooperative	N	Min	Max	\bar{x}	σ
Through CMS, the time spent on transport and follow-up calls as well as reporting time is saved.	730	4	5	4.1	.170
Through CMS Accounting is well organized.	730	4	5	4.7	.280
Through CMS Products and services rendered are recorded and secured.	730	4	5	4.3	.090
Through CMS credit and sales transactions are well managed	730	4	5	4.4	.451
Managed CMS Clients and suppliers are well managed	730	4	5	4.2	.420
Valid N (listwise)	730	4	5	4.3	.280

Source: Field data (2022).

8.12. Overall Impact of CMS on Productivity of cooperative

Respondents to the research indicated that the overall impact of CMS on Efficiency of cooperative is Outstanding as justified by the overall $\bar{x} = 4.6 > 4.21$ and $\sigma = .007 < 1.0$ (table 16). With an average mean greater than 4.0, respondents affirmed that Through CMS, Human resource and membership are well managed ($\bar{x} = 5.00$; $\sigma = .000$); Through CMS, cooperatives payoff their debt due to accurate information about the total debt and mobile payment ($\bar{x} = 4.80$; $\sigma = .280$); Through CMS, cooperatives’ assets are well

managed ($\bar{x} = 3.40$; $\sigma = .090$); Through CMS, cooperative members receive timely their liquidity using mobile payment ($\bar{x} = 5.0$; $\sigma = .000$); Through CMS, cooperative data is well managed and reporting is quick and easy ($\bar{x} = 5.0$; $\sigma = .000$).

Table 16: Overall impact of CMS on Efficiency of cooperative

Impact of CMS on Productivity of cooperative	N	Min	Max	\bar{x}	σ
Through CMS, Human resource and membership are well managed.	730	5	5	5.0	.000
Through CMS, cooperatives payoff their debt due to accurate information about the total debt and mobile payment	730	4	5	4.8	.280
Through CMS, cooperatives' assets are well managed	730	2	3	3.4	.090
Through CMS, cooperative members receive timely their liquidity using mobile payment	730	5	5	5.0	.000
Through CMS, cooperative data is well managed and reporting is quick and easy	730	5	5	5.0	.000
Valid N (listwise)	730	4.2	4.6	4.6	.070

Source: Field data (2022).

CONCLUSION

This research analyzed “Project design and implementation of cooperative management system (CMS) software and its impact on the efficiency and productivity of cooperatives in Rwanda” and it was conducted on 146 cooperatives using Cooperative Management System (CMS) across 19 districts of 4 Provinces of Rwanda (Eastern, Western, Northern, and Southern). The research assessed the appreciation of cooperative managers on the design and functionality of CMS and its impact on efficiency and productivity of cooperatives. Independent variables were six main modules of CMS namely Membership management, Payment module, Accounting module, Human resource module, Requisitioning module, and Credit module while dependent variable was Productivity and Efficiency of cooperative. The research was descriptive using a mix of quantitative, qualitative and empirical design and correlational design while testing hypotheses. The study used a sample of 750 respondents including 730 cooperative members from a total population of 61,320 members of 146 cooperatives using Cooperative Management System (CMS) across 19 districts of 4 Provinces of Rwanda (Western, Northern Eastern and Southern) plus 19 District Cooperatives Officers and 1 Director of Cooperatives Promotion and Capacity Building Unit in Rwanda Cooperative Agency (RCA). A questionnaire designed in form of five levels Likert scale was used and data was collected and analysed through KoBo Toolbox and SPSS. The results of the research indicated that CMS has an impact on productivity and efficiency of cooperatives ($\bar{x} = 4.7$; $\sigma = .220$). CMS Membership management module impacts on productivity and efficiency of cooperatives through accurate data about the members that promotes effective planning ($\bar{x} = 4.9$; $\sigma = .200$); CMS Payments management module impacts on productivity and efficiency of cooperatives through promoting stakeholders' satisfaction ($\bar{x} = 4.6$; $\sigma = .200$); CMS Accounting module impacts on productivity and efficiency of cooperatives through updated, easy and quick financial reporting ($\bar{x} = 4.7$; $\sigma = .190$); CMS Human resource management module impacts on productivity and efficiency of cooperatives through employee motivation and satisfaction ($\bar{x} = 4.8$; $\sigma = .200$); CMS Credit management module impacts on productivity and efficiency of cooperatives through accurate and updated information about the debt owed and timely payment ($\bar{x} = 4.5$; $\sigma = .300$). The main CMS challenges outline by the respondents are the following: The challenges are the following: CMS is not free. It requires additional contribution of members to cover the cost of its installation and maintenance ($\bar{x} = 5.0$; $\sigma = .000$); CMS requires the cooperatives to have among members those with advanced education level yet there are pure rural cooperatives where none have attended secondary school ($\bar{x} = 4.3$; $\sigma = .080$); CMS has issue of confidentiality of the data: the data of the cooperatives are managed by the government which hosts the

CMS system ($\bar{x}= 5.0$; $\sigma =.000$); CMS use requires internet which incurs additional operational cost ($\bar{x}= 4.1$; $\sigma =.351$); Most of cooperatives managers prefer the ordinal routine of cooperative management due to low level of understanding and flexibility to change their routine services for adopting CMS ($\bar{x}= 5.0$; $\sigma =.000$). Corresponding solutions proposed by the respondents are the following: Support of the RCA on installation cost and the cooperatives should cover maintenance costs ($\bar{x}= 4.8$; $\sigma =.070$); More training on even members with good primary education on the use of CMS ($\bar{x}= 4.3$; $\sigma =.380$); Confederations should play important role in the management of CMS and the role of the government should be reduced with the time ($\bar{x}= 4.9$; $\sigma =.290$); The government should reduce the cost of internet to be affordable for all including cooperatives using CMS system ($\bar{x}= 4.7$; $\sigma =.151$); More capacity building is required for cooperative managers to open their mind on the use of ICT for the development. Also the experience of successful cooperatives in the use of CMS should be shared among cooperatives ($\bar{x}= 4.6$; $\sigma =.400$).

RECOMMENDATIONS

To RCA

The research found that RCA is less involved in the adoption and use of CMS. However, there is an issue of security of data since CMS is hosted by a partnership between Government and Private sector through the Ministry of ICT. The research recommends the RCA the following:

- (1) To take the responsibility of hosting the CMS in order to ensure sustainability and resilience of the system. This because the RCA was established to promote cooperatives in Rwanda.
- (2) The adoption of CMS seems an initiative took by the private sector under the support of the government; but there was no involvement of cooperative members in the design of the project. The risk is high that cooperatives may pay affiliation fee to CMS but use it less due to poor conviction about its importance. RCA should participate in the training and motivating the use of the system through issuing the incentives to adopt it by several means including rewarding the best users cooperatives or covering a portion of fee in form of direct support to cooperatives.
- (3) To ensure the maintenance of CMS by RCA for alleviating this burden to the cooperatives members.
- (4) To support small cooperatives with good intention to adopt the system but having limited financial means by covering at least 50% of the adoption costs.
- (5) To advocate to the government to reduce the cost of internet to be affordable for all including cooperatives using CMS system.

To Cooperatives

- (6) To plan a big role in motivating other cooperatives adoption CMS through experience sharing. In fact, the government of Rwanda is committed to zero paper and zero trip for government services in 2024. The private sector including cooperatives should therefore align to this government plan and adopt ICT for smooth management of their business.
- (7) To provide more training on even members with good primary education on the use of CMS
- (8) More capacity building is required for cooperative managers to open their mind on the use of ICT for the development.
- (9) To share experience of successful cooperatives in the use of CMS to new and reluctant cooperatives.

5.1. Suggestions for further research

This research was qualitative as it collected the perceptions of the cooperatives managers and the stakeholders on the use of CMS for their productivity and efficiency. Further studies should use a quantitative approach and demonstrate quantitatively the contribution of CMS on productivity and efficiency of the cooperatives. The topic should be “Quantitative analysis of the impact of CMS on productivity and efficiency of cooperatives in Rwanda”.

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