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INFORMATION TECHNOLOGY

INFLUENCE OF ADOPTION OF INFORMATION AND COMMUNICATION TECHNOLOGY ON THE GROWTH OF DAIRY COOPERATIVE SOCIETIES IN THE NANDI COUNTY IN KENYA

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ABSTRACT

Statement of the Problem: Despite the important role played by dairy cooperative societies in supporting Kenya's dairy industry, many continue to experience slow growth, low profitability, weak financial sustainability, and operational inefficiencies. Limited adoption of information and communication technology (ICT) has been identified as one of the factors contributing to these challenges.

Purpose of the Study: This study examined the influence of ICT adoption on the growth of dairy cooperative societies in Nandi County, Kenya.

Methodology: The study was guided by the Technology Acceptance Model and adopted a mixed-methods approach using descriptive and correlational research designs. Data were collected from 105 management staff drawn from 21 registered dairy cooperative societies through structured and semi-structured questionnaires. Descriptive and inferential statistics were used to analyze the data.

Findings: The findings revealed a moderate positive and statistically significant relationship between ICT adoption and the growth of dairy cooperative societies ($r = 0.553$, $p < 0.001$). Regression analysis further showed that ICT adoption had a positive and significant effect on growth ($\beta = 0.261$, $p = 0.000$).

Conclusion: The study concludes that increased investment in ICT can improve operational efficiency, financial sustainability, and overall cooperative growth.

Recommendation: The study recommends greater integration of digital technologies in financial management, production, communication, and service delivery to enhance competitiveness and long-term sustainability.

Keywords: *Adoption, Information, Communication Technology, Growth, Dairy Cooperative Societies*

INTRODUCTION

Successful dairy cooperatives across the world have demonstrated the value of strategic management in promoting growth and competitiveness. Through effective planning, innovation, market diversification, and technology adoption, these cooperatives have been able to respond to changing consumer demands and dynamic market conditions. Such practices have contributed to improved productivity, stronger market presence, and long-term sustainability within the dairy sector (FAO, 2023). Dairy industry in Africa plays a significant role in supporting rural livelihoods, food security, and economic development. Dairy cooperatives have become important institutions for smallholder farmers access facilitation to markets, production inputs, extension services, and financial support. However, many cooperatives across the continent still experience challenges such as weak governance structures, limited access to technology, inadequate infrastructure, besides increasing market competition (African Development Bank, 2023). Therefore, strategic management practices have gained prominence as important mechanisms for improving organizational growth, operational efficiency and long-term sustainability. Cooperatives that embrace effective planning, innovation, leadership, and technology adoption are positioned in a better and enhancing productivity while remaining competitive in dynamic market environments (Food and Agriculture Organization, 2023; OECD, 2023).

The dairy industry in Kenya is an important contributor to economic growth, food security, employment creation, and household income. Dairy cooperatives play a central role in milk collection, processing, value addition, and marketing. They also provide farmers with access to markets, training, and support services that enhance productivity and improve livelihoods (Otieno et al., 2022; Tegemeo Institute, 2024). According to Nikaido (2019), technological capabilities acquire and adapt to local conditions to create solutions that offer state-of-the-art development. Since technology is at the heart of the most vital aspect of entrepreneurial activities, effective and efficient technology management practices are essential for dairy cooperatives to operate at all stages of an enterprise throughout their life cycle (Sahlman & Haapasalo, 2019). Strategic management serves a critical role for the ongoing in addition to systematic management of the organization.

PROBLEM STATEMENT

The dairy sector is one of the most important agricultural subsectors in Kenya. It contributes about 4% of the country's Gross Domestic Product (GDP) and 8% of the agricultural GDP,

while providing income to over 1.8 million smallholder dairy farmers (Otieno et al., 2022; Tegemeo Institute, 2024). Dairy cooperative societies are central to this sector because they provide milk collection, processing, marketing, and other support services. In spite of this contribution, many dairy cooperatives continue to experience slow growth, low profitability, weak financial sustainability, and operational challenges. These problems have largely been linked to limited adoption and use of information and communication technology (ICT).

Previous studies have shown that ICT can improve organizational performance. For instance, studies by Patel and Sharma (2023), Johnson and Miller (2022), Uwizeyimana and Mukamana (2023), and Mugisha and Turyasingura (2022) found that ICT adoption improves efficiency, communication, and service delivery in cooperative organizations. However, these studies were conducted outside Kenya, where the business environment and technological infrastructure differ from those of Kenyan dairy cooperatives. In Kenya, Kamau et al. (2022) found that ICT improved the operational performance of dairy cooperatives in O'lessos Sub-County, Nandi County. However, the study was limited to one sub-county and did not examine whether ICT contributes to broader growth outcomes.

The available literature therefore reveals clear research gaps. Empirically, there is limited evidence on the effect of ICT adoption on the growth of dairy cooperative societies across Nandi County. Most previous studies measured ICT using indicators of operational performance such as efficiency, milk quality, and service delivery, while giving little attention to growth indicators such as profitability, revenue growth, financial sustainability, and member dividends. This study sought to fill these gaps by examining the influence of ICT adoption on the growth of dairy cooperative societies in Nandi County, Kenya.

RESEARCH OBJECTIVES

To examine how the adoption of information and communication technology influences the growth of dairy cooperative societies in the Nandi County in Kenya.

Hypotheses

$H0_3$: Information and communication technology has no statistically significant effect on the growth of dairy cooperatives in Nandi County Kenya.

LITERATURE REVIEW

The adoption of Information and Communication Technology (ICT) has transformed the way organizations operate by enhancing efficiency, innovation, and competitiveness. Within dairy

cooperative societies, ICT facilitates effective management of operations, improves service delivery, and strengthens market linkages, thereby contributing to organizational growth and sustainability. Patel and Sharma (2023) examined the influence of digital technologies on the performance of dairy cooperatives in India. The study adopted a mixed-methods research design involving cooperative managers and dairy farmers. The findings revealed that the use of digital record management systems, mobile applications, and electronic payment platforms improved operational efficiency, enhanced communication with farmers, and strengthened market access. The study concluded that information communication technology contributes significantly to organizational growth by improving productivity and service delivery. However, the study was conducted in a highly digitized dairy sector, making it difficult to generalize the findings to developing regions with limited technological infrastructure.

Johnson and Miller (2022) investigated the role of information technology adoption in agricultural cooperatives across Europe. Using survey data collected from cooperative managers, the researchers found that the integration of digital platforms improved decision-making, customer engagement, and operational performance. The study further established that cooperatives that embraced digital transformation recorded higher growth rates than those relying on traditional management systems. Nevertheless, the study focused on large-scale agricultural cooperatives operating in developed economies, which differ substantially from smallholder-based dairy cooperatives in Kenya.

In Rwanda, Uwizeyimana and Mukamana (2023) assessed the effect of ICT adoption on the performance of dairy cooperatives. The study established that the use of mobile technologies, digital payment systems, and electronic record-keeping improved milk collection efficiency, reduced operational costs, and enhanced service delivery. The researchers concluded that ICT adoption plays a critical role in improving cooperative growth and competitiveness. However, the study did not examine the influence of ICT on broader growth indicators such as profitability and membership expansion.

Mugisha and Turyasingura (2022) examined the contribution of digital technologies to the performance of agricultural cooperatives in Uganda. The findings indicated that cooperatives that adopted information systems and mobile communication technologies experienced improved coordination, better market information access, and increased operational efficiency. The study recommended greater investment in ICT infrastructure to enhance cooperative

growth. However, the study focused on agricultural cooperatives generally and did not specifically address dairy cooperatives.

Kamau et al. (2022) investigated the influence of ICT adoption on the performance of dairy farmers' cooperative societies in O'lessos Sub-County, Nandi County. The study found that technologies such as artificial insemination services, milk testing equipment, and digital communication platforms improved productivity, efficiency, and milk quality. While the findings demonstrated a positive relationship between technology adoption and organizational performance, the study focused primarily on operational outcomes and did not directly examine growth indicators such as profitability, revenue generation, customer expansion, and asset growth.

Similarly, Wanjiku and Mwangi (2024) examined the influence of digital innovation on the growth of dairy cooperatives in Central Kenya. The study established that cooperatives that utilized digital payment systems, electronic record management, and online marketing platforms achieved higher growth in sales volume, customer reach, and operational efficiency. The researchers concluded that ICT adoption enhances competitiveness and supports sustainable growth within dairy cooperatives. However, the study was conducted outside Nandi County and may not adequately capture the unique operational challenges facing dairy cooperative societies within the county.

The study in O'lessos by Kamau et al. (2022) links technology adoption. It reveals the relationship between technology adoption and performance in Nandi County; however, such a study does not directly measure the growth of metrics revenue, profitability, dividends, or explore additional innovations apart from technologies such as artificial insemination. In addition, it focuses on only one sub-county and fails to examine the county-wide impact. Therefore, there is a research gap at the county level regarding how innovation and effects of technology adoption on the expansion of dairy cooperatives within Nandi County, Kenya, considering its rural context, recent infrastructure developments and specific operational aspects challenges.

THEORETICAL REVIEW

Technology Acceptance Model (TAM) was applied in the study. First proposed in Davis (1986), this model is among the most widely used models for explaining user acceptance behavior. TAM is primarily rooted in social psychology theory as well as Theory of Reasoned Action. The TRA claims that beliefs inform attitudes from which intentions result by generating

behavior. And Davis (1986, 1989) also proposed the paradigms of the original Technology Acceptance Model: perceived usefulness and perceived ease of use, along with attitude and intention to use. Of the constructs, perceived usefulness and perceived ease of use constitute the end-user's beliefs about a technology and so are potential indicators predicting attitude towards it, influencing its acceptance in the system.

Perceived ease of use also was relatively related to current and future use. He discovered that A significantly greater correlation was found between PU and system usage than perceived ease of use did. According to further regression analysis, perceived ease of use could be an antecedent of PU instead of a direct cause of system usage. That is, TA (technology acceptance) through PU is indirectly affected by perceived ease of use in relation to PU.

RESEARCH METHODOLOGY

Mixed-methods research, combining quantitative and qualitative techniques, was used. Two sets of variables were examined quantitatively to measure statistical relationship between planning and ICT adoption on strategic management practices and the growth of dairy cooperatives based on profitability, liquidity, and revenue growth. Qualitative research to understand contextual factors, challenges, and perceptions of cooperative managers and members concerning strategic management and growth. The research employed descriptive and correlational designs. The descriptive aspect provided an overview of dairy cooperatives' strategic management practices and growth metrics. The selected target population included organized formal dairy in Nandi County that collects, processes, and markets milk for small-scale farmers. These included 21 registered dairy cooperative societies active in Nandi County. From these dairies, the targeted respondents were management members, including the chief executive officer, marketing, finance, human resources, and quality assurance managers.

The selection of these respondents involved purposive sampling, because of the given that they had adequate knowledge about the strategic management practices at their dairy cooperative societies. Hence, there were 105 respondents drawn from the 21 dairy cooperative societies. Structured and semi-structured questionnaires was used to collect quantitative as well as qualitative data from the dairy cooperatives. Questionnaires were subject to content validation to confirm that all the dimensions of the concept being investigated were included. Subject-matter experts evaluated it to ascertain that the instrument sufficiently met the key research objectives. Descriptive analysis and inferential statistics were applied.

DATA ANALYSIS AND FINDINGS

According to findings, respondents agreed that adopting new technologies, such as milk coolers, had reduced operational costs according to a mean = 3.6420. This is an indication that adoption of new technology reduced operational costs. Furthermore, the respondents agreed that technology innovation in product offerings such as yogurt, cheese, had increased the revenue of their dairy cooperative societies. This is according to mean = 3.6173. In addition, the respondents agreed that technology adoption had improved milk quality, enhancing profitability according to a mean score of 3.6667. Respondents equally agreed that investments in technology had strengthened their financial sustainability according to a mean score of 3.7901. Finally, respondents agreed that technology innovation had enabled the dairy cooperative societies to compete more effectively and increase member dividends according to mean = 3.6543. This implies that for those dairy cooperatives offering dividends, technological innovation was critically.

Table 1: Adopting Information and Communication Technology on The Growth

Statement	Mean	Std. Deviation
Adopting new technologies, such as milk coolers, has reduced operational costs.	3.6420	1.2279
Technology Innovation in product offerings (e.g. yogurt, cheese) has increased our revenue.	3.6173	1.2803
Technology adoption has improved milk quality, enhancing profitability.	3.6667	1.1292
Investments in technology have strengthened our financial sustainability.	3.7901	.8763
Technology Innovation has enabled us to compete more effectively and increase member dividends.	3.6543	1.0626

Respondents further indicated that the innovations and technologies adopted by their cooperatives had contributed significantly to improved financial performance. They noted that the use of modern systems enabled timely payment for raw milk, which in turn helped maintain the cooperatives' sustainability. Several cooperatives reported using the latest milk management software for milk reception and farmer payments, while others adopted tools such as EasyProd, which enhanced operational efficiency and strengthened financial performance. Respondents also highlighted that the use of sophisticated machines had reduced losses and increased profitability. In addition, the adoption of milk testing equipment helped eliminate

low-quality milk, thereby minimizing losses and ultimately improving the cooperatives' financial performance.

The study equally undertook correlation analysis and regression analysis. Correlation analysis was analyzed and results showed R=0.553 (p-value < 0.001). Regression analysis was undertaken and results showed that a unit increase in information and communication technology adoption, holding other factors constant, increases the growth of dairy cooperative societies by 0.261 units. The regression analysis further produced a p-value of 0.000, which was below the 0.05 threshold. Therefore, the null hypothesis was rejected. The findings suggest that information and communication technology has a statistically significant positive influence on the growth of dairy cooperative societies in Nandi County, Kenya. Adoption of technology enhances operational efficiency, communication, and service delivery, thereby supporting cooperative growth.

CONCLUSIONS

The study concludes that indeed adopting information and communication technology influence the growth of dairy cooperative societies in Nandi County, Kenya positively and significantly. Technological innovations have led to reduced operational costs, improved product quality, and increased revenue generation. Additionally, technology has enhanced financial sustainability and strengthened the cooperatives' ability to offer consistent dividends to members. These findings highlight that investing in modern technologies and product innovation is a key driver for operational efficiency, profitability, and long-term sustainability among dairy cooperative societies.

RECOMMENDATIONS

Based on the finding that ICT adoption influences positively to operational efficiency, product quality, and profitability, the study recommends that dairy cooperatives integrate digital technologies in production, marketing, and financial management. Future studies should explore the effect of emerging digital technologies, including mobile applications, artificial intelligence, and digital payment systems, on the growth and operational efficiency of dairy cooperative societies.

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