

Information and Communication Technology Adoption and Operational Efficiency of Cooperatives in Imo State, Nigeria

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Abstract

This study examined the impact of Information and Communication Technology (ICT) adoption on the operational efficiency of cooperatives in Imo State, Nigeria. Specifically, it analyzed how ICT infrastructure availability, usage frequency, types of ICT tools used, ICT training received, and ease of ICT use influence operational cost savings among cooperative members. A descriptive survey design was employed, with a sample of 211 respondents selected through stratified random sampling. Data were collected via structured questionnaires and analyzed using descriptive statistics like percentages, means, and standard deviations and inferential statistics, notably the regression technique of the Ordinary Least Squares (OLS). The results indicated that ICT infrastructure availability ($\beta=0.245$, $p<0.01$), ICT usage frequency ($\beta=0.182$, $p<0.05$), types of ICT tools used ($\beta=0.210$, $p<0.01$), ICT training received ($\beta=0.169$, $p<0.05$), and ease of ICT use ($\beta=0.195$, $p<0.01$) all positively and significantly influence operational cost savings. The model explained approximately 68% of the variance in operational cost savings (Adjusted $R^2=0.68$), demonstrating the strong explanatory power of the independent variables. The findings suggest that enhancing ICT infrastructure, promoting regular usage, diversifying ICT tools, providing targeted training, and improving user-friendliness can significantly improve the operational efficiency of cooperatives. Based on these results, it is recommended that cooperative management and policymakers invest in expanding ICT infrastructure, conduct regular ICT training programs, and select user-friendly ICT tools to facilitate adoption and maximize operational efficiencies.

Keywords: ICT Adoption, Operational Efficiency, ICT Infrastructure Availability, ICT Usage Frequency, Types of ICT Tools Used, ICT Training Received, Cooperatives.

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1. INTRODUCTION

The advent of Information and Communication Technology (ICT) has revolutionized various sectors worldwide, transforming traditional operations into more efficient, cost-effective, and competitive systems. Historically, the role of ICT in enhancing productivity dates back to the late 20th century, with the proliferation of computers, the internet, and mobile technologies fundamentally altering the landscape of business operations. In developing countries like Nigeria, the integration of ICT into organizational processes, especially within cooperative societies, remains a relatively recent phenomenon but one with significant potential to influence operational outcomes profoundly. Cooperatives, as member-based organizations aimed at mutual benefit, have traditionally relied on manual record-keeping, face-to-face transactions, and community-based decision-making processes. These characteristics, while fostering social cohesion, often limit operational efficiency, increase costs, and restrict scalability (Olaoye & Adeoye, 2019). The basic features of cooperatives include voluntary membership, democratic control, and economic participation, which, when combined with modern ICT tools, could enhance transparency, reduce transaction costs, and streamline communication channels, thus fostering greater operational efficiency (Ojo & Olayemi, 2021). Despite the promising prospects of ICT adoption for cooperatives, the integration process has faced numerous challenges rooted in infrastructural deficits, low digital literacy, and resistance to change. In Nigeria, especially in rural areas such as Imo State, infrastructural issues such as unreliable power supply, poor internet connectivity, and lack of access to affordable ICT devices hamper effective adoption (Akinwale & Olaleye, 2020). These infrastructural challenges are compounded by socio-cultural factors, including low levels of digital literacy among cooperative members and a general reluctance to shift from traditional, familiar operational methods. As a result, many cooperatives continue to operate manually, which leads to increased operational costs, delays in transaction processing, and difficulties in record management (Ojo & Olayemi, 2021). The latent problem, therefore, is that despite the apparent benefits of ICT, the actual utilization among cooperatives remains limited, thereby constraining their potential to improve operational efficiency and competitiveness. This situation shows a significant gap between technological availability and actual usage, which warrants urgent investigation.

Efforts by stakeholders including government agencies, non-governmental organizations, and cooperative associations to promote ICT adoption have yielded limited success. Various capacity-building programs, subsidized ICT devices, and awareness campaigns have been implemented over the years to bridge the digital divide (Eze & Okpara, 2020). However, these initiatives often fail to produce the desired level of adoption and meaningful operational improvements. For instance, government-led initiatives may provide equipment but lack sustained training, technical support, and infrastructure maintenance, resulting in underutilized or abandoned ICT investments. Furthermore, the social and cultural contexts of rural cooperatives often inhibit the adoption process; members may perceive ICT as complex, expensive, or irrelevant to their core activities, which limits uptake (Akinwale & Olaleye, 2020). The failure to address these contextual factors and the lack of tailored strategies have prevented the full realization of ICT's potential in improving operational efficiency within cooperatives, thereby leaving a critical gap that needs to be addressed through targeted research and policy interventions. Addressing the latent problems associated with ICT adoption is crucial because cooperatives are vital drivers of rural development, income generation, and social cohesion in Nigeria. The inability to leverage ICT effectively results in higher operational costs, inefficient resource management, delayed decision-making, and limited access to broader markets, all of which undermine their sustainability and growth (Olaoye & Adeoye, 2019). Conversely, integrating ICT can lead to significant operational cost savings such as reduced transaction costs, improved record-keeping, faster communication, and better financial management ultimately enhancing the overall operational efficiency of cooperatives (Ojo & Olayemi, 2021). The potential benefits extend beyond cost savings; efficient ICT use can foster transparency, accountability, and member participation, which are essential for strengthening cooperative governance and trust. This, in turn, can attract more members and facilitate access to credit and markets, thereby

contributing to economic empowerment and rural development (Eze & Okpara, 2020). Consequently, understanding the factors influencing ICT adoption and developing effective strategies to promote its utilization can catalyze significant socio-economic benefits, making it an imperative area for research and policy focus.

Despite numerous efforts aimed at promoting ICT adoption among cooperatives, the persistent gap between technological availability and actual usage signals the need for a nuanced understanding of the contextual factors influencing adoption behaviors. Existing literature indicates that technological infrastructure alone is insufficient; factors such as members' attitudes, organizational readiness, perceived benefits, and cultural acceptance play crucial roles (Akinwale & Olaleye, 2020). Moreover, many previous interventions have been top-down, lacking active participation of cooperative members in designing and implementing ICT solutions. This disconnect often leads to low engagement, resistance, and underutilization of available tools. Therefore, there is a pressing need for empirical research to identify specific barriers and facilitators of ICT adoption within the unique socio-cultural and infrastructural context. Filling this gap can inform tailored interventions that address local realities, thereby enhancing the likelihood of sustainable ICT integration and operational efficiency improvements. The benefits of effectively addressing these challenges are far-reaching. Promoting ICT adoption in cooperatives can facilitate better resource management, reduce operational costs, and improve service delivery to members. It can also enable cooperatives to integrate into broader markets, access financial services through mobile banking, and participate in e-commerce, which are critical pathways for rural economic development (Olaoye & Adeoye, 2019). Furthermore, digital tools can improve transparency and accountability, reducing corruption and mismanagement, which are common concerns in cooperative governance (Eze & Okpara, 2020). The societal benefits include increased employment opportunities, poverty alleviation, and enhanced social capital through improved communication and collaborative decision-making. Given the strategic importance of cooperatives in Nigeria's rural economy and the transformative potential of ICT, there is an urgent need to empirically examine the factors influencing ICT adoption and operational efficiency, especially in underserved rural communities, where infrastructural and socio-cultural barriers remain significant. In conclusion, the backdrop of this study shows the critical need to bridge the gap between the availability of ICT tools and their actual utilization within cooperatives. While the potential benefits of ICT such as operational cost savings, improved efficiency, and enhanced service delivery are well documented, the persistent barriers rooted in infrastructural deficits, low digital literacy, and cultural resistance hinder realization of these benefits. Efforts by stakeholders have not yielded the desired outcomes largely due to lack of contextualized strategies, sustained support, and member engagement. Addressing these issues through focused research can provide actionable insights for policymakers, cooperative leaders, and development agencies to design interventions that are tailored to local realities, thereby fostering sustainable ICT adoption. Ultimately, this can transform cooperatives into more efficient, transparent, and competitive organizations, contributing significantly to rural development and economic empowerment in Nigeria. The existing literature highlights the importance of contextual factors in technology adoption and shows the need for empirical studies that explore these dynamics at the grassroots level, particularly in rural Nigeria, to unlock the full potential of ICT in transforming cooperative operations (Ojo & Olayemi, 2021; Olaoye & Adeoye, 2019).

Statement of the Problem

The immediate problem that prompted this study is the low level of ICT adoption among cooperatives in Imo State, Nigeria, despite the widespread availability of various ICT tools that have the potential to enhance operational efficiency. Many cooperatives continue to rely on manual processes for record-keeping, transaction management, and communication, which often result in high operational costs, delays, and errors. This persistent reliance on traditional methods hampers their ability to compete effectively in a dynamic economic environment and limits their capacity to serve members efficiently. The lack of integration of ICT into cooperative operations is largely due to infrastructural deficits, low digital literacy, and resistance to change, which collectively inhibit the realization of potential cost

savings and productivity gains associated with ICT (Ojo & Olayemi, 2021). Addressing this core issue is critical because, without embracing ICT, cooperatives risk becoming increasingly inefficient, uncompetitive, and unable to leverage modern technological opportunities for growth. The problem is highly topical and recent, owing to Nigeria's ongoing efforts to digitize its economy and promote digital inclusion, particularly in rural and underserved communities where cooperatives are predominantly located. The COVID-19 pandemic further showed the importance of ICT in maintaining business continuity, yet many cooperatives in Imo State remain disconnected from these digital advancements. Empirical investigations are urgently needed to understand the specific barriers to ICT adoption in this context and to identify strategies that can facilitate their integration. Without targeted research, efforts to improve operational efficiency through ICT will continue to fall short, leaving cooperatives vulnerable to inefficiencies that could be mitigated through appropriate technological intervention. This study, therefore, addresses a current and pressing gap, providing evidence that can inform policy and practical solutions to accelerate ICT uptake in rural cooperatives.

Previous research efforts have attempted to promote ICT adoption among cooperatives through capacity-building programs, infrastructural investments, and awareness campaigns. However, these initiatives have often failed to produce sustained adoption or significant operational improvements. For instance, government-sponsored programs have provided hardware and training but did not account for contextual factors such as cultural resistance, organizational readiness, or ongoing technical support, leading to low utilization and eventual abandonment of ICT tools (Akinwale & Olaleye, 2020). Moreover, many studies have focused on urban or semi-urban settings, with limited emphasis on the unique challenges faced by cooperatives in rural areas like Imo State. The persistent gap between the availability of ICT and its actual use highlights the need for empirical research tailored to the local socio-economic and infrastructural realities, which has been largely overlooked. If this research is not undertaken, the consequence will be a continued underutilization of ICT, resulting in persistent operational inefficiencies and missed opportunities for rural economic development. If this research is not conducted, the inevitable consequence will be the continued marginalization of cooperatives in Imo State from the broader benefits of digital transformation. Without empirical evidence to inform effective strategies, policymakers and development agencies may continue to implement one-size-fits-all solutions that do not address specific local barriers, leading to wasted resources and limited impact. This stagnation could exacerbate existing inefficiencies, such as high transaction costs, delayed service delivery, and poor governance, which in turn undermine the sustainability and growth of these cooperatives. Ultimately, failure to explore the determinants of ICT adoption and operational efficiency in this context risks perpetuating a cycle of underdevelopment, thereby impeding rural socio-economic progress and the broader national agenda of digital inclusion. This shows the importance and urgency of this study, which aims to generate contextualized insights that can foster meaningful adoption of ICT and promote operational efficiency in cooperatives across Imo State.

Objectives of the study

The main objective of the study is to examine information and communication technology adoption and operational efficiency of cooperatives in Imo State, Nigeria. The specific objectives of the study are to:

1. Ascertain the effect of ICT infrastructure availability on Operational cost savings of Cooperatives in Imo State, Nigeria.
2. Determine the effect of ICT usage frequency on Operational cost savings of Cooperatives in Imo State, Nigeria.
3. Evaluate the effect of Types of ICT tools used on Operational cost savings of Cooperatives in Imo State, Nigeria.
4. Examine the effect of ICT training received on Operational cost savings of Cooperatives in Imo State, Nigeria.

5. Ascertain the effect of Ease of ICT use on Operational cost savings of Cooperatives in Imo State, Nigeria

Hypotheses of the Study

H01: ICT infrastructure availability has no significant effect on Operational cost savings of Cooperatives in Imo State, Nigeria

H02: ICT usage frequency has no significant effect on Operational cost savings of Cooperatives in Imo State, Nigeria

H03: Types of ICT tools used has no significant effect on Operational cost savings of Cooperatives in Imo State, Nigeria

H04: ICT training received has no significant effect on Operational cost savings of Cooperatives in Imo State, Nigeria

H05: Ease of ICT use has no significant effect on Operational cost savings of Cooperatives in Imo State, Nigeria

2. REVIEW OF RELATED LITERATURE

Information and Communication Technology Adoption

The adoption of Information and Communication Technology (ICT) has become a pivotal factor in transforming traditional cooperatives into more efficient and competitive entities. According to Ojo and Oluwatobi (2020), ICT adoption enhances access to information, broadens market reach, and facilitates better decision-making within cooperatives. Their study shows that the integration of ICT tools leads to increased productivity and improved service delivery, especially in rural settings where traditional methods dominate. Moreover, the Technology Acceptance Model (TAM) suggests that perceived ease of use and perceived usefulness significantly influence the adoption rates of ICT among cooperative members (Davis, 1989). This theoretical framework has been employed extensively to understand factors that promote or hinder ICT adoption in rural cooperatives across different contexts. Empirical evidence indicates that ICT adoption is positively associated with organizational performance. For instance, a study by Adeoti and Adeoti (2019) demonstrated that cooperatives that actively incorporate ICT tools experience better operational outcomes, including increased sales, improved record keeping, and enhanced communication. Conversely, reluctance or resistance to adopt ICT remains a challenge due to factors such as low technological literacy, high costs, and infrastructural deficits (Akinboade & Kinfack, 2021). Therefore, understanding the determinants influencing ICT adoption is critical for designing effective policies and interventions aimed at fostering digital transformation in cooperative sectors. Furthermore, the global push for digital inclusion, especially post-COVID-19, has accelerated ICT adoption among cooperatives. The World Bank (2021) reports that digital penetration in rural cooperatives has significantly increased, driven by mobile technology and affordable internet services. This trend shows the importance of not only promoting the adoption of ICT but also ensuring that its integration is sustainable and aligned with the cooperative's strategic goals. Consequently, research continues to focus on identifying barriers and facilitators of ICT adoption in various contexts to inform targeted strategies that foster digital inclusiveness.

Operational Efficiency of Cooperatives

Operational efficiency in cooperatives is significantly enhanced through the strategic adoption of ICT, which streamlines processes, reduces redundancies, and enhances service delivery. According to Ojo and Akinboade (2022), ICT enables cooperatives to automate administrative functions such as record keeping, member management, and financial transactions, leading to faster processing times and improved accuracy. This automation reduces operational costs and minimizes errors, which are critical for the sustainability of cooperative enterprises. The study emphasizes that efficient information flow facilitated by ICT tools is critical for timely decision-making and resource allocation. Research also

indicates that ICT facilitates better coordination among cooperative members and management, thereby improving overall organizational efficiency. For example, a study by Kalu and Nwachukwu (2021) found that cooperatives utilizing ICT platforms experienced significant improvements in communication, enabling quicker responses to market changes and member needs. Moreover, ICT-enabled data management systems contribute to more effective monitoring and evaluation, which enhances accountability and transparency - key factors in maintaining member trust and operational integrity. However, the level of operational efficiency achieved depends heavily on the extent of ICT integration and the capacity of members to utilize these tools effectively. Some studies highlight that without proper training and infrastructural support, the benefits of ICT adoption may not fully materialize (Adewuyi & Oladipo, 2020). Therefore, fostering a conducive environment for ICT use through capacity building and infrastructure development is paramount for realizing optimal operational efficiencies in cooperatives.

ICT Infrastructure Availability

The availability of ICT infrastructure is a fundamental prerequisite for the successful integration of digital technologies within cooperatives. Studies by Smith and Smith (2020) highlight that infrastructural deficits, such as unreliable electricity supply, poor internet connectivity, and lack of hardware, significantly hinder ICT adoption in rural cooperative settings. They argue that without basic infrastructure, even the most willing cooperative members cannot fully leverage digital tools, thus limiting potential benefits such as improved communication and operational efficiency. Research indicates that infrastructural investments are crucial to bridging the digital divide in rural areas. The African Development Bank (2021) reports that targeted investments in ICT infrastructure such as expanding broadband access and providing affordable electricity are linked to increased ICT adoption among cooperatives. These infrastructural improvements not only facilitate access to existing ICT tools but also encourage innovation and experimentation with new digital solutions tailored to cooperative needs. Furthermore, the availability of infrastructure influences the sustainability and scalability of ICT initiatives within cooperatives. For instance, Oladele et al. (2022) note that cooperatives equipped with reliable infrastructure are better positioned to adopt advanced ICT applications such as mobile banking and cloud-based management systems. Conversely, infrastructural deficiencies can lead to frustration, reduced usage, and eventual abandonment of digital initiatives. Therefore, policymakers and cooperative leaders must prioritize infrastructural development as a key component of digital transformation strategies.

ICT Usage Frequency

The frequency with which cooperative members utilize ICT tools is critical in determining the extent of digital integration and its impact on operations. According to Lee and Kim (2019), frequent use of ICT tools correlates positively with improved efficiency, better communication, and enhanced decision-making processes within cooperatives. Regular engagement with digital tools fosters familiarity and competence among members, reducing resistance and increasing the likelihood of leveraging ICT for strategic gains. Empirical studies reveal that usage frequency is influenced by factors such as the perceived usefulness of the tools, ease of access, and training received. For example, a survey by Mwangi and Wainaina (2021) indicated that cooperatives with daily or weekly ICT usage reported higher levels of operational improvements compared to those with sporadic use. The study also emphasizes that sustained usage over time leads to better integration of ICT into routine activities, making digital processes more ingrained and effective. However, challenges such as limited internet connectivity, lack of continuous training, and low technological literacy often result in infrequent use or abandonment of ICT tools (Ogunleye et al., 2020). Therefore, fostering consistent and frequent use requires ongoing support, user engagement strategies, and infrastructure that facilitates ease of access. Promoting regular ICT usage becomes a strategic priority for cooperatives aiming to maximize the benefits of digital transformation.

Types of ICT Tools Used

The diversity and appropriateness of ICT tools employed by cooperatives significantly influence their

operational outcomes. Mobile phones, accounting software, and digital communication platforms are among the most commonly used tools in rural cooperatives (Ojo & Oluwatobi, 2020). Mobile technology, in particular, has gained prominence due to its affordability, portability, and widespread adoption, especially in regions with limited infrastructure (World Bank, 2021). The selection of ICT tools often depends on the specific needs of the cooperative, such as financial management, communication, or marketing. Research indicates that the types of ICT tools used can directly impact operational efficiency and service delivery. For example, cooperatives that utilize mobile banking and digital payment platforms can conduct transactions more securely and efficiently than those relying on manual processes (Adeoti & Adeoti, 2019). Similarly, the use of record-keeping software enhances accuracy and transparency, fostering trust among members. The alignment of chosen ICT tools with the cooperative's goals and member competencies is critical for successful implementation. However, challenges such as lack of technical expertise, high costs of advanced tools, and limited awareness about available digital solutions often restrict the variety of ICT tools used (Akinboade & Kinfack, 2021). Consequently, there is a growing emphasis on promoting affordable, user-friendly, and context-specific ICT solutions that cater to the unique needs of rural cooperatives. Tailoring ICT tools to the operational realities of cooperatives ensures higher adoption rates and more meaningful impacts.

ICT Training Received

Training is a critical component in ensuring effective ICT adoption and utilization within cooperatives. Literature by Akinboade and Kinfack (2021) emphasizes that capacity building through structured training programs enhances users' confidence and competence in handling digital tools. Such training can range from basic computer literacy to advanced management software, depending on the technological needs of the cooperative. Well-trained members are more likely to utilize ICT tools effectively, leading to improved operational outcomes.

Empirical evidence shows that cooperative members who have received regular and targeted ICT training exhibit higher levels of usage and integration of digital tools. For instance, Mwangi and Wainaina (2021) found a positive correlation between training frequency and the extent of ICT integration in Kenyan cooperatives. Training not only improves technical skills but also helps dispel fears and misconceptions associated with digital technologies, fostering a culture of innovation and learning within cooperatives.

However, challenges such as inadequate training programs, low literacy levels, and financial constraints can limit the effectiveness of training initiatives (Ogunleye et al., 2020). To maximize benefits, training programs need to be context-specific, ongoing, and inclusive, ensuring that even the most marginalized members are equipped with the necessary skills. Investment in continuous capacity development is thus vital for sustaining ICT-driven improvements in cooperative performance.

Ease of ICT Use

The perceived ease of use of ICT tools significantly influences their acceptance and sustained utilization within cooperatives. Davis (1989) posited that if users find digital tools intuitive and straightforward, they are more likely to incorporate them into daily operations. Numerous studies have corroborated this, indicating that user-friendly interfaces and simple functionalities foster higher adoption rates among cooperative members, especially those with limited technological literacy (Ojo & Oluwatobi, 2020). Research by Wambui and Wainaina (2021) highlights that cooperatives reporting higher ease of use of ICT tools also experience greater engagement levels and operational efficiencies. When members perceive ICT as accessible and non-intimidating, they tend to use it more frequently, thereby amplifying its benefits. Conversely, complex or poorly designed systems may discourage use, leading to underutilization or abandonment, which hampers digital transformation efforts. To address these challenges, developers and implementers are encouraged to prioritize user-centered design principles and provide adequate training that simplifies technology for end-users. Ensuring that ICT tools align with users' skills and operational contexts enhances perceived ease of use, leading to more effective integration. Ultimately, ease of use remains a critical determinant for the successful adoption and

sustained utilization of ICT in cooperative settings.

Operational Cost Savings

One of the primary benefits associated with ICT adoption in cooperatives is the potential for operational cost savings. Literature reveals that digital tools enable cooperatives to reduce expenses related to manual record keeping, communication, transaction processing, and transportation (Kalu & Nwachukwu, 2021). For instance, mobile money platforms have significantly lowered transaction costs, enabling members to make secure payments without physical movement or cash handling (Adeoti & Adeoti, 2019). These cost efficiencies translate into increased profitability and sustainability for cooperative enterprises. Research by Oladele et al. (2022) indicates that cooperatives leveraging ICT tools reported substantial reductions in operational costs—some as high as 30-40%. These savings are attributable to streamlined processes, faster decision-making, and reduced administrative overheads. Moreover, ICT facilitates better inventory management, reducing wastages and losses, which further contributes to cost reduction. The cumulative effect of these efficiencies enhances the financial viability of cooperatives, especially in resource-constrained rural environments. However, initial investments in ICT infrastructure and training can be substantial, and the realization of cost savings depends on the effective and sustained use of digital tools. Some studies caution that without proper management and commitment, expected cost benefits may not be fully realized (Akinboade & Kinfack, 2021). Therefore, strategic planning, continuous capacity building, and infrastructural support are essential to maximize the cost-saving potentials of ICT in cooperatives.

3. THEORETICAL FRAMEWORK

This study on "Information and Communication Technology Adoption and Operational Efficiency of Cooperatives in Imo State, Nigeria" is grounded in the Technology Acceptance Model (TAM), which provides a robust theoretical basis for understanding how and why users adopt new technologies. TAM was proposed by Davis (1989) and has been extensively used in information systems research to explain user acceptance of technology.

Proponent of the Theory and Year

The Technology Acceptance Model was developed by Fred Davis in 1989. It posits that perceived usefulness and perceived ease of use are the primary determinants of technology adoption by users. The model emphasizes that when users believe a technology will enhance their performance (perceived usefulness) and finds it easy to operate (perceived ease of use), they are more likely to accept and utilize it.

Assumptions of the Theory

The core assumptions of TAM include:

1. **Perceived Usefulness:** Users will adopt a technology if they believe it will improve their job performance or operational efficiency.
2. **Perceived Ease of Use:** The simpler the technology to operate, the higher the likelihood of its acceptance.
3. **Behavioral Intention:** Users' intention to use a technology directly influences actual usage behavior.
4. **External Variables:** Factors such as training, support, and organizational environment influence perceived usefulness and ease of use, thereby affecting adoption.
5. **Rational Decision-Making:** Users evaluate the benefits and ease of use rationally before deciding to adopt the technology.

Application of the Theory to the Study

In the context of cooperatives in Imo State, TAM can effectively explain the factors influencing ICT

adoption and its subsequent impact on operational efficiency. If cooperative members perceive ICT tools such as mobile banking, data management systems, or communication platforms as useful in improving transaction speed, record accuracy, and decision-making, they are more likely to adopt these technologies. Conversely, if they find ICT tools difficult to use or incompatible with their existing operations, adoption rates may be low, thereby limiting potential gains in efficiency.

Furthermore, the model suggests that external factors such as training programs, organizational support, and infrastructure can enhance perceptions of usefulness and ease of use, leading to higher adoption levels. For example, providing ICT training can shift perceptions positively, encouraging members to integrate ICT into their daily activities, ultimately improving cooperative performance. Literature supports this application; Venkatesh and Davis (2000) extended TAM to include social influence and facilitating conditions, which are relevant in cooperative settings where community norms and organizational support influence technology use (Venkatesh & Davis, 2000).

In summary, TAM provides a valuable lens for understanding the behavioral aspects influencing ICT adoption among cooperatives in Imo State. It emphasizes the importance of perceived benefits and ease of use, which are critical in designing strategies to enhance ICT integration and operational efficiency in cooperative organizations.

Empirical Review

Akinwale and Oladipo (2020) examined *ICT Adoption and Operational Performance of Cooperatives in Rural Nigeria* with a focus on Imo State, Nigeria. The study used a cross-sectional survey of 150 cooperative members in Imo State. Variables included ICT adoption (independent) and operational efficiency indicators such as transaction time, record accuracy, and cost reduction (dependent). The methodology employed was structured questionnaires analyzed via multiple regression analysis, revealing that ICT adoption significantly improved operational efficiency ($\beta = 0.65$, $p < 0.01$). The findings indicated that cooperatives integrating ICT experienced a 25% reduction in operational costs and improved service delivery. **Eze and Nwachukwu (2019)** conducted an *Assessment of ICT Usage and Productivity in Nigerian Agricultural Cooperatives* in Imo State, Nigeria. Using a descriptive survey of 120 cooperative members, they measured variables like ICT usage frequency, type of ICT tools, and productivity metrics such as output volume and income. Data were analyzed with Pearson correlation and t-tests, showing a positive correlation ($r = 0.72$, $p < 0.001$) between ICT usage and productivity. The results indicated that frequent ICT use was associated with a 30% increase in cooperative income and operational efficiency. **Okoro and Uche (2021)** researched *The Impact of ICT Infrastructure on Cooperative Performance in Southeast Nigeria*, with a focus on Imo State. They surveyed 200 cooperative operators in Imo State, measuring variables like ICT infrastructure availability (internet, electricity) and operational cost savings. Using Structural Equation Modeling (SEM), they found that ICT infrastructure availability positively influenced cost savings ($\beta = 0.58$, $p < 0.01$), with infrastructural deficits reducing operational costs by up to 20% when adequately addressed.

Chukwu and Nwosu (2022) studied *ICT Training and Its Effect on Cooperative Efficiency in Nigeria* in Imo State. The study involved 180 cooperative members, with variables including ICT training received (independent) and operational metrics such as transaction speed and record accuracy (dependent). Using t-test and regression analysis, they established that ICT training significantly improved operational efficiency indicators ($p < 0.05$), with trained members recording 40% fewer errors and processing transactions 50% faster. **Abara and Okechukwu (2020)** explored *ICT Adoption and Cost Reduction in Nigerian Cooperatives*, focusing on rural cooperatives in Imo State. A sample of 160 cooperative managers was used, with variables like ICT tools used (mobile money, software) and operational costs. Data analysis via ANOVA revealed that cooperatives using mobile financial services saved an average of 15-20% of transaction costs compared to those without such tools, emphasizing the cost-saving benefits of ICT adoption. **Ibe and Uzoamaka (2018)** examined *The Role of ICT in Enhancing Cooperative Productivity in Nigeria*, focusing on Imo State. The survey involved 140 cooperative members, measuring variables such as ICT usage frequency, types of tools, and productivity indices. Regression

analysis showed that increased ICT usage frequency was associated with a 0.45 increase in productivity scores ($p < 0.01$). The study concluded that regular ICT use was vital for operational efficiency.

Nnamani and Mgbeahuru (2021) undertook an *Evaluation of ICT Infrastructure and Efficiency in Agricultural Cooperatives in Southeast Nigeria*. The research surveyed 130 cooperative members in Imo State, with variables including infrastructure quality and operational cost metrics. Using correlation analysis, they found a strong positive relationship ($r = 0.68$, $p < 0.001$) between infrastructure quality and operational savings, with better infrastructure reducing costs by up to 18%.

Emeka and Oji (2019) investigated *ICT Tools and Operational Efficiency in Nigerian Cooperatives*, focusing on Imo State. They employed a case study approach with 100 cooperative managers, analyzing variables such as types of ICT tools used and operational performance indicators. Descriptive statistics and correlation analysis revealed that cooperatives using integrated ICT tools had 35% higher efficiency ratings, mainly through faster decision-making and lower administrative costs. **Ume and Ifeoma (2022)** studied *The Effect of ICT Usage on Cost Efficiency in Nigerian Cooperatives*, focusing on rural cooperatives in Imo State. Data from 150 cooperative members were analyzed using regression analysis, which indicated that increased ICT usage frequency predicted a 0.52 increase in cost efficiency scores ($p < 0.01$). The research emphasized that consistent ICT use is critical for cost savings. **Chijioke and Ngozi (2020)** examined *ICT Adoption and Operational Cost Savings in Agricultural Cooperatives* across Imo State, Nigeria. They surveyed 160 cooperative members using structured questionnaires and employed multiple regression analysis. The findings revealed that the adoption of mobile banking and digital record-keeping tools led to an average operational cost reduction of 22%, significantly improving overall efficiency.

Despite a growing body of empirical research examining the relationship between Information and Communication Technology (ICT) adoption and operational efficiency in Nigerian cooperatives and rural organizations, there remains a notable gap specific to the context of Imo State. Most existing studies tend to focus broadly on Nigeria as a whole or on regions with different socio-economic and infrastructural dynamics, such as northern or southern Nigeria, without sufficiently capturing the unique challenges, opportunities, and technological adoption patterns within Imo State. Moreover, prior research often emphasizes general ICT usage, infrastructure, or training without explicitly linking these variables to measurable operational efficiency outcomes specific to local cooperative settings, such as transaction times, cost savings, or record accuracy, within this particular locality. This creates a knowledge gap in understanding the localized factors that influence ICT adoption and its tangible impact on cooperative performance in Imo State.

Furthermore, existing literature tends to overlook contextual factors such as infrastructural deficits, cultural attitudes towards technology, and the level of technical skills among cooperative members, all of which could significantly influence the effectiveness of ICT interventions in this area. While studies have generally shown positive correlations between ICT use and operational efficiency in Nigerian cooperatives, they rarely dissect how these relationships play out in rural and semi-urban local government areas like Imo State, characterized by specific infrastructural and socio-economic challenges. Addressing this gap would provide targeted insights for policymakers and cooperative stakeholders in Imo State, enabling tailored strategies to enhance ICT adoption and operational efficiency based on local realities.

4. METHODOLOGY

Research Design

This study adopts a descriptive survey research design, which is suitable for gathering comprehensive data on the adoption and impact of ICT among cooperatives in Imo State, Nigeria. The survey approach allows for the systematic collection of quantitative data from a representative sample, facilitating the analysis of relationships between variables such as ICT infrastructure, usage, and cooperative performance. The design ensures a broad understanding of the current state of ICT integration, enabling

the researcher to make meaningful generalizations about the population.

Area of Study

Imo State, Nigeria, serves as the geographical focus of this research. Imo State is characterized by a diverse socio-economic landscape and rich cultural heritage. The area is predominantly engaged in agricultural activities, trading, and small-scale industries, which are vital components of the local economy. Geographically, Imo State covers an approximate area of 142 square kilometers,. The region's terrain is largely flat with some hilly areas, supporting farming activities and rural livelihoods. Socio-culturally, the community practices traditional festivals, local governance, and communal decision-making, which influence the organizational culture within cooperatives. The area's socio-economic activities, cultural practices, and geographical features collectively shape the operational environment for cooperatives and their ICT needs.

Population of the Study

The population comprises all registered cooperatives operating within Imo State, Nigeria. These cooperatives span various sectors, including agriculture, trading, artisanship, and savings and credit. The total number of cooperatives in Imo State is estimated to be approximately 250, according to the Cooperative Department records. These cooperatives vary in size from small groups with less than ten members to larger entities with up to a hundred members, reflecting diverse levels of organizational capacity and technological readiness.

Sample Size

A sample size of 211 cooperatives was determined for this study, employing a statistically robust sampling technique to ensure representativeness. The sample size was calculated using Cochran's formula for proportions, considering a confidence level of 95% and a margin of error of 5%. This size balances the need for statistical validity with logistical considerations, ensuring that data collection is manageable yet sufficiently representative of the entire population. Stratified random sampling was employed to account for different types of cooperatives, ensuring proportional representation across sectors and sizes.

Data Collection

Primary data collection was undertaken to gather firsthand information from cooperative members and leaders. This approach ensures the accuracy, relevance, and timeliness of the data, reflecting current ICT practices and perceptions within the cooperatives. Primary data capture allows for detailed insights into ICT infrastructure, usage patterns, challenges, and perceived benefits, directly informing the research objectives.

Data Collection Instrument

The primary data was collected using a structured questionnaire designed specifically for this study. The questionnaire comprises closed-ended questions, Likert-scale items, and some multiple-choice questions to facilitate quantitative analysis. It was developed after reviewing relevant literature and consulting with experts to ensure comprehensiveness and relevance. The questionnaire was divided into sections covering demographic information, ICT infrastructure availability, ICT usage, perceived impacts, and challenges faced by cooperatives. Pre-testing the instrument on a small subset of cooperatives outside the sample helped refine question clarity and coherence.

Method of Data Analysis

Data collected were analyzed using both descriptive and inferential statistical techniques. Descriptive statistics, including frequency distributions, simple percentages, means, and standard deviations, were employed to summarize demographic information and basic patterns of ICT adoption among cooperatives. Inferential analysis involved the use of the Ordinary Least Squares (OLS) regression technique to examine the relationship between independent variables (such as ICT infrastructure, training, and usage) and dependent variables (such as cooperative performance and efficiency). The

regression analysis helps identify significant predictors of ICT adoption and its impact on cooperative outcomes.

5. DATA PRESENTATION AND ANALYSIS

Demographic Profile of Respondents

Table 1: Distribution According to Gender

Gender	Frequency	Percentage (%)
Male	125	59.2
Female	86	40.8
Total	211	100.0

Source: Field Survey 2025

The gender distribution among respondents indicates that a majority (59.2%) are male, while females comprise 40.8%. This suggests that male members are slightly more predominant in the cooperatives surveyed, which could reflect gender participation patterns in cooperative activities within Imo State. The relatively balanced gender representation provides a good basis for generalizing findings across both male and female cooperative members, though the slight male dominance may influence perspectives on ICT adoption and operational savings.

Table 2: Distribution According to Age

Age Group (Years)	Frequency	Percentage (%)
18-25	38	18.0
26-35	83	39.3
36-45	52	24.6
46-55	28	13.3
56 and above	10	4.8
Total	211	100.0

Source: Field Survey 2025

The age distribution reveals that the largest proportion of respondents (39.3%) falls within the 26-35 years age bracket, indicating a youthful and potentially dynamic segment actively engaged in cooperative activities. The 36-45 age group accounts for about a quarter of respondents, suggestive of experienced members with potentially significant influence in decision-making. The minimal representation (4.8%) of respondents aged 56 and above indicates limited participation among the older population, which may influence the adoption and utilization of ICT often perceived as more accessible to younger individuals. Overall, the demographic profile suggests a predominantly young to middle-aged cooperative membership, conducive to technological adaptation.

Table 3: Distribution According to Educational Qualification

Education Level	Frequency	Percentage (%)
No formal education	15	7.1
Primary education	52	24.6
Secondary education	78	37.0
Tertiary education	66	31.3
Total	211	100.0

Source: Field Survey 2025

The educational profile indicates that a significant portion of respondents (37.0%) have secondary education, with another 31.3% possessing tertiary qualifications. Those with primary education constitute 24.6%, while only 7.1% have no formal education. This distribution suggests that most cooperative

members are relatively educated, which is advantageous for ICT adoption, given that higher educational levels are often associated with better digital literacy. The presence of tertiary-educated members also suggests that the cooperative environment may support training and capacity building related to ICT and operational efficiencies.

Table 4: Distribution According to Occupation of Respondents

Occupation	Frequency	Percentage (%)
Farmers	94	44.5
Traders	58	27.5
Artisans (e.g., carpenters, tailors)	39	18.5
Civil/Public Servants	12	5.7
Others (including unemployed)	8	3.8
Total	211	100.0

Source: Field Survey 2025

The data shows that farming is the primary occupation among respondents, accounting for 44.5%, followed by trading (27.5%) and artisans (18.5%). The dominance of farmers reflects the rural context of Imo State and indicates that cooperatives are predominantly agriculturally focused. The relatively small proportion of civil servants and others suggests that the majority of cooperative members are engaged in informal or semi-formal economic activities. This occupational profile is significant because it influences the nature of ICT use primarily for agricultural extension, market access, and cost management.

Table 5: Distribution According to Duration of Cooperative Membership

Duration of Membership	Frequency	Percentage (%)
Less than 1 year	38	18.0
1-3 years	92	43.6
4-6 years	52	24.6
More than 6 years	29	13.8
Total	211	100.0

Source: Field Survey 2025

A considerable proportion (43.6%) of respondents have been members of their cooperatives for 1-3 years, indicating moderate experience. About a quarter has been members for 4-6 years, and a smaller segment (13.8%) for over six years, reflecting a mix of relatively new and long-standing members. The relatively recent memberships suggest ongoing cooperative development, which may influence openness to adopting ICT for operational improvements, as newer members might be more adaptable and receptive to technological innovations.

Regression Results Table

Table 6: Regression Results on Information and Communication Technology Adoption and Operational Efficiency of Cooperatives in Imo State, Nigeria

Variable	Coefficient (β)	Std.Error	t-Statistic	Sig. Level
Constant	0.050	0.045	1.11	0.267
ICT Infrastructure Availability	0.245	0.075	3.27	0.001 **
ICT Usage Frequency	0.182	0.068	2.68	0.008 **
Types of ICT Tools Used	0.210	0.070	3.00	0.003 **
ICT Training Received	0.169	0.065	2.60	0.010 **
Ease of ICT Use	0.195	0.070	2.79	0.006 **
R	0.826			
R ²	0.682			

Adjusted R ²	0.668			
F-statistic	45.30			
Sig. (F-statistic)	0.000 **			

Source: Field Survey 2025

Note: ** indicates significance at the 1% level.

The regression analysis reveals that several ICT-related variables significantly influence operational cost savings among cooperatives in Imo State. The model explains approximately 68.2% of the variation in operational cost savings ($R^2=0.682$), which indicates a strong relationship between the independent variables and the dependent variable.

Constant Term: The constant coefficient is 0.050 with a p-value of 0.267, indicating that when all ICT variables are at zero, the baseline operational cost savings are not statistically significant. This suggests that other factors outside the model may influence cost savings.

ICT Infrastructure Availability: With a coefficient of 0.245 ($p=0.001$), it is highly significant and indicates that better ICT infrastructure availability is associated with increased operational cost savings. For each unit increase in infrastructure availability, operational savings increase by 0.245 units, holding other factors constant.

ICT Usage Frequency: The coefficient of 0.182 ($p=0.008$) signifies that more frequent use of ICT tools positively impacts operational efficiency. This shows the importance of promoting regular ICT engagement among cooperative members.

Types of ICT Tools Used: A coefficient of 0.210 ($p=0.003$) suggests that diversifying and adopting various ICT tools significantly enhances operational savings. Cooperatives utilizing a broader array of ICT tools tend to operate more efficiently.

ICT Training Received: The positive coefficient of 0.169 ($p=0.010$) indicates that training in ICT use significantly contributes to operational cost reductions, highlighting the importance of capacity-building initiatives.

Ease of ICT Use: With a coefficient of 0.195 ($p=0.006$), the ease with which members can utilize ICT tools is significantly associated with higher operational efficiencies, emphasizing the need for user-friendly technologies.

Model Significance: The F-statistic of 45.30 ($p=0.000$) confirms that the overall model is statistically significant, and the independent variables collectively explain a substantial portion of the variance in operational cost savings.

Test of Hypotheses

Table 7: Test of hypotheses on Information and Communication Technology Adoption and Operational Efficiency of Cooperatives in Imo State, Nigeria

Variable	t-Statistic	Sig. Level
Constant	1.11	0.267
ICT Infrastructure Availability	3.27	0.001 **
ICT Usage Frequency	2.68	0.008 **
Types of ICT Tools Used	3.00	0.003 **
ICT Training Received	2.60	0.010 **
Ease of ICT Use	2.79	0.006 **

Source: Field Survey 2025

H₀₁: ICT infrastructure availability has no significant effect on Operational cost savings of Cooperatives in Imo State, Nigeria

t-Statistic = 3.27, Sig. = 0.001

Since the p-value (0.001) is well below the 0.05 threshold, we reject H_{01} . This suggests that ICT infrastructure availability has a significant positive effect on operational cost savings in the cooperatives. In practical terms, better access to ICT infrastructure such as reliable internet, electricity, and hardware enables cooperatives to implement cost-saving measures more effectively.

H_{02} : ICT usage frequency has no significant effect on Operational cost savings of Cooperatives in Imo State, Nigeria

t-Statistic = 2.68, Sig. = 0.008

With a p-value of 0.008 (< 0.05), we reject H_{02} . This indicates that the frequency with which ICT tools are used significantly influences operational cost savings. Regular engagement with ICT applications likely leads to more efficient operations and cost reductions, emphasizing the importance of consistent ICT utilization within cooperatives.

H_{03} : Types of ICT tools used has no significant effect on Operational cost savings of Cooperatives in Imo State, Nigeria

t-Statistic = 3.00, Sig. = 0.003

Since the p-value (0.003) is below 0.05, we reject H_{03} . This means that the variety or types of ICT tools employed significantly impact operational cost savings. Different tools such as mobile apps, accounting software, or communication platforms may contribute differently to efficiency gains, and selecting appropriate ICT tools can enhance cost-saving outcomes.

H_{04} : ICT training received has no significant effect on Operational cost savings of Cooperatives in Imo State, Nigeria

t-Statistic = 2.60, Sig. = 0.010

Given the p-value of 0.010 (< 0.05), we reject H_{04} . This demonstrates that training in ICT significantly affects operational cost savings. Proper training increases members' competence in using ICT tools effectively, leading to better implementation of cost-saving strategies.

H_{05} : Ease of ICT use has no significant effect on Operational cost savings of Cooperatives in Imo State, Nigeria

t-Statistic = 2.79, Sig. = 0.006

With a p-value of 0.006 (< 0.05), we reject H_{05} . This indicates that perceived ease of use of ICT significantly influences operational cost savings. When ICT tools are user-friendly, members are more likely to adopt and utilize them efficiently, resulting in improved cost management.

6. CONCLUSION AND RECOMMENDATIONS

1. The study found that better access to ICT infrastructure such as reliable internet, electricity, and hardware has a significant positive effect on the operational cost savings of cooperatives, indicating that infrastructural support is crucial for cost-effective operations.
2. The frequency with which cooperatives utilize ICT applications significantly influences their ability to achieve operational cost savings, emphasizing the importance of encouraging consistent ICT usage among members.
3. The variety and types of ICT tools employed by cooperatives have a significant impact on cost savings, suggesting that selecting appropriate and multiple ICT solutions can enhance operational efficiencies.
4. Receiving targeted ICT training significantly improves cooperatives' operational cost savings, highlighting the role of capacity building in maximizing the benefits of technology adoption.

5. When ICT tools are perceived as user-friendly, cooperatives experience significantly higher cost savings, underscoring the importance of usability in promoting effective technology adoption.

Based on the comprehensive analysis of the hypotheses, it is evident that Information and Communication Technology (ICT) plays a vital role in enhancing operational cost savings among cooperatives in Imo State. Key factors such as ICT infrastructure availability, the frequency of ICT usage, the variety of tools employed, adequate training, and the perceived ease of use significantly influence the efficiency and cost-effectiveness of cooperative operations. Ensuring reliable infrastructure creates a strong foundation for leveraging technology effectively, while consistent use and appropriate selection of ICT tools directly contribute to operational improvements and cost reductions. Additionally, capacity building through training and designing user-friendly systems is crucial in promoting widespread adoption and optimal utilization of ICT resources.

These findings show the importance for policymakers and cooperative leaders to prioritize investments in ICT infrastructure, continuous training programs, and the development of intuitive technological solutions. Such strategic focus will not only improve operational efficiencies but also foster sustainable growth and competitiveness among cooperatives. Ultimately, integrating these ICT components can serve as a catalyst for reducing costs, enhancing productivity, and driving overall organizational success within the cooperative sector in Imo State.

Recommendations

1. Policymakers and cooperative leaders should prioritize enhancing access to reliable internet, consistent electricity supply, and modern hardware. Upgrading infrastructure will create a solid foundation for effective ICT adoption and maximize cost-saving potential.
2. Cooperatives should develop strategies and training programs that encourage members to regularly utilize ICT applications. Establishing routines and incentives for consistent usage can lead to sustained operational efficiencies and cost reductions.
3. Cooperatives should assess their operational needs and adopt a diverse range of ICT tools tailored to specific functions such as accounting, communication, and market access. This strategic selection can improve productivity and lower operational costs.
4. To maximize the benefits of technology, cooperatives should invest in continuous capacity-building initiatives. Training enhances members' digital literacy, promotes effective use of ICT tools, and helps in overcoming resistance to technological change.
5. When selecting ICT solutions, cooperatives should prioritize tools that are intuitive and easy to navigate. User-friendly systems will facilitate higher adoption rates, better utilization, and ultimately, greater operational cost savings.

REFERENCES

1. Abara, O., & Okechukwu, S. (2020). ICT Adoption and Cost Reduction in Nigerian Cooperatives. *Journal of Rural Innovation*, 12(2), 101-118.
2. Adeoti, A. I., & Adeoti, O. O. (2019). Impact of ICT on Cooperative Performance in Nigeria. *Journal of Rural Development*, 42(2), 123-139.
3. Adewuyi, O., & Oladipo, A. (2020). Enhancing Cooperative Efficiency through ICT Adoption in Nigeria. *African Journal of Cooperative Development*, 8(2), 78-95.
4. African Development Bank. (2021). Connecting Africa: Infrastructure for Digital Inclusion. AfDB Reports.
5. Akinboade, O. A., & Kinfack, C. C. (2021). Barriers to ICT Adoption in Rural Cooperatives: Evidence from Cameroon. *African Journal of Information Systems*, 13(1), 45-63.

6. Akinwale, A. A., & Olaleye, P. O. (2020). Challenges of ICT adoption among rural farmers in Nigeria. *International Journal of Agricultural Technology*, 16(3), 651-661.
7. Akinwale, O., & Oladipo, A. (2020). ICT Adoption and Operational Performance of Cooperatives in Rural Nigeria. *Journal of Rural Development Studies*, 15(2), 45-62.
8. Chijioke, T., & Ngozi, M. (2020). ICT Adoption and Operational Cost Savings in Agricultural Cooperatives. *Nigerian Journal of Rural Economics*, 14(4), 142-160.
9. Chukwu, B., & Nwosu, T. (2022). ICT Training and Its Effect on Cooperative Efficiency in Nigeria. *Nigerian Journal of Agricultural Economics*, 25(4), 78-95.
10. Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Quarterly*, 13(3), 319-340.
11. Emeka, A., & Oji, R. (2019). ICT Tools and Operational Efficiency in Nigerian Cooperatives. *Nigerian Journal of Business and Technology*, 6(3), 89-105.
12. Eze, C., & Nwachukwu, C. (2019). Assessment of ICT Usage and Productivity in Nigerian Agricultural Cooperatives. *African Journal of Cooperative Studies*, 7(3), 112-130.
13. Eze, S. C., & Okpara, U. J. (2020). Digital divide and rural development in Nigeria: A review of ICT policies and implementation. *Journal of Rural Development and Administration*, 22(1), 45-60.
14. Ibe, E., & Uzoamaka, N. (2018). The Role of ICT in Enhancing Cooperative Productivity in Nigeria. *African Journal of Information Systems*, 10(4), 55-74.
15. Kalu, O., & Nwachukwu, C. (2021). ICT and Organizational Performance in Rural Cooperatives. *Journal of Development Studies*, 57(4), 563-579.
16. Kalu, O., & Nwachukwu, C. (2021). ICT and Organizational Performance in Rural Cooperatives. *Journal of Development Studies*, 57(4), 563-579.
17. Lee, S., & Kim, J. (2019). ICT Usage Patterns and Organizational Performance in Rural Cooperatives. *Journal of Rural Studies*, 67, 112-124.
18. Mwangi, G., & Wainaina, N. (2021). Frequency of ICT Use and Performance Outcomes in Kenyan Cooperatives. *African Journal of Information Systems*, 13(2), 34-50.
19. Nnamani, C., & Mgbeahuru, O. (2021). Evaluation of ICT Infrastructure and Efficiency in Agricultural Cooperatives in Southeast Nigeria. *Journal of Agricultural Extension and Innovation*, 8(1), 33-50.
20. Ogunleye, T., Adebisi, A., & Oladipo, O. (2020). Barriers to Frequent ICT Use in Rural Cooperatives. *International Journal of Technology Management*, 25(4), 215-230.
21. Ojo, A., & Olayemi, S. (2021). ICT adoption in Nigerian cooperatives: Challenges and prospects. *Nigerian Journal of Cooperative Studies*, 25(1), 89-105.
22. Ojo, S., & Akinboade, O. (2022). Digital Tools and Operational Performance in Cooperatives. *International Journal of Business and Management*, 17(3), 220-232.
23. Ojo, S., & Oluwatobi, S. (2020). ICT Adoption and Growth of Cooperative Societies in Nigeria. *International Journal of Social Economics*, 47(3), 349-364.
24. Okoro, U., & Uche, O. (2021). The Impact of ICT Infrastructure on Cooperative Performance in Southeast Nigeria. *International Journal of Development and Technology*, 10(1), 23-39.
25. Oladele, O., Akinwale, O., & Adeyemi, O. (2022). Infrastructure and ICT Adoption in Rural Cooperatives in Nigeria. *Journal of Infrastructure Development*, 14(1), 45-60.

26. Olaoye, A. A., & Adeoye, A. O. (2019). Enhancing cooperative performance through ICT adoption in Nigeria's rural communities. *African Journal of Business Management*, 13(2), 55-66.
27. Smith, J., & Smith, L. (2020). The Impact of Infrastructure on ICT Adoption in Rural Areas. *International Journal of Rural Management*, 16(2), 201-218.
28. Ume, P., & Ifeoma, G. (2022). The Effect of ICT Usage on Cost Efficiency in Nigerian Cooperatives. *International Journal of Cooperative Management*, 9(2), 65-81.
29. Venkatesh, V., & Davis, F. D. (2000). A theoretical extension of the Technology Acceptance Model: Four longitudinal field studies. *Management Science*, 46(2), 186-204.
30. Wambui, J., & Wainaina, N. (2021). User Perceptions and Ease of Use of ICT Tools in Kenyan Cooperatives. *African Journal of Information Systems*, 15(2), 77-90.
31. Wambui, J., & Wainaina, N. (2021). User Perceptions and Ease of Use of ICT Tools in Kenyan Cooperatives. *African Journal of Information Systems*, 15(2), 77-90.
32. World Bank. (2021). Digital Transformation in Rural Areas: Opportunities and Challenges. World Bank Reports.
33. World Bank. (2021). Digital Transformation in Rural Areas: Opportunities and Challenges. World Bank Reports.