# Comparative analysis of information and communication technology usage for accessing agricultural information among cassava value chain actors in Oyo and Ogun states, Nigeria

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**Abstract -** This study investigated the comparative analysis of information and communication technology (ICT) usage among selected cassava value chain actors (CVCAs) in Oyo and Ogun States, Nigeria. Multistage sampling techniques was employed in the selection of 187 respondents in Oyo State and 168 respondents in Ogun State. Data were collected through a validated structured interview schedule and were analyzed through descriptive and inferential statistical tools. The results indicated that the basic ICT tools like radio (100%), mobile phones (100%), and social media (98.9% and 98.8%) were commonly used by the respondents; however, advanced technologies such as GPS and aerial drones have low adoption in the two states. The major identified constraints to ICT usage include erratic power supply, inadequate digital training and illiteracy, significantly impacting the use of ICT in accessing cassava value chain information. The result of the T-test revealed that there was no significant difference in the level of ICT (t-value= 0.650) usage between the two states. The study concluded that radio, mobile phones, and social media are the most commonly available and used ICT tools among CVCAs in both Oyo and Ogun States, with limited adoption of advanced technologies such as GPS and aerial drones, while the level of ICT usage remains relatively low across both states. The study recommends increasing ICT training opportunities for CVCAs to enhance improved ICT usage, and improvement in rural infrastructural facilities for accessibility of ICT tools and boost productivity within the cassava value chain.

**Keywords:** Cassava, Communication, Information, Technology, Value Chain

## INTRODUCTION

Agriculture plays a pivotal role in Nigeria's economy, serving as the primary source of livelihood for most citizens Olaniyi et al. (2022). Its development is significantly influenced by the availability and timely dissemination of relevant information to farmers. In 2020, global cassava production was estimated at 291 million metric tonnes, with Africa contributing over 62% of this output (FAO 2022). Nigeria emerged as one of the leading producers worldwide, accounting for approximately 59.5 million metric tonnes, which represents about 21% of global production (Olaniyi et al., 2022; PWC, 2020). Notably, cassava farmers, cultivating between 0.5 and 5 hectares, are responsible for the majority of Nigeria's cassava production (Angba and Iton, 2020).

Cassava has gained increased prominence due to its diverse industrial, economic, and nutritional applications, primarily attributed to its starch-rich roots. Beyond its role as a staple food, cassava has transitioned into a significant source of income, with the potential to become a major foreign exchange earner, thereby positively impacting Nigeria's economic trajectory. Despite its economic potential, cassava remains predominantly used for human consumption, particularly in forms such as *Garri*, cassava flower, and *fufu*.

A value chain refers to a series of activities that an organization undertakes to produce and deliver a valuable product or service to the market (Olaniyi and Enwelu, 2021). Throughout this chain, value is incrementally added, enhancing the product's competitive edge in terms of quality and market price. Essentially, a value chain encompasses a sequence of processes aimed at creating and enhancing the value of a product, while analyzing the opportunity costs associated with this progression (Lee et al., 2018). It represents the advancement of a product from production to the final consumer, with value being added at each stage (Wen-Lung et al., 2018). Cassava exemplifies such a value chain, as it can be processed into various products, ranging from traditional and innovative food items to livestock feed while the main actors within the cassava value chain include farmers/producers, processors, and marketers.

The Cassava Value Chain (CVC) plays a critical role in Nigeria's agricultural economy, contributing significantly to food security and serving as a primary income source for millions of rural households. Despite this dominance, the sector grapples with low productivity, limited market access, and inefficiencies along the value chain (Adeniran et al., 2024). Information and Communication Technology (ICT) is increasingly recognized as a transformative tool to address these challenges, offering innovative solutions that enhance productivity, improve market connectivity, and provide critical agricultural information (Okadi et al., 2024).

ICT applications in agriculture have rapidly evolved, offering benefits such as real-time weather updates, market price information, and advanced farming techniques. For cassava value chain actors (CVCAs), ICT adoption can enhance production, processing, and marketing efficiency (Alfa., 2022). However, ICT adoption varies

significantly due to disparities in infrastructure, affordability, and digital literacy (Ebisike et al., 2021). Oyo and Ogun States are the leading cassava producers in southwestern Nigeria (FAO, 2022), there is a need to explore how ICT tools are being used differently in these states, the barriers faced by actors in using these technologies, and the impact on productivity and market access. This comparative analysis will shed light on differences in ICT utilisation and help identify targeted interventions that can promote broader ICT usage and improve cassava value chain efficiency. Based on the above background, the study investigated the comparative analysis of ICT usage among cassava value chain actors in Oyo and Ogun States. Specifically, it described the available and accessible ICT tools to CVCAs, the level of ICT usage and the constraints to ICT usage by CVCAs.

## METHODOLOGY

The study was carried out in southwestern Nigeria, which comprises six (6) states, namely Oyo, Osun, Ogun, Ekiti, Ondo, and Lagos states. The zone lies in the equatorial rainforest belt, and the rainfall varies from 1500mm to 1800mm per annum. It is located between Longitude 30° and 7°E and Latitude4° and 9°N. The total land area is about 191,843 square kilometers. Oyo and Ogun States were purposively selected out of six constituent states in Southwest Nigeria. This selection was based on high cassava production data of the selected states in southwest Nigeria from the FAO database (FAO, 2022).

A multi-stage sampling procedure was adopted in the selection of the respondents for this study. The first stage involved the random selection of two agricultural zones out of the total agricultural zones in each of the selected states (Oyo and Ogun States). Second stage involved 50% of the total blocks in each of the selected agricultural zones, while three (3) blocks each were selected from Oyo and Ogbomoso agricultural zones in Oyo State respectively making six blocks in Oyo State. Also, five blocks were selected from Ijebu and Remo Agricultural Zones in Ogun state, Nigeria, making a total of eleven blocks selected. At the Third stage random sampling technique was used in the selection of one hundred and eighty-seven 187 (67 farmers, 60 processors, 60 marketers) CVCAs in Oyo state and one hundred and sixty-seven 167 (68 farmers, 50 processors and 50 marketers) cassava value chain actors in Ogun state respectively. Primary data were collected using a well-structured interview schedule; the data collected for this study were subjected to both descriptive and inferential statistical tools. The dependent variable of the study was the level of ICT usage among the Cassava value chain actors (CVCAs) across the states, and this was measured on a 4-point rating scale of always = 3, sometimes =2, rarely = 1, and never = 0, while the inferential statistic tool; T-test was used to test the slated hypothesis by checking the difference between the selected states

## RESULTS AND DISCUSSION
### Information and Communication Technology available to cassava value chain actors

The data on Information and Communication Technology (ICT) available to cassava value chain actors (CVCAs) in Oyo and Ogun States reveals that a wide range of technologies is available to the majority of actors, with radio, mobile phones, and social media being the most prevalent. The result in Oyo State shows that 100% of respondents reported having access to both radio and mobile phones, while 98.9% indicated the availability of social media. 93.0% had access to television, 89.3% to video, 85.0% to computers, and 80.7% to the internet. Sophisticated technologies such as Global Positioning System (GPS) (24.6%) and aerial drones (2.7%) recorded low in terms of its availability and access respectively. This implies that the range of ICT tools suggests that most CVCAs in Oyo have access to essential communication tools, as well as some advanced technologies. Furthermore, in Ogun State, all (100%) the respondents reported access to radio and mobile phones, with 98.8% having access to social media. Access to television, video, and computers was also high, with 92.3%, 85.7%, and 83.3% of respondents having these technologies available, respectively. The use of the internet was reported by 75.6% of respondents, while 25.0% and 3.0% had access to GPS and aerial drones, respectively. Generally, the widespread use of basic ICT tools such as mobile phones and radios shows their critical role in disseminating information to cassava value chain actors, providing updates on market prices, weather conditions, and agricultural techniques. Social media platforms are increasingly being used by CVCAs to enhance communication and networking; access to more advanced technologies, such as GPS and aerial drones, is still limited. This finding is in line with that of Yekinni et al., (2019) and Ebisike et al., (2021) they reported that Information and Communication Technology significantly improve access to agricultural information and retrieval of useful messages.

**Table 2: Distribution of respondents by ICT tools available to CVCAs**

| ICT Tools Available | Oyo State F (%) | Ogun State F (%) |
|---|---|---|
| Radio | 187(100) | 168(100) |
| Television | 174(93.0) | 155(92.3) |
| Computer | 159(85.0) | 140(83.3) |
| Mobile phone | 187(100) | 168(100) |
| Internet | 151(80.7) | 127(75.6) |
| Social media | 185(98.9) | 166(98.8) |
| Global positioning system (GPS) | 46(24.6) | 42(25.0) |
| Aerial drone | 5(2.7) | 5(3.0) |
| Video | 167(89.3) | 144(85.7) |

Source: Field survey, 2024

**Level of ICT usage among Cassava Value Chain Actors (CVCAs)**

The level of ICT usage among cassava value chain actors (CVCAs) in Oyo and Ogun states indicates a clear preference for basic communication technologies in the two states, while more advanced ICT tools remain underutilised. The result in Oyo State revealed that radio (WMS= 2.87), Mobile phones (WMS= 2.73) and social media (WMS= 2.55) were found to be the most frequently used ICT tools by the sampled respondents. This indicates the significant role these ICT tools play as primary source of information dissemination among CVCAs. However, other ICT tools like television (WMS=1.97) and the internet (WMS=1.88) were less frequently used, indicating limited access or preference for these mediums. Meanwhile, the use of computers, GPS, and aerial drones had the lowest usage scores; this implies that their availability, accessibility, and level of use are minimal among cassava value chain actors in Oyo State. Similarly, the result in Ogun State follows the same trends where radio (WMS=2.92), mobile phones (WMS=2.68) and social media (WMS=2.37) were the most used ICT tools by the respondents. On the other hand, ICT tools such as television (WMS=1.93), video (WMS=1.76), and the internet (WMS=1.71) also had relatively low usage levels. Advanced technologies like GPS and aerial drones were barely utilised, with WMS scores of 0.27 and 0.11 respectively. This indicates that while basic ICT tools such as radios, mobile phones, and social media are integral to the activities of cassava value chain actors, there is a significant gap in the usage of more advanced technologies. Generally, this implies that in both states, radios, mobile phones, and social media dominate the ICT landscape, providing cassava value chain actors CVCAs with vital and relevant information. However, the limited use of advanced ICT tools like GPS, aerial drones, and computers may be attributed to factors such as limited accessibility, affordability, and lack of awareness of these tools regarding their potential benefits. This finding is consistent with findings by Fawole et al. (2024), and Olaniyi and Enwelu (2021), who noted that the radio. Mobile phone and social media were the most used Information and Communication Technology among the value chain actors to disseminate and retrieve agricultural information.

**Table 6: The Distribution of respondents by Level of ICT usage among Cassava Value Chain Actors (CVCAs) in Oyo and Ogun State**

| ICT level of Usage | OYO WMS | OGUN WMS |
|---|---|---|
| Radio | 2.87 | 2.92 |
| Television | 1.93 | 1.93 |
| Computer | 1.28 | 1.36 |
| Mobile phone | 2.73 | 2.68 |
| Internet | 1.89 | 1.71 |
| Social media | 2.55 | 2.37 |
| Global positioning system (GPS) | 0.30 | 0.27 |
| Aerial drone | 0.13 | 0.11 |
| Video | 1.78 | 1.76 |

Source: Field survey, 2024

**Categorisation of the respondents according to level of information and communication technology usage**

The categorisation of respondents according to the level of Information and Communication Technology (ICT) usage among cassava value chain actors (CVCAs) in Oyo and Ogun states reveals a predominance of low ICT usage in both states. The data in Oyo State shows that the majority of CVCAs (56.7%) were classified as low-level users of ICT, 29.1% as moderate users, and only a few 13.9% as high-level users. This indicates that the overall level of ICT usage among cassava value chain actors in Oyo State is low, with more than half of the respondents exhibiting minimal engagement with these technologies. Similarly, in Ogun State, a larger percentage of CVCAs (61.9%) were categorized as low-level ICT users, while 27.4% fell into the moderate category,

and only a few 10.7% were high-level users of ICT. This finding implies that the level of ICT usage in both states is significantly low, with the majority of actors not fully utilising the potential of these technologies to enhance their operations. The low level of ICT usage among cassava value chain actors can have significant implications for agricultural productivity and efficiency, while limited use of ICT tools may hinder access to crucial agricultural information, reduce market linkages, and slow the adoption of new technologies that could enhance value chain processes.

The result corroborates the findings of Olaniyi and Enwelu 2021 and Nwobodo et al. 2023, who emphasized that low ICT usage among the cassava actors could limit their ability to access weather forecasts, market prices, and best agricultural practices, which are essential for making informed decisions.

**Table 7: Categorisation of the Respondents According to Level of Information and Communication Technology Usage among the CVCAs**

| Category | n=187 Oyo State Range of score | F(%) | n =168 Ogun State Range of score | F(%) |
|---|---|---|---|---|
| Low | ≤15 | 106(56.7) | ≤15 | 108(61.9) |
| Moderate | 15-18 | 55(29.1) | 15-18 | 46(27.4) |
| High | >18 | 26(13.9) | >18 | 18(10.7) |
| *Mean* | 15.47 | | 15.11 | |
| *Std. Dev.* | 2.62 | | 2.62 | |

Percentage % in parenthesis, WMS-Weighted Mean Score
Source: Field survey, 2024

**Constraints to ICT usage by the CVC actors in Oyo and Ogun States.**

The constraints to ICT usage among cassava value chain actors (CVCAs) in Oyo State reveal several significant barriers that hinder its effective usage for CVC activities. The identified constraints include erratic power supply (WMS = 2.82), the complexity of ICT tools (WMS = 2.77) and high cost of internet subscriptions (WMS = 2.76). Moreover, inadequate rain (WMS = 2.50), language barriers (WMS = 2.48), and poor network coverage (WMS = 2.41), indicate systemic problems related to infrastructure, education, and affordability. High illiteracy levels (WMS: 2.36), costs associated with acquiring ICT tools (WMS = 2.35), inadequate knowledge and skills (WMS = 2.19), and limited availability of ICT tools (WMS = 2.12) also contribute to the low levels of technology usage. These findings resonate with the findings of Ekanem and Aniebiet (2018), which reported similar constraints to the use of ICT tools such as infrastructure deficits, high costs, and low literacy as critical barriers to ICT usage among cassava value chain actors in rural agricultural sectors across Nigeria. The implications are profound: unless these

constraints are effectively addressed, the potential for ICT to enhance agricultural productivity, processing and improve market access will remain unrealized.

Similarly, the constraints identified by cassava value chain actors in Ogun State show that barriers such as erratic power supply (WMS = 2.77) and the complexity of using ICT tools (WMS = 2.73) significantly hinder technology usage, followed by the high cost of internet subscriptions (WMS = 2.64). Inadequate training on ICT (WMS = 2.46) and poor network coverage (WMS = 2.42) further compound the difficulties faced by these actors. Additional issues, including illiteracy among CVCAs (WMS = 2.27), high costs associated with acquiring ICT tools (WMS = 2.39), and language barriers (WMS = 2.39). Furthermore, inadequate knowledge and skills regarding ICT tools (WMS = 2.04) and inadequate availability of ICT tools (WMS = 2.07) present additional constraints. These challenges align with the findings of Obinna et al. (2023), who emphasized that unstable power supply, high costs of ICT, and low ICT literacy are significant impediments to ICT utilisation in the agricultural sector.

Generally, the constraint affecting the use of ICT in Oyo and Ogun state revealed that erratic power supply, complexity of using ICT tools, high cost of internet subscriptions, inadequate training on ICT and poor network coverage respectively. This is an indication the many factors have been militating the level of use of ICT among Cassava Value Chain actors in Oyo and Ogun state respectively. The result corroborates that of Naik et al., 2022, who worked on the constraints faced in the usage of ICT Tools by Farmers in Anantapur District of Andhra Pradesh.

**Table 7: Distribution of respondents according to the constraints to ICT Usage by the CVC actors Oyo and Ogun State**

| Constraints to ICT usage by CVCAs in Oyo state | OYO WMS | OGUN WMS |
|---|---|---|
| Erratic power supply | 2.82 | 2.77 |
| Inadequate knowledge and skills on how to use ICT tools | 2.19 | 2.04 |
| Inadequate availability of ICT tools | 2.12 | 2.07 |
| Complexity in the use of ICT tools | 2.77 | 2.73 |
| Poor network coverage | 2.41 | 2.42 |
| Illiteracy level of the CVC actors | 2.36 | 2.27 |
| Inadequate training on ICT | 2.50 | 2.46 |
| High cost of acquiring ICT tools | 2.35 | 2.39 |
| High cost of internet subscription | 2.76 | 2.64 |
| Language barrier (as most of the text are in English language) | 2.48 | 2.39 |

Source: Field survey, 2024          WMS-Weighted Mean Score

**Test of hypothesis**

There is no significant difference in the level of Information and Communication Technology (ICT) usage among CVCAs between Oyo and Ogun States. The result of the independent sample test analysis, as shown in Table 9, indicates that there is no significant difference in the level of ICT usage across the selected states (Oyo and Ogun). The mean scores for ICT usage were 15.47 for Oyo State and 15.11 for Ogun State, with a t-value of 0.650. When further subjected to T-test for equality of mean, the F-value of 0.206, was not significant at any level. This suggests that the level of ICT usage among Cassava value chain actors (CVCAs) in both Oyo and Ogun states does not differ statistically. The lack of significant difference may be attributed to the similarity in ICT usage patterns among the respondents across the two states. Therefore, the null hypothesis, which posits that there is no significant difference in the level of ICT usage across the selected states among the CVCAs, is accepted. This finding corroborates the work of Matthew et al., (2023), who reported similar patterns of ICT adoption and usage in rural agricultural communities across different Nigerian states, noting that infrastructural limitations and socioeconomic factors often result in comparable levels of ICT engagement, irrespective of geographic location. Furthermore, Olatunde et al. (2024) also reported that there was no significant regional variation in ICT usage among farmers in Southwestern Nigeria, further supporting the notion that ICT adoption barriers tend to be uniformly distributed across rural agricultural sectors in the region.

**Table 9: Summary of Independent t – Test showing difference in level of information and communication technology usage among the cassava value chain actors between Oyo and Ogun State.**

| State | F | Mean | Standard deviation | Standard Error Mean |
|---|---|---|---|---|
| Oyo | 187 | 15.47 | 2.620 | 0.192 |
| Ogun | 168 | 15.11 | 2.623 | 0.202 |

| | Levene's test for Equality of variable | | | | | |
|---|---|---|---|---|---|---|
| | F | Sig | t-value | df | p-value | Mean Difference |
| Equal Variable Assumed | 0.206 | 0.650 | 1.264 | 353 | 0.207 | 0.352 |
| Equal variable Assumed | | | 1.264 | 348.879 | 0.207 | 0.352 |

Source: Field Survey, 2023

## CONCLUSION AND RECOMMENDATION

This study examined a comparative analysis of Information and Communication Technology (ICT) usage among cassava value chain actors (CVCAs) in Oyo and Ogun States, Nigeria. The findings reveal that while some ICT tools, such as radio, mobile phones, and social media, are accessible and utilised to some extent, the overall usage of advanced technologies like GPS and aerial drones remains limited. The major constraints affecting the level of ICT usage among CVCAs include erratic power supply, the complexity of ICT tools, high internet costs, inadequate training, and other systemic barriers such as high illiteracy rates and poor infrastructure. Categorisation of CVCAs in both states indicates that the majority have low levels of ICT usage and knowledge, with more than half of respondents falling into the low ICT usage category. Oyo State exhibited lower ICT knowledge levels compared to Ogun State, where knowledge levels were higher. Although the study revealed that there is no significant difference in the overall attitude towards ICT usage between the two states, the level of ICT usage showed notable variation, with Ogun State having relatively higher ICT engagement. It is recommended that stakeholders invest in rural electrification, telecommunication infrastructure, and ICT training programs. Moreover, policy interventions should subsidize ICT tools and services to improve affordability, while localised solutions and awareness campaigns should promote the benefits of ICT in agriculture, ultimately fostering sustainable development.

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