

## Analysis of Communication Channels and Content in the Dissemination of CRIN Hybrid Cocoa Technologies in Southwest Nigeria

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### Abstract

Cocoa is a cornerstone of Nigeria's agricultural economy, yet productivity remains suboptimal despite the availability of high-yielding varieties like the Cocoa Research Institute of Nigeria (CRIN) hybrids. This lag is often attributed to ineffective communication and extension systems. This study investigates the extent and effectiveness of communication channels and content used to disseminate CRIN hybrid cocoa technologies to farmers in Southwest Nigeria. A multistage sampling technique was used to select 130 hybrid cocoa farmers from Ondo and Oyo States, the region's leading cocoa producers. Data were collected via a structured interview schedule and analyzed using descriptive and inferential statistics. Findings reveal a significant reliance on mass media, with radio being the most available (100%) and most utilized (Weighted Mean Score [WMS] = 2.78) channel. Interpersonal channels are also frequently used, while the adoption of digital tools like mobile phones and the internet is moderate. A critical communication gap was identified in the disseminated content; while basic nursery and harvesting practices are frequently communicated, crucial information on post-harvest quality management and advanced agronomy were largely neglected. This imbalance hinders the full adoption of the technology package, limiting potential gains in yield and quality. The study concludes that while a multi-channel environment exists, its effectiveness is undermined by content gaps and the under-utilization of participatory and institutional platforms. It recommends a strategic shift towards an integrated, multi-channel communication approach that emphasizes content completeness, strengthens farmer organizations, and builds the capacity of extension agents to facilitate co-learning and dialogue.

**Keywords:** Agricultural Communication, Hybrid Cocoa, Technology Adoption, Extension Services, Southwest Nigeria, CRIN, Communication Channels.

### 1. Introduction

Cocoa (*Theobroma cacao*) remains one of Nigeria's most important cash crops, contributing significantly to foreign exchange earnings and rural livelihoods, especially in the Southwestern region of the country. For decades, it has been a driver of rural economic growth and a primary source of income for millions of smallholder farmers. However, despite the development of improved varieties such as the Cocoa Research Institute of Nigeria (CRIN) hybrid cocoa, which promises higher yields, early maturity, and disease resistance, national productivity levels remain sub-optimal. This productivity gap is largely attributed to the poor adoption of modern agronomic and post-harvest practices that are integral to optimizing the potential of these hybrids (Ofori-Gyamfi *et al.*, 2021)

The successful dissemination and adoption of such complex agricultural innovations; especially for a highly demanded cash crop (Cocoa) which is the focus of this research, depend heavily on the effectiveness of communication strategies targeted at smallholder farmers. Agricultural information dissemination is a core function of extension services and plays a critical role in promoting technological adoption, enhancing productivity, and improving farmer welfare (Oladosu, Akintonde & Hamed, 2024; Feder, Murgai, & Quizon, 2004). However, the complexity of hybrid cocoa cultivation—which involves new nursery practices, specific input use, quality-conscious post-harvest handling, and navigating modern value chain processes—requires a more structured, comprehensive, and multi-channel communication approach than what is traditionally employed.

Unfortunately, anecdotal evidence and empirical studies suggest that there are significant communication gaps in the dissemination of such technologies in Nigeria (Agwu, Dimelu, & Madukwe, 2008). These gaps often result in uneven knowledge distribution, partial or incorrect adoption of practices, and consequently, low yield outcomes among cocoa farmers. Farmers may adopt one component of the technology package, such as planting the hybrid seedlings, but fail to implement the accompa-

nying practices related to soil management, pest control, or post-harvest processing, thereby failing to realize the full benefits of the innovation.

This study investigates the extent and effectiveness of communication channels and content used to disseminate CRIN hybrid cocoa technologies to farmers in Southwest Nigeria. It seeks to provide empirical evidence on the current state of agricultural communication within the cocoa sub-sector. Specifically, the study examines the types of information being shared, the communication platforms available to farmers, the frequency of their use, and the alignment of these channels and content with farmers' holistic information needs. The goal is to identify areas of strength and critical gaps in the current communication systems. By doing so, this research aims to provide evidence-based recommendations for designing and implementing more inclusive, participatory, and impactful communication strategies for the dissemination of hybrid cocoa and other agricultural innovations in Nigeria and similar contexts.

## 2. Literature Review

### 2.1 Communication and Agricultural Innovation

Communication is the central nervous system of the agricultural innovation process. According to Rogers' (2003) seminal work on the Diffusion of Innovations, the adoption of a new idea is contingent on how information about it is communicated over time among members of a social system. In the context of agricultural extension, communication is not merely about informing farmers; it is a multifaceted process intended to persuade, educate, reinforce, and support sustained behavior change (Van den Ban & Hawkins, 1996). Agricultural communication must be dynamic, two-way, and meticulously tailored to the socio-cultural and economic specificities of the farming audience to be effective. Agricultural innovations like the CRIN hybrid cocoa are complex systems, not single products. They require that farmers understand and correctly implement a suite of new practices, from seed selection and nursery preparation to fertilizer application and precise post-harvest handling. If communication systems fail to adequately cover the entire production cycle or do not address the specific questions and concerns of farmers, the probability of successful adoption is significantly diminished (Kaur, 2022). Effective communication, therefore, serves as the bridge between the development of an innovation and its practical application on the farm.

### 2.2 Communication Channels in Agricultural Extension

Communication channels in agricultural extension have undergone a transformative shift from traditional face-to-face methods to a pluralistic digital paradigm characterized by high-speed, bidirectional information flows (Mulungu *et al.*, 2025). While traditional farm visits and telephone calls remain primary sources of information for many smallholders, modern extension increasingly utilizes mobile-based decision-support tools, such as the Rice Advice app, to deliver personalized, field-specific recommendations that significantly improve productivity and managerial performance (Arouna *et al.*, 2025; Mapiye *et al.*, 2025). Emerging technologies, including Artificial Intelligence (AI) and the Internet of Things (IoT), are now being integrated to facilitate predictive analytics for pest detection and climate-smart farming advice, further enhancing farmer resilience (Fan & Gan, 2025; Morepje *et al.*, 2024). Additionally, social media platforms like Facebook and WhatsApp have emerged as vital tools for reducing social isolation and enabling rapid networking and marketing among farming communities (Ramavhale *et al.*, 2024). Despite this digital expansion, the effectiveness of these channels often depends on being bundled with physical inputs like fertilizer, highlighting that digital communication is most potent when it supplements rather than entirely replaces localized, hands-on support (Arouna *et al.*, 2025).

### 2.3 Challenges in Communicating Complex Hybrid Technologies

Communicating hybrid technologies presents a set of unique challenges that distinguish them from simpler innovations. Unlike conventional farming practices, hybrid innovations often involve complex agronomic principles, specific input requirements (e.g., fertilizers, pesticides), and stringent market-based quality standards that farmers must meet. Research by Agwu *et al.* (2008) and Okunade (2007) indicates that many public extension systems in Nigeria lack the financial resources, technical expertise, and logistical capacity to effectively disseminate this level of detailed information in a sustained and participatory manner.

Moreover, a common pitfall is an imbalance in communication content. Extension messages often focus more on pre-planting or early-stage practices, such as land clearing and sowing, while critical innovations related to the use of improved seedlings, integrated pest

management, or quality-enhancing post-harvest storage are insufficiently communicated. This "content gap" can lead to the partial or improper adoption of a technology package, ultimately resulting in suboptimal returns on the farmer's investment and a sense of disillusionment with the innovation (Christoplos, 2010).

#### **2.4 Towards a Multi-Channel and Participatory Communication Approach**

To overcome these challenges, a growing consensus in the literature advocates for a multi-channel, participatory communication approach. A multi-channel strategy that integrates mass media, interpersonal, institutional, and ICT-based platforms is more likely to yield better outcomes by reinforcing messages and reaching diverse segments of the farming population. Arouna *et al.*, 2025 argue for a fundamental shift from a linear model of "communication for technology transfer" to a more dynamic model of "communication for innovation." This new model emphasizes co-learning, multi-stakeholder dialogue, and the creation of feedback loops between researchers, extension agents, and farmers.

Furthermore, participatory learning platforms, such as Farmer Field Schools (FFS) and Innovation Platforms (IPs), have proven effective in bridging the gap between abstract knowledge and practical application, particularly for complex technologies (Pretty, 1995). These platforms empower farmers to become active participants in the learning process rather than passive recipients of information. In the Nigerian context, operationalizing such approaches requires deliberate policy support, significant investment in building the capacity of extension agents, development of rural ICT infrastructure, and the active engagement of farmer groups in the co-creation and dissemination of agricultural knowledge. Understanding how existing communication content and channels align—or fail to align—with farmers' needs is therefore an essential first step toward improving the adoption of innovations like CRIN hybrid cocoa.

This study adopted the Innovation Diffusion Theory (Rogers, 2003) as its primary framework to analyze the adoption process of CRIN hybrid cocoa. It investigated how the perceived attributes (relative advantage, complexity) of the hybrid influence farmers' progression through the innovation-decision process. Furthermore, it employed the Technology Acceptance Model to operationalize and measure the key perceptual constructs of perceived usefulness and perceived ease of use through a structured survey instrument.

### **3. Methodology**

#### **3.1 Study Area**

The study was conducted in the Southwestern geopolitical zone of Nigeria, which comprises six states: Oyo, Osun, Ondo, Ekiti, Ogun, and Lagos. This region lies within the equatorial rainforest belt and is characterized by high rainfall ranging from 1500mm to 1800mm per annum, a mean annual temperature of 26° C, and consistently high humidity levels. The agro-ecological conditions are highly favorable for the cultivation of tree crops, including cocoa, oil palm, and kola nut. Farming is the predominant occupation in the rural parts of the area, with most farms operating on a semi-commercial basis and relying heavily on rainfall for irrigation.

#### **3.2 Sampling Procedure and Sample Size**

The population for the study consisted of all male and female farmers cultivating CRIN hybrid cocoa varieties across Southwest Nigeria. A multistage sampling technique was employed to select a representative sample of respondents.

**Stage 1:** Ondo and Oyo States were purposively selected from the six states in the zone. This choice was based on their status as the leading cocoa-producing states in Nigeria, ensuring that the sample would be drawn from areas with a high concentration of the target population.

**Stage 2:** From a comprehensive list of registered cocoa farmers (obtained from Cocoa Farmers Association) in both states, a sampling frame of verified hybrid cocoa farmers was established.

**Stage 3:** A proportionate random sampling method was used to select the final respondents. Based on available data indicating a hybrid cocoa farmer population of approximately 1200 in Ondo and 700 in Oyo, a sampling fraction of 0.068% was applied. This resulted in the random selection of 82 farmers from Ondo State and 48 farmers from Oyo State, yielding a total sample size of 130 respondents.

#### **3.3 Data Collection and Instrumentation**

Primary data were collected using a well-structured interview schedule. The research instrument was designed to capture information on socio-economic characteristics, availability and utilization of communication channels, and the specific content of information received regarding hybrid cocoa technologies. The instrument underwent rigorous pre-testing with 25 cocoa farmers in a non-study area (Osun State)

to eliminate ambiguities, ensure clarity of questions, and check the logical flow of the sections.

To ensure validity, the instrument was reviewed by three experts in agricultural extension and rural sociology. Their feedback was incorporated to enhance content and construct validity. Reliability was established using the test-retest method, where the instrument was administered to a small group of farmers twice with a two-week interval. The results were correlated using the Pearson Product Moment Correlation (PPMC) method, which yielded a high coefficient ( $r = 0.88$ ), confirming the instrument's consistency and reliability.

### 3.4 Measurement of Variables

**Dependent Variable:** The primary dependent variable was the *extent of utilization of hybrid cocoa technologies*, which was measured based on the frequency of receiving information on specific practices. This was rated on a three-point ordinal scale: Always (3), Occasionally (2), and Never (1).

#### Independent Variables:

*Socio-economic characteristics:* These included age (in years), sex (categorical: male/female), education level (in years), marital status (categorical), household size (number of persons), and years of farming experience (in years).

*Communication Channels:* Availability of channels was measured with a binary (Yes/No) response. The extent of utilization of available channels was measured on a three-point ordinal scale: Always (3), Occasionally (2), and Never (1).

*Perception and Adoption:* Other variables such as the adoption of hybrid cocoa varieties and perception toward seedlings were measured using binary (Yes/No) and Likert-type scales.

### 3.5 Data Analysis

Data collected from the field were coded and analyzed using the Statistical Package for the Social Sciences (SPSS) version 25.0. Data analysis involved both descriptive and inferential statistics. Descriptive statistics such as frequencies, percentages, means, standard deviation, and Weighted Mean Scores (WMS) were used to summarize the data. The WMS was calculated to rank the frequency of information communication and channel utilization. Inferential statistics, including Pearson Product Moment Correlation (PPMC) and Chi-square, were employed to test for significant relationships between variables, while Kendall's Coefficient of

Concordance was planned for assessing agreement among farmers on ranked items.

## 4. Results and Discussion

This section presents the findings of the study, starting with the socio-economic profile of the respondents, followed by an analysis of the communication content, and the availability and utilization of communication channels for disseminating CRIN hybrid cocoa technologies.

### 4.1 Socio-economic Characteristics of Respondents

Understanding the demographic profile of cocoa farmers is essential for tailoring communication strategies effectively. Table 1 summarizes the key socio-economic characteristics of the respondents.

The results in Table 1 indicate that the majority of hybrid cocoa farmers (60.0%) were in their middle age (40-59 years), with a mean age of 51.5 years. This suggests an aging farmer population, which has implications for labor availability and receptiveness to physically demanding innovations. The sector is heavily male-dominated (86.2%), highlighting a need for gender-sensitive communication approaches to ensure female farmers are not excluded. Educational attainment is varied, with a significant portion having primary (34.6%) or secondary (39.2%) education, but a notable 16.9% having no formal education. This underscores the importance of using communication channels like radio that do not depend on literacy. The farmers are highly experienced, with a mean farming experience of 24.2 years, suggesting they possess deep indigenous knowledge but may also be entrenched in indigenous practices.

### 4.2 Content of Information Communicated on Hybrid Cocoa Utilization

To assess the focus of current communication efforts, farmers were asked about the frequency with which they received information on specific agronomic and post-harvest practices. The findings are presented in Table 2.

The results in Table 2 reveal a clear imbalance in the communication content. The most frequently communicated practice is the *sowing of cocoa beans into black polythene bags* (WMS=2.62), a fundamental nursery practice. This is followed by the *breaking of harvested cocoa pods* (WMS=2.55), a standard post-harvest activity. While information on *tray fermentation* (WMS=2.45) is communicated with moderate frequency, indicating some focus on quality, a critical gap exists at the end of the value chain.

Strikingly, the practice of *bagging dried fermented beans using food-grade hydrocarbon-free jute bags*—a crucial step for preventing contamination and ensuring premium quality for export markets—is the least communicated activity (WMS=0.90). A vast majority of farmers (70.7%) reported *never* receiving information on this best practice. This finding is critical, as it suggests that communication efforts are failing to cover the full technology

**Table 1: Socio-economic Characteristics of Respondents(n=130)**

Variable	Category	Frequency	Percentage(%)
<b>Age(Years)</b>	<40	25	19.2
	40-59	78	60.0
	≥60	27	20.8
	<b>Mean=51.5 years</b>		
<b>Sex</b>	Male	112	86.2
	Female	18	13.8
<b>Education Level</b>	No formal education	22	16.9
	Primary education	45	34.6
	Secondary education	51	39.2
	Tertiary education	12	9.2
<b>Farming Experience</b>	<10 years	15	11.5
	10-29 years	85	65.4
	≥30 years	30	23.1
	<b>Mean=24.2 years</b>		
<b>Household Size</b>	1-4 members	35	26.9
	5-8 members	79	60.8
	>8 members	16	12.3
	<b>Mean=6 members</b>		

Source: Field Survey, 2025

package, particularly the components that determine the final market value of the beans. This aligns with Christoplos (2010), who warned against communication content gaps that hinder the realization of full economic benefits from agricultural innovations. The emphasis seems to be on production, with little attention paid to market-oriented quality assurance.

#### 4.3 Availability of Communication Channels

The effectiveness of communication is partly determined by the range of channels available to farmers. Table 3 shows the distribution of respondents by their access to various communication channels.

The findings indicate a rich, multi-channel communication environment. Radio is universally available(100%), cementing its status as the most pervasive medium for reaching rural farmers. Television access is also extremely high (99.2%). Beyond mass media, there is strong access to both modern and traditional interpersonal channels. A high percentage of farmers have access to mobile phones(85.4%), friends (85.4%), and input marketers(85.4%). Access to institutional sources like public extension agents(83.1%) and innovative farmers(84.6%) is also robust. This diverse availability suggests that a multi-channel strategy is not only desirable but also highly feasible. However, the availability of a channel does not guarantee its use or effectiveness.

**Table 2: Frequency of Communication on Specific Hybrid Cocoa Practice Source: Field Survey, 2025**

Specific Information/ Practice	Always(%)	Occasionally (%)	Never(%)	WMS	Rank
Sowing of cocoa beans into black polythene bags	71.5	21.5	7.0	2.62	1st
Breaking of harvested cocoa pods with clubs/sticks	68.5	25.4	6.1	2.55	2nd
Fermentation of beans(tray method)for 5-7 days	55.4	34.6	10.0	2.45	3rd
Planting cocoa seedlings directly into the soil	48.5	38.5	13.0	2.35	4th
Drying of fermented beans on raised platforms	41.5	42.3	16.2	2.25	5th
Planting of CRIN seedlings(at stake)	40.8	42.3	16.9	2.24	6th
Transportation of mature pods to breaking point	37.7	45.4	16.9	2.20	7th
Harvesting of mature pods with specified tools	33.1	47.7	19.2	2.13	8th
Bagging of dried beans in food-grade jute bags	10.8	18.5	70.7	0.90	9th

Source: Field Survey, 2025

**4.4 Utilization of Communication Channels for Hybrid Cocoa Information**

While many channels are available, their actual use by farmers to seek and receive information on hybrid cocoa varies significantly. Table 4 presents the extent of utilization,

ranked by Weighted Mean Score.

Confirming its universal availability, radio is also the most extensively utilized channel (WMS=2.78),with 78.5% of farmers reporting they "always" use it for agricultural information. This finding strongly supports the conclusions of Ani

(2007) and Adebayo & A desope(2007) on the primacy of radio in Nigeria's rural information ecosystem. Television (WMS=2.56) and newspapers (WMS = 2.52) follow, reinforcing the dominance of mass media.

The utilization of digital channels is moderate but promising. Mobile phones (WMS=2.44) and the internet (WMS=2.42) are ranked 4th and 5th, indicating a significant and growing number of farmers are leveraging these tools. This aligns with Aker's(2011) review on the role of ICTs in agriculture. However, their use still trails behind traditional mass media, likely due to persistent barriers of cost, connectivity, and digital literacy as highlighted by Asenso-Okyere and Mekonnen(2012).

Interpersonal and institutional channels show a concerning trend. While friends (WMS=2.35) and social groups (WMS=2.31) are well-utilized, formal channels like public extension agents (WMS=2.27) and farmers' organizations (WMS=1.96) rank lower. The relatively low utilization of extension agents and the bottom-ranking of farmers' organizations suggest a disconnect between farmers and these for-

mal support structures. This underutilization is a missed opportunity for the kind of participatory, trust-based learning advocated by Röling(1988) and Pretty(1995), which is crucial for complex innovations like hybrid cocoa.

#### 4.5. Discussion

The findings of this study provide a nuanced picture of the communication landscape for CRIN hybrid cocoa in South-west Nigeria. While a diverse array of channels is available, their utilization and the content they convey are misaligned with the holistic needs of farmers seeking to adopt the full technology package. Several key themes emerge from the data.

##### 4.5.1 The Paradox of Channel Richness and Content Poverty

The study reveals a paradox: farmers operate in a channel-rich environment but suffer from content poverty. The universal availability and high utilization of radio (Tables 3&4) present a powerful tool for mass dissemination. However, the information being disseminated is incomplete. The strong emphasis on basic nursery and harvesting practices at the expense

**Table 3: Availability of Communication Channels to Farmers**

Communication Channels	Frequency	Percentage
Radio	130	100.0
Television	129	99.4
Newspaper	90	69.2
Internet	96	76.0
E-mail	67	73.8
Mobile phones	111	85.4
Friends	111	85.4
Neighbours	99	76..0
Innovative Farmers	110	84.6
Public Extension agents	107	83.3
Private Sector extension agents	106	81.5
Field days	99	76.2
Input Marketers	111	85.4
Posters	96	73.9
Flannel Graph	88	67.7
Handbills	94	72.3
Agricultural shows	95	73.1
Farmers Organization	102	78.5
Religious group	94	72.3
Social group	99	76.1

**Source: Field Survey, 2025**

**Table 4:Extent of Utilization of Communication Channels by Farmers**

Communication Channel	Always(%)	Occasionally (%)	Never(%)	WMS*	Rank
Radio	78.5	14.6	6.9	2.78	1st
Television	60.8	34.6	4.6	2.56	2nd
Newspaper	58.5	35.4	6.1	2.52	3rd
Mobile Phone	51.5	41.5	7.0	2.44	4th
Internet	49.2	43.8	7.0	2.42	5th
Email	45.4	47.7	6.9	2.38	6th
Friends	40.0	54.6	5.4	2.35	7th
Field Day/ Demonstration	43.1	48.5	8.4	2.34	8th
Social Groups	40.8	50.0	9.2	2.31	9th
Innovative Farmers	39.2	48.5	12.3	2.27	10th
Public Extension Agent	38.5	50.0	11.5	2.27	10th
Input Marketers	35.4	54.6	10.0	2.25	12th
Private Sector Extension Agent	34.6	54.6	10.8	2.23	13th
Posters/ Handbills/ Flannel Graphs	29.2	50.0	20.8	2.08	14th
Farmers'Organizations	25.4	45.4	29.2	1.96	15th

**Source:Field Survey,2025**

of crucial, value-adding post-harvest techniques like the use of food-grade jute bags (Table 2) is a critical failure of the current communication system. This content gap directly impacts farmer income and the international competitiveness of Nigerian cocoa. It corroborates the arguments of Christoplos(2010) that extension content often fails to address the full spectrum of a value chain, focusing on production while neglecting quality and market linkage aspects. Without comprehensive information, farmers engage in partial adoption, which limits yield and quality improvements and can lead to disillusionment with the very innovation designed to help them.

#### **4.5.2 Dominance of Mass Media and the Untapped Potential of Interpersonal Channels**

The continued dominance of radio and television as the most utilized channels (Table 4) is consistent with decades of research in rural Africa (Bolarin and Ayanlade(2020). Their wide reach and ability to overcome literacy barriers

make them indispensable. However, an over-reliance on these one-way, top-down channels can inhibit the feedback and dialogue necessary for complex learning. Rogers(2003) emphasized that while mass media is effective for creating awareness (the "knowledge" stage of adoption), interpersonal channels are more influential in the "persuasion" and "decision" stages, as they allow for clarification, trust-building, and adaptation to local contexts. This is also similar to the findings of Kigatiira, Mberia, & Ngula(2018) and Oladosu and Yekinni(2008).

The high utilization of informal interpersonal channels like friends and social groups (ranked 7th and 9th)confirms this. Farmers trust their peers. Yet, formal interpersonal channels—public extension agents and especially farmers' organizations—are underutilized. The low ranking of farmers' organizations (WMS=1.96, Rank 15th) is particularly alarming. These organizations should be the epicenters of peer-to-peer learning, collective action, and participatory communication(Pretty,1995).Their underutilization suggests they are either weak, not trusted, or not

actively integrated into the formal extension strategy. This represents a significant missed opportunity to foster the co-learning and dialogue that Leeuwis and Aarts(2011) argue is central to "communication for innovation."

#### 4.5.3 The Emerging but Incomplete Digital Transition

The moderate but significant utilization of mobile phones (WMS=2.44) and the internet (WMS=2.42) signals an ongoing digital transition among cocoa farmers. This is an encouraging trend that aligns with the global vision of ICTs transforming agricultural extension(Aker,2011).Farmers are increasingly using these tools to seek information on their own terms. However, this transition is incomplete. Utilization still lags behind mass media, and the slightly lower rank for internet and email suggests that barriers of digital literacy, cost, and infrastructure remain formidable, as identified by Billah,Rahman,Mahimairaja,Lal,&Naidu(2024) and Asenso-Okyere and Mekonnen(2012).

Furthermore, for digital tools to be truly effective, they must be integrated into a broader communication strategy. Simply making information available online is insufficient. Digital platforms must be designed to be interactive, use local languages, provide content relevant to the entire production cycle, and be supported by on-the-ground extension efforts. The current scenario risks creating a "digital divide" not only between those with and without access but also between those who can effectively navigate digital information and those who cannot.

#### 4.5.4 Implications for the Agricultural Innovation System

The findings of this study have profound implications for the Nigerian cocoa innovation system. The communication gaps identified directly undermine the efforts of research institutions like CRIN. Developing high-potential hybrid varieties is only half the battle; ensuring that the complete knowledge package for their cultivation reaches farmers is the other equally important half. The current communication approach appears fragmented and linear, failing to operate as a cohesive system.

To improve the adoption of CRIN hybrids and future innovations, a systemic shift is required. This involves moving away from a simple "dissemination" mindset to one of "facilitating learning." As proposed by Leeuwis & van den Ban(2004), communication must be reconceptualized as a process of dialogue, negotiation, and co-creation of knowledge among all actors in the innovation system—researchers, extension agents, input dealers, and farmers. The underutilization of public extension agents and farmer organizations points to a weakness in the institutional framework that is meant to support this dialogue. Strengthening these platforms is not just a matter of improving information flow but of building the social infrastructure for innovation.

## 4.6 Conclusion and Recommendations

### 4.6.1 Conclusion

This study set out to assess the communication channels and content involved in the dissemination of CRIN hybrid cocoa technologies in Southwest Nigeria. The findings confirm the existence of a multi-channel communication environment, but its effectiveness is severely hampered by critical shortcomings. Firstly, there is a significant imbalance in communication content, with a strong focus on rudimentary production practices while neglecting crucial, market-oriented post-harvest quality management information. This gap prevents farmers from realizing the full economic potential of hybrid cocoa. Secondly, while mass media channels, particularly radio, are widely available and utilized, there is a worrying underutilization of formal institutional and participatory platforms such as extension agents and farmer organizations. These are the very platforms needed to facilitate the deep learning, trust, and feedback required for the successful adoption of complex technologies. Finally, while digital tools are gaining traction, their potential is not yet fully harnessed due to infrastructural and literacy barriers. In its current state, the communication system promotes awareness but fails to provide the comprehensive, sustained, and interactive support needed for full technology adoption and practice change.

### 4.6.2 Recommendations

Based on these conclusions, the following recommendations are proposed to enhance the effectiveness of agricultural communication for the cocoa sub-sector in Nigeria:

#### For the Cocoa Research Institute of Nigeria (CRIN) and Extension Agencies:

**Develop a Complete Content Package:** Create a holistic information package that covers the *entire* cocoa value chain, from advanced nursery management to market-compliant post-harvest processing and storage. Special emphasis must be placed on closing the identified gap in quality management information (e.g.,fermentation, drying, use of food-grade bags).

**Adopt an Integrated Multi-Channel Strategy:** Strategically combine different channels to reinforce messages. Use radio and TV for creating mass awareness, but follow up with mobile phone messages(SMS/voice notes in local languages), and support these with in-person, practical demonstrations through extension agents and at the community level.

#### For Government and Policymakers:

**Strengthen Farmer Organizations:**Invest in revitalizing and strengthening cocoa farmers'cooperatives and associations.These groups should be formally integrated into the extension system as primary hubs for peer-to-peer learning, demonstration plots, and feedback collection. Provide training in group dynamics, financial management, and communication.

**Invest in Extension Capacity and Rural Infrastructure:** Increase funding for the public extension system to improve the

agent-to-farmer ratio, provide continuous technical training on modern cocoa agronomy, and equip agents with transportation and digital tools. Concurrently, work with telecommunication companies to improve network coverage and data affordability in rural areas.

#### For All Stakeholders (Public and Private Sector):

**Promote Participatory Communication Platforms:** Shift from a top-down information delivery model to a participatory one. Promote and fund platforms like Farmer Field Schools (FFS) and Innovation Platforms where farmers, researchers, extension agents, and buyers can interact, share knowledge, and co-create solutions. This will ensure that communication is a two-way street and that innovations are adapted to local realities.

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