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RADIO AS A TOOL FOR PROMOTING MODERN IRRIGATION FARMING IN KUDAN LOCAL GOVERNMENT AREA OF KADUNA STATE (A CASE OF NOMAN ZAMANI AGRICULTURAL PROGRAMME OF NAERLS ABU ZARIA)

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Abstract

This research study examines the role of radio as a tool for promoting modern irrigation farming in Kaduna State, with a specific focus on the Noman Zamani radio programme of the National Agricultural Extension and Research Liaison Services (NAERLS) at Ahmadu Bello University, Zaria. The objective of this research is to assess the effectiveness of radio in disseminating information and knowledge related to modern irrigation farming practices to farmers in Kaduna State. Diffusion of Innovation Theory will be adopted as the theoretical framework, while Survey Method and Focus Group Discussion (FGD) will be used as the method of data collection, using Questionnaire as the instrument for data collection. Findings of the study will reveal if the Noman Zamani radio programme has been instrumental in disseminating valuable information on modern irrigation farming

techniques, best practices, and government agricultural policies to farmers in Kaduna State. It will also suggest whether the programme has effectively reached a wide audience of farmers and has contributed to increasing their knowledge and adoption of modern irrigation farming methods.

Introduction

The establishment of radio as a mass medium serves multiple purposes: to educate, entertain, inform, and socialize people. Its emphasis largely revolves around creating awareness, surveilling the environment, correlating societal components in responding to their surroundings, and transmitting cultural heritage (McQuail, 1998). Radio also provides individual rewards such as relaxation and tension reduction, helping people cope with real-life problems and enabling societies to avoid breakdown (Mendelson, 1966). Its significant social impact, influencing attitudes and behaviours, is undeniable. Radio's unique attributes include simplicity, extensive reach, immediacy, and the ability to transmit in various local languages (McQuail, 1978; Moemeka, 1981). These features make it a highly credible source of news and enlightenment in most parts of Africa (Okigbo, 1990), surpassing literacy barriers and serving as an effective communication tool in any society (Moemeka, 1981). Radio's personal touch adds urgency to the process of societal change.

Communication, at its core, is the process through which one person (the communicator) elicits responses from another (the communicant) using symbols (Hall, 1967). In radio programming, the communicator is often a group rather than an individual, reaching a diverse audience. This audience varies widely in social, educational, economic, psychological, cultural, ethical, religious, political, physical, and intellectual aspects. Such diversity presents challenges for creating effective radio programs. Addressing these challenges underpins the focus of this work: promoting irrigation farming through NAERLS Agricultural Programs.

Radio is widely recognized as an effective medium for disseminating knowledge and information, thereby contributing to socioeconomic progress, especially in rural areas of developing countries. Agriculture, particularly irrigation, plays a vital role in Nigeria's economy, serving as a primary source of food, income, and employment during the slack periods of rain-fed agriculture. It is a critical sector for socioeconomic growth, especially as rural communities depend on agriculture for their livelihoods.

Rural and community radio stations educate local populations in native languages on key topics such as agriculture. Operated by and for the community, radio involves local people in its programming, fostering active participation in development (Anderson, Sweeney, and Williams, 2003). Today, access to education, information, and communication is crucial for individual and societal development. Information recognition and awareness are among the most efficient drivers of human progress (WSIS, 2005). Scholars contend that among modern communication tools, radio has the greatest potential for effectiveness in the developing world (Oso, 2002). It has been widely acknowledged for its extensive reach, affordability, and accessibility in even the remotest areas.

Radio broadcasting in Nigeria began in 1932 and rapidly developed into a significant social and political force. In 1978, the Federal Radio Corporation of Nigeria (FRCN) was established, with three national broadcasting stations located in Kaduna, Enugu, and Ibadan, while Lagos served as the national headquarters. Local radio stations in the North, such as Nagarta Radio and KMSC (Kano Media Services Corporation), both government- and

privately-owned, have aired programs by extension workers to disseminate agricultural innovations to rural areas.

Notable programs include *Mu Koma Gona* ("Let's Go Back to the Farm"), *Noma Karkara* ("A Variety Program on Agriculture"), and *Noma Yanke Talauci* ("Farming as a Solution to Poverty"). These programs have contributed significantly to the national economy. As radio remains a vital channel for promoting development, this study focuses on its role in advancing modern irrigation farming in Kaduna State through the National Agricultural Extension Research and Liaison Services (NAERLS) program *Noman Zamani*. Broadcast on FRCN Kaduna, *Noman Zamani* is a 30-minute program that addresses various topics, including crop improvement, water conservation, soil management, livestock, fisheries, and beekeeping.

Statement of the Problem

Irrigation farmers in Nigeria face several constraints in their efforts to achieve higher agricultural productivity, including limited access to vital information required for improving yields. Farmers are often excluded from decision-making processes that directly affect their welfare (Arokoyo, 1996). In Kaduna State, smallholder irrigation farmers encounter significant challenges in adopting modern irrigation farming practices. These challenges include insufficient knowledge of water requirements, irrigation scheduling, and skills for maintaining and operating pumps. These deficiencies result in suboptimal yields as crops are frequently over- or under-irrigated, leading to wastage of scarce water resources.

To increase agricultural productivity, irrigation farmers are introduced to the use of modern equipment, pesticides, fertilizers, and effective water application techniques. However, many farmers lack the necessary training and orientation to apply these resources correctly, which often leads to unintended harm to their crops. Additionally, limited access to information on modern irrigation technologies and practices further hinders the adoption of efficient farming methods. Radio plays a crucial role in addressing these challenges by serving as an effective tool for disseminating information to farmers, especially in rural areas. Its ability to cut across literacy barriers makes it particularly suited for reaching diverse audiences. As a broadcast medium, radio has been widely recognized for its potential to drive both rural and urban development programs. It acts as a bridge, connecting development facilitators with beneficiaries.

Despite the proven potential of radio in promoting agricultural information, there is limited research on its impact in advancing modern irrigation farming practices in Kaduna State. Specifically, there is a gap in understanding how programs like *Noman Zamani* of the National Agricultural Extension and Research Liaison Services (NAERLS) at Ahmadu Bello University, Zaria, influence farmers' knowledge, attitudes, and practices regarding modern irrigation farming.

Aim and Objectives of the Study

The overall aim of the study is to ascertain whether or not the objectives of the "Noman Zamani" radio program of NAERLS ABU Zaria have enhanced farmers' knowledge, attitudes, and practices related to modern irrigation farming in Kaduna State. The main objectives are:

1. To assess the level of awareness of modern irrigation farming practices among farmers in Kaduna State, with a focus on the Noman Zamani radio program of NAERLS ABU Zaria.

2. To assess the level of utilization of modern irrigation farming practices among farmers in Kaduna State, with a focus on Noman Zamani radio program of NAERLS ABU Zaria.
3. To identify the information needs of farmers regarding modern irrigation farming.

Research Question

1. What is the level of awareness and utilization of modern irrigation farming practices among farmers in Kaduna state, with focus on Noman Zamani radio program of NAERLS ABU, Zaria?
2. What is the level of utilization of modern irrigation farming practices among farmers in Kaduna state, with focus on Noman Zamani radio program of NAERLS ABU, Zaria?
3. What information do farmers need regarding modern irrigation farming?

LITERATURE REVIEW

Conceptual Clarification

To understand the position of this study, relevant concepts such as radio, agriculture, radio programs and irrigation farming were reviewed as follows:

Radio

The word "Radio" originates from a type of electromagnetic radiation discovered by German physicist Heinrich Hertz (Christopher, 2020). Radio was first used for communication around 1887. Earlier, the prefix "radio" was used to indicate radiant energy. Radio can be categorized into four main types: public, private, community, campus, and international radio. Throughout the early to late 20th century, radio emerged as a global phenomenon in mass mobilization, conveying information and ideas to remote, isolated locations (Dominic, 1999). Myers (2008) highlights that radio has proven itself as a developmental tool, facilitating a more participatory and horizontal form of communication. Moreover, the rediscovery of radio, particularly through new ICT platforms (e.g., online radio), has bridged the digital divide, reaching hard-to-reach rural audiences (Myers, 2008). Its ability to immediately transcend geographical boundaries is one of its unique features (Fulano, 2016).

During the colonial period, particularly after World War II, the Nigerian government recognized the effectiveness of radio in mobilizing people and invested substantial resources in developing radio broadcasting (Oso, 2002). Its importance was further reinforced during the civil war, where radio served as a key propaganda tool in mobilizing and informing the population for reconciliation, rehabilitation, and reconstruction efforts (Osunkunle, 2008). Important government messages and policy-related information continue to be disseminated through the radio. Thus, Radio is multifaceted; it conveys messages, mobilises groups and organizations, fosters social dialogue, supports community capacity-building, raises awareness on local issues, and amplifies voices in higher political levels.

Furthermore, the growth of radio stations in recent decades reflects increased investment in these information technologies (Chapman, Blench, Gordana, and Zakariah, 2003). Across West Africa and sub-Saharan Africa, radio remains the most important mass communication medium, surpassing newspapers and television (Daloz & Verrier-Frechette, 2000; Girard, 2003). Research by Balam and Norman (2012) highlights that community radio remains the most accessible medium for rural communities, capable of reaching them within a short period. Despite its limitations, such as its audio-only nature, surveys

consistently show that radio remains the dominant mass medium in Africa, with the widest geographical reach and highest audience compared to television, newspapers, and other ICT platforms (Myers, 2008). Ezekiel and Peter (2014) add that radio, television, and mobile phones are more affordable than internet, satellite, and cable television, which tend to be more expensive.

Agriculture

The term agriculture comes from two Latin words, *Agrum* and *Cultura* (Etymologeek, 2020). The Latin *Agrum* means field, farm, land or estate. While *Cultura* means growing or cultivation. Crops-review (2020) agriculture is the art and science of growing plants and other crops and raising animals for food, other human needs or economic gain. Rimando (2004) sees agriculture as the systematic raising of useful plants and livestock under the management of man. In Abellanosa and Pava (1987), he defines agriculture as the growing of both plants and animals for human needs. And, Rubenstein (2003) defines agriculture as the deliberate effort to modify a portion of Earth's surface through the cultivation of crops and the raising of livestock for sustenance or economic gain.

The agricultural sector is formally associated with the production of both food and cash crops and the rearing of animals. Today, agriculture has expanded beyond farming crops to encompass forestry, dairy, fruit cultivation, poultry, beekeeping, processing, marketing, and distribution. In Nigeria, the Agricultural sector is one of the oldest professions (Adekoya and Badiru, 2012). It is an important sector because it is the source of food and other raw materials for industries (Wulystan, 2018). This sector is the chief thrust of national survival as it provides jobs for about 65% of the population (Windapo and Afolayan, 2013).

According to Ikyembe (2015), it is a critical sector in any country's economy, even in the developed countries of Europe and America. Anthony (2007) notes that "about 75-80% of Nigerians who live in rural areas are still engaged in agriculture and food production, which is a vanguard of the government's rural transformation initiative to empower rural farmers. According to the Food and Agriculture Organization (2003), it remains the primary source of income for around 2.5 billion people in the developing world. Also, this sector has been rated a major essential part of any country's development (Daneji, 2011). It plays an important role in both poverty reduction and economic growth (Gurmesa, Felekech and Taha, 2011).

Agricultural Radio Broadcast

Agricultural radio broadcasting, as defined by Haider (2014), involves radio programs aimed at disseminating agricultural information to boost farmers' productivity in both developed and underdeveloped countries. These programs are developed by subject matter experts and communicators to provide technical agricultural knowledge to farming communities (Farm Radio International, 2014). Agricultural radio broadcasting focuses on educational and enlightening agricultural programs for the masses (Anosike, 2018). Additionally, it is a structured provision of information, education, and entertainment to diverse audiences through radio or television (Folarin, cited in Olalekan, Onjefu, and Mikaila, 2013).

One of the unique aspects of agricultural radio programs is their ability to educate farmers on improving agricultural production for self-sufficiency. These programs provide information on various agricultural practices such as site selection, land preparation, seed selection, fertilizer application, weed control, crop protection, and marketing, often

delivered in indigenous languages (Ogundumifitini, 2006). Agricultural radio broadcasting has been recognized as the most effective medium for agricultural development, particularly in the developing sector. Being the most affordable and accessible mass medium, it reaches farmers regardless of their financial status, offering a platform for the dissemination of timely and relevant information.

Radio programs are often designed collaboratively by stakeholders, including farmers, agricultural companies, government bodies, and NGOs. These programs are aired through radio stations to raise awareness and educate the target audience. Some programs are co-sponsored by state ministries of agriculture, focusing on various stages of farming such as planting, weeding, water management, harvesting, and marketing.

Inadequate agricultural radio programs can hinder agricultural development if not strategically designed, ensuring full stakeholder participation (farmers, research institutions, agricultural-related companies), appropriate language use, the format of the programs (discussions, interviews, dramas, phone-ins), suitable airing times, and feedback mechanisms. For example, the National Agricultural Extension and Research Liaison Services (NAERLS) actively engages farmers through agricultural innovations. NAERLS has produced over 60 research titles, 30 radio programs with 12,876 broadcasts on 24 national and state radio stations in seven languages (English, Hausa, Yoruba, Igbo, Fulani, Nupe, Pidgin English), and 28 television titles with 5,500 broadcasts in five languages (English, Hausa, Yoruba, Igbo, Pidgin English) (NAERLS, 2007).

Examples of agricultural radio programs include Boluyo on Lagos FM, Agbe afoko soro on Ogun State Broadcasting Corporation, Ise agbe on Ondo State Radiovision Corporation, Agbeloba on Broadcasting Corporation of Oyo State, and Noman Zamani of FRCN Kaduna State.

Irrigation Farming

Irrigation is a vital agricultural practice that involves the artificial application of water to land to assist in the growth of crops. This method ensures a stable supply of water, compensating for irregular rainfall and arid climatic conditions. Modern irrigation systems, including drip, sprinkler, and surface irrigation, are designed to maximize water efficiency and crop yields while minimizing waste. Drip irrigation, for example, delivers water directly to the root zones of plants, reducing evaporation and ensuring optimal use of resources. By integrating irrigation techniques with crop management practices, farmers can enhance productivity, improve food security, and sustain agricultural landscapes (Smith et al., 2020).

The evolution of irrigation has been instrumental in transforming agriculture from subsistence to commercial scales. Historically, civilizations relied on basic flood irrigation, harnessing river systems like the Nile, Indus, and Tigris-Euphrates to support farming. Today, technological advancements allow for precision irrigation, which employs sensors and automated systems to monitor soil moisture and deliver water accordingly. These innovations not only conserve water but also mitigate the impacts of climate variability on farming. Moreover, irrigation enables the cultivation of high-value crops in regions with limited natural water resources, contributing significantly to economic growth and rural development (Jones & Brown, 2018).

Agricultural radio broadcast in Nigeria (1963-date): A Review

Nigeria has witnessed several agricultural radio programmes broadcast right from the first republic down to the present fourth republic. Radio agricultural broadcasts are said to date

back to 1963 (Ariyo, mentioned in Adekoya and Badiru, 2012). The first agricultural radio broadcast was the program *Agbe Mase* (I will take to farming) on the Western Nigeria Broadcasting Corporation (Ariyo cited in Adekoya and Badiru, 2012).

By 1964, the *National Accelerated Food Production Programmes* (NAFPP) was established by both the federal and state governments to accelerate the production of grains: Maize, rice, guinea corn, millet, wheat, cassava and cowpeas (Daneji, 2011). In the year 1972, the *Agricultural Development Programmes* (ADPs) were established. The idea of Agricultural Development Programmes is an offshoot of the concept of integrated agricultural and rural development. It started in the Northern Nigerian towns of Gombe and Gusau with two pilot projects assisted by the World Bank. Then in 1976, *Operation Feed the Nation* was launched to address the problems of rising food crisis, rural-urban migration and escalating food import bills. According to Daneji (2011), the OFN programme attempted to mobilize the general public to participate actively in agricultural production and ensure self-sufficiency in food production. In 1977, the *River Basin Development Authority* (RBDA) was also created. The country's abundant water resources and its potential for increasing agricultural production prompted the establishment of the River Basin Development Authority (RBDA). By 1979, the *Green Revolution* programme (GR) replaced the Operation Feed the Nation of the federal military government by the civilian government. The GR was an attempt to bring about radical changes in Nigerian agricultural production and eliminate inherited food problems of successive governments (Daneji, 2011). Then came the *Directorate of Food, Road and Rural Infrastructure (*DFRRI*)* in 1987. DFRRI was established by President Babangida's administration. This programme was partly established due to the deplorable conditions of rural areas, enormous size and dwindling economic resources to address the problem of rural underdevelopment in Nigeria. And, in 1992, the *National Agricultural Land Development Authority* (NALDA) programme was aimed at moderating the problems of low utilization of abundant farm land, thereby increasing the food production level of farmers through expansion of farmers' farm lands. Others were the: *School-to-Land Programmes* in 1980, *Agricultural Credit Guarantee Scheme* (1980), *the National Agricultural and Cooperative Bank* of 1981, the *Accelerated Development Area Project* in 1982, the *Multi-State Agricultural Development Projects* of 1986, the *National Agricultural Insurance Scheme* in 1987, *Nigerian Agricultural Cooperatives and Rural Development Bank, (*NAICRDB*)* of 2000*; Sassakawa Global* 2000*; National Agricultural Development Fund, NADF* of 2002*; Commodity Marketing and Development Companies,* (CMDC) of 2003 (Chinaka, Okoye, Akinpelu, Chinaka and Asumugha, 2011; Daneji, 2011).

In the north, before 1972, there were radio and television programmes in Hausa. Many of these radio programmes were on field crops, livestock, fisheries and home economies (Omenesa and Shittu*,* 2005). The first of such programmes for disseminating information on improved farming practices was *Noma Yanke Talauchi*.

At the dawn of 2000, the decade witnessed diverse bottom-up extension approaches. Its Projects show a clear shift from the technology transfer/adoption projects of the earlier decades to bottom-up approaches. Onagwa (2016) explains that: Farmer groups or cooperatives identify and prioritize their needs and problems and then suggest solutions to the problems. Then, assisted by the extension agents of the programme, they embark on the community development activities that would solve their own identified problems, alleviate their poverty and empower them sustainably (p. 20).

Some of the programmes in the 2000s include the *Poverty Alleviation Programme* in 2000, the *Root and Tuber Expansion Programme* of 2001, the *National Special Programme for Food Security* in 2003, the *National Economic Empowerment and Development Strategy* of 2004, and the *Community-Based Agricultural and Rural Development Programme* in 2007. By 2015, the government initiated several agricultural programmes, including the *Anchor Borrower* Programme, *Growth Enhancement Scheme*, and *Farmer Monie*.

According to Musa (2004), there was also the introduction of *university-based rural and agricultural extension development* projects in Nigeria. The initial general aim was to extend research-based knowledge, practices and technologies to communities in the vicinities of university campuses, as well as develop a model of rural development for large-scale application. Alongside the introduction of the university-based extension systems was the mandatory establishment of three adopted villages by each agricultural research institution at the beginning of 2000.

As time passes by, radio programmes become more regional due to language barriers. Some of the agricultural programmes were aired in Hausa, Igbo, Yoruba and others. For Instance, in the South West, Radio programmes broadcast for Yoruba speakers were *Oba Lokele,* Ere Agbe *Agbelere and Farmers' Forum* and *liana fun Agbe* (Yahaya, Kareem, and Adamson, 2018). In the South East, *Onye Oru Ubi* and *Country Farmer* (Pidgin English) were broadcast for Igbo listeners (Omenesa and Shittu*,* 2005). On the other hand, *Noma Karkara offers* a variety of programmes on agriculture, covering many areas of agricultural development in the country (NAERLs, 2002). NK deals with interviewing farmers, subject matter specialists, extension officers, local industrialists, marketers and policy makers. *Mu Koma Gona* is a programme that encourages everyone to go into farming. The MKG programme also deals with the dissemination of technical information on production, processing, marketing and utilization of farm produce and products.

Also, is the programme *Agric Panorama*. This is an English agricultural programme dealing with the dissemination of improved agricultural practices. The topics treated under this programme are:

- Tie-dye Batik.
- Preparation of soybean Kunu.
- Preparation of Zobo drink.
- Clothing renovation techniques.
- Bio Gas Technology.
- Ginger Production.
- Groundnut production.
- Groundnut harvesting, processing and marketing.
- Control of internal and external parasites of livestock.
- Control of ticks in livestock.
- Worms and deworming of animals.
- Preparation of shinkafa kunu.
- Ostrich rearing.
- The use of groundnut oil extraction equipment.
- Duck meat utilization.
- Groundnut rehabilitation.
- Preparation of Zobo jam

Other Hausa radio Agric programs *are Daga Kasuwanninmu, Noma Tushen Arziki, Ina manoma, Noman Zamani, Attajirin rani, Let's go farming, Noma da Kiwo, Don makiyaya a ruga, Kebi Ma Panu, Kiwace- Kiwace* (Ango *et al, 2013;* NAERLs, 2002; Ikyembe, 2015).

Noman Zamani

Noman Zamani is one of the few agricultural programmes aired on the Kaduna State Media Corporation, Niger State Radio, among others. It is a 30-minute programme that discusses issues related to fisheries, livestock, feeds, crops, irrigation, storage of farm produce, etc., to boost agricultural production in the country. According to NAERLs (2002), the *Noman Zamani* programme primarily focuses on disseminating technical information to all farmers, regardless of their gender. The topics treated in the agricultural radio program *Noman Zamani* are:

- Noma da sarrafa auduga (The production and utilization of cotton).
- Chuttukan Dabbobi (Livestock diseases and their control).
- Cutukan Dabbobi da Matsalar Kwari (Pests and Disease Livestock and their Control).
- Hanyoyin Anfani da Magungunan Aikin gona (Safe use of Pesticides)
- Girbi da Adana Hatsi (Grain crops harvesting and storage).
- Matakan ci da adana da sayar da Auduga (Cotton harvesting and marketing)
- Dabarun adana wake (Cowpea storage).
- Hanyoyin sarrafa waken soya (Soybean processing for utilization)
- Gyaran fili don aikin gona (Land preparation for planting).
- Yin takin Gargajiya (How to make Farm Yard Manure (Compost making)
- Formation of Fadama Farmers Association
- Dabarun Noman Gona (Improved Millet Production Practices).
- Matakan Noman Masara (Improved Maize Production practices).
- Dabarun Noman Dawa (Improved G/Com production practices).
- Noma da sa taki. (Weeding and fertilizer application)
- Cututtukan Dabbobi da damina (Animal deworming practices).
- Kula da Shanun Noma (Care of work bulls).
- Farfado da noman gyada (Groundnut Production Rehabilitation).
- Noman waken soya (soybeans production)
- lnganta noman rani (Dry season farming).
- Noman Albasa da rani (Dry season Onion Production techniques.
- Noman Tumatir da rani (Dry season tomato production).
- Kula da dabbobi da rani (Dry season livestock management).
- Baje fiJi don noman rani (Dry season farming land preparation).
- Rabon ruwa don noman rani (Water distribution techniques for dry season farming).
- Canjin shuka (Crop rotation practices) and
- Hanyoyin cinikin auduga (Cotton marketing)

Awareness of Modern Irrigation Farming Practices

Awareness of modern irrigation farming practices is crucial for addressing global challenges such as food security, water scarcity, and climate change. Modern irrigation systems, including drip, sprinkler, and center pivot systems, offer significant improvements over traditional irrigation methods like furrow or flood irrigation. These advanced techniques enhance water-use efficiency, reduce wastage, and ensure precise application tailored to the specific needs of crops. For example, drip irrigation delivers water directly to the root zones of plants, reducing evaporation and preventing waterlogging. Similarly,

sprinkler systems distribute water uniformly, mimicking rainfall and ensuring consistent crop hydration (Smith, 2020). The growing demand for agricultural sustainability underscores the need for raising awareness about these innovative practices among farming communities.

Awareness campaigns must also address cultural and behavioural aspects to ensure acceptance among farming communities. Tailored communication strategies, emphasizing the long-term economic and environmental benefits of modern irrigation, can drive behaviour change. For instance, training workshops, farmer field schools, and knowledge-sharing platforms can help farmers understand and embrace these systems. Furthermore, local success stories and peer-to-peer learning initiatives can reinforce the impact of awareness programs, motivating farmers to adopt these innovative methods. By fostering greater awareness and adoption of modern irrigation practices, the agricultural sector can achieve higher productivity, resilience, and sustainability.

Utilization of Modern Irrigation Farming Practices

The utilization of modern irrigation farming practices plays a pivotal role in enhancing agricultural efficiency, boosting crop yields, and ensuring sustainable water resource management. Modern irrigation methods such as drip irrigation, sprinkler systems, and center pivot irrigation are designed to address the inefficiencies of traditional methods like flood or furrow irrigation. These techniques enable precise water delivery to crops, minimizing water loss due to evaporation, runoff, and seepage. For instance, drip irrigation systems deliver water directly to the root zones of plants, ensuring optimal hydration with minimal wastage, which is particularly beneficial in arid and semi-arid regions (Smith, 2020).

Despite their benefits, the utilization of these systems is often limited by factors such as high initial costs, lack of technical expertise, and inadequate access to resources. To address these challenges, governments, agricultural organizations, and private stakeholders need to provide financial incentives, training programs, and infrastructure development. Strategies like subsidies for irrigation equipment, access to low-interest loans, and farmer education initiatives can make modern irrigation technologies more accessible and practical for smallholder farmers. Increased utilization of these practices not only improves agricultural productivity but also contributes to water conservation and environmental sustainability, paving the way for a more resilient agricultural sector.

Theoretical Framework

Development Media Theory

The development media theory seems appropriate for this study. The tenets of knowledge Gap theory have been applied to a wide range of studies on social sciences, namely: knowledge, practice, and behavioural change (Brosius and Peter, 2017; Asemah and Yaroson, 2008; Anaeto, Onabajo and Osifeso, 2012).

Development media theory presupposes that media should serve as a facilitator of development goals among developing countries (Ridwan, Suleiman and Fatonji, 2014). According to the development media theory, the media should be used to serve the general good of the nation. The media are seen as agents of economic development and social change in any community. Thus, the theory suggests that the media should be used to complement the government's efforts by carrying out programmes that will lead to positive behavioural change among the people. The development media theory, according to

Okunna (1999), accepts that economic development and nation-building should take precedence over some freedom of the press and of individuals. In addition, the theory advocates that the mass media should assist the government in the task of nation-building and that the government should control the media as well as journalists to achieve this goal.

Folarin (2002) pointed out the major tenets of the theory as originally propounded by Dennis McQuail. These include the need for the media to accept and carry out positive development tasks in line with nationally established policy, and the media's freedom to be open to economic priorities in line with nationally established policy. He also noted that the media should prioritize in their content the national culture and languages.

The theory is relevant to the study because it emphasizes using radio agricultural programmes to develop the society. It is considered here on the assumption that the programme Noman Zamani disseminates modern agricultural programmes (as the name implies) to irrigation farmers in Kudan LGA, Kaduna state. Thus, the media need to be employed to bring about social, political and economic development in Kudan LGA, Kaduna.

Methodology

The research design for this study will be cross-sectional. The research method is a quantitative survey method. The research design was considered appropriate for this study because quantitative data allows the use of a large sample, numeracy, and generalization, whereas qualitative data elicits deeper insight into the audience (Wotanis, 2011; Rahman, 2016; Maxwell, 2012).

Population of the Study

The population of this study is farmers' groups of adopted villages in the Kudan local government area of Kaduna state. Thus, the population of farmers in Kudan LGA is 136,992.

Sample Size

A sample is defined as a small group of elements or subjects drawn through a definite procedure from the specified population. In other words, it is the actual number of participants in a study population that is objectively selected for the study. Moreover, samples are done because the entire population cannot be studied. Since the whole population could not be studied due to time, financial, logistics, and other constraints, it became necessary to sample, that is, draw a sample that would represent the entire population. The sample for the study is 384 (calculator, 2024).

Sampling Technique

A purposive sampling technique will be employed to select the study's sample from the primary population. Purposive sampling involves selecting farmers (Participants, subjects, or elements) for specific characteristics or qualities and eliminating those who fail to meet these criteria (Wimmer and Dominick, 2011). This sampling technique allows researchers to gain in-depth insights by intentionally selecting participants who are best suited to provide rich, meaningful data (Palinkas et al., 2015). Unlike random sampling, purposive sampling ensures that only those individuals who meet predefined criteria are included, which enhances the relevance and quality of the findings (Etikan, Musa, & Alkassim, 2016).

Method of Data Collection

Given that the study will adopt a mixed method, the data for this study will consist of two types of data: primary and secondary data. The primary data (raw data) will be collected through the aid of a questionnaire and in-depth interviews. The secondary data will be

sourced from the following secondary sources: journals, books, newspapers, magazines, projects, workshops, etc.

Description of Presentation and Analysis

The method of data analysis will be simple descriptive analysis for the quantitative data. The data will be gathered and presented in tables, and each variable will be calculated using percentage scores with the support of the Statistical Package for Social Sciences (SPSS).

Data Presentation

A total of 384 questionnaires were distributed among the participants. At the point of collection, only a total of 361 were returned completed.

Section A: *level of awareness and utilization of modern irrigation farming practices among farmers in Kaduna state, with focus on Noman Zamani radio program of NAERLS ABU, Zaria.*

Table 1: How familiar are you with modern irrigation farming practices?

Categories	Frequency	Percentage
Very Familiar	120	33.2%
Somewhat Familiar	150	41%
Not Familiar	91	25.2%
Total	361	100%

Table 1 illustrates the respondents' familiarity with modern irrigation farming practices. The largest group, representing 41% of the total sample, is somewhat familiar with modern irrigation techniques, totalling 150 respondents. A significant portion, 33.2% (120 respondents), reported being very familiar, indicating a high level of awareness among a substantial number of farmers. However, 25.2% (91 respondents) indicated that they are not familiar with modern irrigation farming practices, highlighting the need for targeted awareness and education programs to bridge the knowledge gap. The total sample size is 361 respondents, reflecting a diverse level of familiarity within the group.

Table 2: What are the primary sources of information about modern irrigation practices available to you?

Categories	Frequency	Percentage
Radio Programs	180	49.9%
Agricultural Extension Services	90	24%
Social media/Internet	60	16.6%
Peers and Community	13	8.6%
Total	361	100%

Table 2 highlights the primary sources of information about modern irrigation practices available to respondents. Radio programs are the most commonly cited source, with 180 respondents (49.9%) relying on this medium, showcasing its pivotal role in disseminating agricultural knowledge. Agricultural extension services are the second most significant source, used by 90 respondents (24%). Social media and the internet account for 60 respondents (16.6%), reflecting the growing importance of digital platforms in reaching farmers. A smaller proportion, 13 respondents (8.6%), depend on

peers and the community as their primary source. The total sample of 361 respondents underscores the diverse channels through which information on modern irrigation is accessed, with radio emerging as the dominant medium.

Table 3: How frequently do you listen to the Noman Zamani radio program?

Categories	Frequency	Percentage
Frequently	200	55.4%
Occasionally	90	24%
Rarely	30	8.3%
Never	41	11.4%
Total	361	100%

Table 3 shows the frequency with which respondents listen to the Noman Zamani radio program. The majority of respondents, 200 individuals (55.4%), reported listening to the program frequently, indicating its strong reach and relevance among farmers. 90 respondents (24%) listen to it occasionally, while a smaller proportion, 30 respondents (8.3%), listen rarely. Additionally, 41 respondents (11.4%) indicated they never listen to the program, suggesting a need for alternative communication channels to engage this group. The total sample size is 361 respondents, with over half being regular listeners, emphasizing the program's significance as a source of agricultural information.

Table 4: What role does the program play in increasing your awareness of modern irrigation practices?

Categories	Frequency	Percentage
Major role	190	52.6%
Minor role	120	33.2%
No role	51	14.1%
Total	361	100%

Table 4 shows the role of the Noman Zamani radio program in increasing respondents' awareness of modern irrigation practices. A significant majority, 190 respondents (52.6%), indicated that the program plays a major role in enhancing their awareness of modern irrigation methods. 120 respondents (33.2%) noted that the program plays a minor role, while a smaller portion, 51 respondents (14.1%), stated that the program plays no role in raising awareness. The total sample size of 361 respondents highlights the program's significant impact on educating farmers about modern irrigation practices.

Section B: *Level utilization of modern irrigation farming practices among farmers in Kaduna state, with focus on Noman Zamani radio program of NAERLS ABU, Zaria.*

Table 5: Have you adopted any modern irrigation practices for your farm?

Categories	Frequency	Percentage
Yes	216	59.8%
No	145	40.2%
Total	361	100%

Table 5 shows whether respondents have adopted any modern irrigation practices for their farms. 59.8% (216 respondents) reported that they have adopted modern irrigation methods, while 40.2% (145 respondents) indicated that they have not yet adopted these practices. The total sample size is 361 respondents, reflecting a relatively high level of adoption of modern irrigation techniques among farmers.

Table 6: What are the benefits you have observed from using modern irrigation practices?

Categories	Frequency	Percentage
Increased crop yield	175	48.5%
Water conservation	100	27.7%
Reduced labor	50	13.9%
Improved crop quality	36	9.9%
Total	361	100%

Table 6 presents the benefits respondents have observed from using modern irrigation practices. The most common benefit reported is increased crop yield, with 175 respondents (48.5%) indicating this. Water conservation follows closely with 100 respondents (27.7%). Reduced labour was noted by 50 respondents (13.9%), while improved crop quality was mentioned by 36 respondents (9.9%). The total sample size is 361 respondents, highlighting the various advantages modern irrigation methods provide in enhancing agricultural productivity and efficiency.

Table 7: How frequently do you use modern irrigation methods for your farming activities?

Categories	Frequency	Percentage
Daily	120	33.2%
Weekly	95	26.3%
Occasionally	80	22.2%
Rarely	41	11.4%
Never	25	6.9%
Total	361	100%

Table 7 shows how frequently respondents use modern irrigation methods for their farming activities. The majority of respondents, 120 (33.2%), use modern irrigation daily, highlighting the consistent adoption of these practices. 95 respondents (26.3%) use them weekly, while 80 respondents (22.2%) use them occasionally. 41 respondents (11.4%) reported using modern irrigation methods rarely, and 25 respondents (6.9%) never use them. The total sample size is 361 respondents, reflecting a significant portion of farmers actively integrating modern irrigation into their farming routines.

Table 8: How frequently do you use modern irrigation methods for your farming activities?

Categories	Frequency	Percentage
Less than 1 year	70	19.4%
1–3 years	120	33.2%
4–6 years	95	26.3%
More than 6 years	76	21%
Total	361	100%

Table 8 presents the frequency with which respondents have been using modern irrigation methods for their farming activities over different periods. 33.2% (120 respondents) have been using modern irrigation methods for 1 to 3 years, making it the most common duration. 26.3% (95 respondents) have been using them for 4 to 6 years, while 21% (76 respondents) have used them for more than 6 years. 19.4% (70 respondents) reported using modern irrigation methods for less than 1 year. The total sample size is 361 respondents, indicating a steady adoption of modern irrigation techniques over varying durations.

Section C: *Information does farmers need regarding modern irrigation farming?*

Table 9: What type of modern irrigation systems would you like more information about?

Categories	Frequency	Percentage
Sprinkler systems	95	26.3%
Center pivot irrigation	50	13.9%
Smart irrigation systems	80	22.2%
Other	26	7.2%
Total	361	100%

Table 9 shows the types of modern irrigation systems that respondents would like more information about. 26.3% (95 respondents) expressed interest in sprinkler systems, making it the most sought-after system. 22.2% (80 respondents) are interested in smart irrigation systems, while 13.9% (50 respondents) would like to learn more about center pivot irrigation. Additionally, 7.2% (26 respondents) specified other types of irrigation systems. The total sample size of 361 respondents indicates a strong demand for more knowledge across various modern irrigation methods.

Table 10: What specific aspects of modern irrigation do you need more information about?

Categories	Frequency	Percentage
Installation and setup	110	30.5%
Maintenance and troubleshooting	85	23.5%
Cost and financial assistance programs	100	27.7%
Suitability for crops and soil types	50	13.9%
Environmental impact	16	4.4%
Total	361	100%

Table 10 shows the specific aspects of modern irrigation that respondents need more information about. 30.5% (110 respondents) indicated a need for installation and setup guidance, making it the most requested area. 27.7% (100 respondents) seek more information on cost and financial assistance programs, followed by 23.5% (85 respondents) looking for more on maintenance and troubleshooting. 13.9% (50 respondents) require information on suitability for crops and soil types, and 4.4% (16 respondents) are interested in the environmental impact of modern irrigation practices. The total sample size is 361 respondents, reflecting a diverse range of informational needs across different aspects of modern irrigation.

Table 11: What is your preferred medium for receiving information on modern irrigation?

Categories	Frequency	Percentage
Radio programs	140	38.8%
Field demonstrations	110	30.5%
Printed materials	50	13.9%
Mobile apps	45	12.5%
Other	16	4.4%
Total	361	100%

Table 11 shows the preferred media for receiving information on modern irrigation practices. 38.8% (140 respondents) prefer radio programs, making it the most popular choice. 30.5% (110 respondents) opt for field demonstrations, while 13.9% (50 respondents) prefer printed materials. 12.5% (45 respondents) use mobile apps, and 4.4% (16 respondents) selected other mediums. The total sample size is 361 respondents, highlighting the diverse preferences among farmers for accessing modern irrigation information through various channels.

Table 12: Require training or technical assistance in adopting modern irrigation practices?

Categories	Frequency	Percentage
Yes	260	72%
No	101	28%
Total	361	100%

Table 12 shows whether respondents require training or technical assistance in adopting modern irrigation practices. 72% (260 respondents) indicated that they need training or technical assistance, reflecting a high demand for support in learning and implementing modern irrigation techniques. 28% (101 respondents) stated that they do not require such assistance. The total sample size is 361 respondents, indicating a clear need for additional training and technical support in modern irrigation farming.

Table 13: Financial support programs for purchasing modern irrigation systems?

Categories	Frequency	Percentage
Yes, I am fully aware	80	22.2%
Yes, but I need more details	150	41.6%

No, I am not aware	131	36.2%
Total	361	100%

Table 13 shows respondents' awareness of financial support programs for purchasing modern irrigation systems. 22.2% (80 respondents) are fully aware of such programs, while 41.6% (150 respondents) are aware but need more details. 36.2% (131 respondents) are not aware of any financial support programs. The total sample size is 361 respondents, highlighting a significant portion of farmers requiring more information on available financial assistance to adopt modern irrigation practices.

4.5 Discussion of Findings

Research Questions 1: *What is the level of awareness and utilization of modern irrigation farming practices among farmers in Kaduna state, with focus on Noman Zamani radio program of NAERLS ABU, Zaria?*

The summaries of Tables 1, 2, 3, and 4 highlight the importance of the Noman Zamani radio program and other information sources in raising awareness and providing knowledge about modern irrigation practices. Table 5 reveals varying levels of familiarity with modern irrigation, with a significant proportion somewhat familiar (41%) and a notable group very familiar (33.2%). However, 25.2% remain unfamiliar, indicating a need for increased awareness efforts. Table 6 emphasizes the role of radio programs as the primary source of information, with 49.9% relying on this medium. Agricultural extension services and social media also play important roles, though radio remains dominant. Table 3 shows that a majority of respondents (55.4%) frequently listen to the Noman Zamani program, underscoring its strong influence, while Table 8 highlights the program's significant role in enhancing awareness, with over half of the respondents (52.6%) recognizing its major contribution. Overall, these findings reflect the importance of targeted communication and diverse channels in bridging the knowledge gap in modern irrigation practices.

Thus, results show that a significant portion of respondents are aware of the Noman Zamani program, and many find it relevant to their needs. The findings align with the postulations of the Development Media Theory, which emphasizes the role of media in facilitating information dissemination, raising awareness, and fostering agricultural knowledge among farmers through accessible and impactful channels like radio programs. Also, Sanga and Agunga (2018) found that the majority of farmers who used radio and television as sources of agricultural knowledge preferred to listen to and watch agricultural programmes, respectively, in the evenings and at night.

Research question 2*: What is the level of utilization of modern irrigation farming practices among farmers in Kaduna state, with focus on Noman Zamani radio program of NAERLS ABU, Zaria?*

The provided tables highlight the adoption and utilization of modern irrigation practices among respondents. Table 5 shows that 59.8% of respondents have adopted modern irrigation methods, with 40.2% still not using them. Table 6 outlines the benefits observed, with increased crop yield (48.5%) and water conservation (27.7%) being the most common advantages. Table 7 reveals that 33.2% of respondents use modern irrigation daily, with significant adoption across various usage frequencies. Table 8 presents the duration of use, showing that 33.2% have used modern irrigation for 1 to 3 years, while consistent adoption is observed across different time periods. Overall, modern irrigation practices are widely embraced, with varying levels of usage and benefits noted among farmers.

The findings align with the Development Media Theory, which emphasizes the role of media and communication in promoting awareness, knowledge, and the adoption of innovative practices such as modern irrigation methods. The tables highlight that a significant portion of farmers are actively adopting modern irrigation techniques, utilizing various durations and methods, reflecting how media and information dissemination through platforms like radio programs contribute to the widespread adoption of these practices. Research question 3*: What information does farmers need regarding modern irrigation farming?*

The summarized tables reflect various aspects of farmers' engagement with modern irrigation practices. Table 9 highlights a strong demand for information on different types of modern irrigation systems, with sprinkler systems (26.3%) and smart irrigation systems (22.2%) being the most sought-after. Table 10 emphasizes specific areas where farmers need more guidance, such as installation (30.5%), cost and financial support (27.7%), and maintenance (23.5%). Similarly, Table 16 reveals a high need for training and technical assistance, with 72% of respondents expressing a desire for support in adopting modern irrigation practices. Table 11 shows that farmers prefer radio programs (38.8%) as their primary medium for accessing modern irrigation information, followed by field demonstrations and printed materials. Lastly, Table 12 highlights a significant gap in awareness of financial support programs, with 41.6% requiring more details on such initiatives. Together, these findings underscore the diverse informational needs and preferences for enhancing the adoption and implementation of modern irrigation systems among farmers.

The findings from the summarized tables align with the principles of the Development Media Theory, which focuses on the role of communication in promoting knowledge, awareness, and the adoption of modern agricultural practices. According to this theory, the media plays a crucial role in bridging knowledge gaps and facilitating the dissemination of information to enhance farmers' understanding and implementation of innovative methods such as modern irrigation.

Tables 9, 10, 11, and 12 show that farmers seek more information and support for adopting modern irrigation practices. Specifically, the demand for various types of irrigation systems, the need for guidance on installation, financial assistance, and technical training, and preferences for accessible mediums like radio programs and field demonstrations reflect how media and communication channels contribute to agricultural development. By providing targeted support and information, these efforts help farmers improve their practices, leading to more sustainable and productive farming.

Conclusion

The findings from the research questions demonstrate the significant role of the Noman Zamani radio program and other communication channels in increasing awareness and utilization of modern irrigation practices among farmers in Kaduna State. The results align with the Development Media Theory, which highlights the importance of media in facilitating knowledge dissemination, raising awareness, and supporting the adoption of innovative agricultural methods. Farmers have shown high levels of familiarity with modern irrigation practices and are actively adopting these methods, although gaps in information and technical support still exist. Overall, targeted communication through platforms like radio programs plays a crucial role in bridging knowledge gaps and fostering sustainable agricultural development.

Recommendations

Based on the findings and the alignment with the Development Media Theory, the following recommendations are proposed:

1. Enhance Media Outreach: Strengthen the role of radio programs like Noman Zamani by providing more frequent and targeted content on modern irrigation practices. This can help increase awareness and understanding among farmers who rely heavily on accessible communication channels.
2. Expand Training and Technical Support: Develop more robust training and technical assistance programs to support farmers in adopting modern irrigation methods. This could include hands-on workshops, field demonstrations, and personalized support tailored to farmers' specific needs.
3. Improve Access to Financial Support: Increase awareness of available financial assistance programs for modern irrigation systems, ensuring farmers are well-informed about the resources available to them.
4. Diverse Information Channels: Utilize a variety of information channels beyond radio programs, such as social media, agricultural extension services, and mobile apps, to cater to the diverse information needs of farmers.
5. Focus on Knowledge Gaps: Address specific areas where farmers have limited knowledge, such as system installation, maintenance, and financial management, by providing more detailed and accessible information.

By addressing these recommendations, farmers can be better equipped to adopt and benefit from modern irrigation practices, leading to increased productivity and sustainability in agricultural practices.

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