



**THROUGH THE LENSES OF ACTOR-NETWORK APPROACH - THE DIGITAL TRANSFORMATION OF NIGERIAN AGRICULTURAL RESEARCH OUTREACH CENTRE**

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**ABSTRACT**

Agriculture's goal in Nigeria is to provide supportive resources to sustain mankind, environmental resilience against climate change, nation's economy, irrespective of geographical location or social status with a total land of 911,000 sq. km, and about (80%) is available for various agricultural purposes including arable land, permanent crops, pastures, and irrigated land. However, to achieve the set goal in the past, a series of agricultural information dissemination strategies such as radio, television, and print media were employed to raise adequate revenue for the agricultural sector and increase the food supply in Nigeria via Agricultural Research Outreach Centre in the National Agricultural Extension and Research Liaison Services adopted villages/ schools. The study was premised on a mixed method for counterfactuals to facilitate novelties. Despite all the efforts, these strategies did not yield the desired goal, thus, the digital transformation of the agricultural sector particularly to strengthen the extension system in Nigeria. This manner, demands the integration of the agricultural sector into the digital hub to create synergy among the stakeholders, source requisite agricultural information, and hybridize the means of disseminating agricultural information via participatory learning and action platforms. Also, create a Digital Participatory Learning and Action for Agricultural Extension (Di-PLA4AE). Thus, the paper trail on the concept of AROC, ICTs - Digitization, x-rayed the Actor-Network Approach (ANA) by Callon, its application, and the implications of digitization for agricultural activities to stakeholders and criticism in the context. More so, mirror the implications of the Di-PLA4AE and conclusion.

**Keywords:** Approach, Digital, Transformation, Research and Outreach

**INTRODUCTION**

Theories are lenses that cut through reality and allow the highlighting of certain aspects while leaving others' perspectives of the field of analysis. According to Callon (2001), Actor-Network Approach (ANA) is a sociological approach developed in an attempt to provide analytical tools for explaining the very process by which society is constantly reconfigured. ANA gives an explanation of society in the making and attempts to "open the black box" of science and technology and plays a key part. This perception was not biased toward the ANA, the importance of ANA is undeniable for rejuvenating the scientific view considering the overlap between human and non-human, or nature and social (Couldry, 2008).

At this point, it is appropriate to focus on ANA contributions to the area of digital transformation of the Agricultural Research Outreach Centre (AROC) in Nigeria as the hub of agriculture information sources on contemporary agricultural practices by stakeholders. More than focusing on multiple actors, ANA allows a renewed look at subject-object relations, thereby, terminating the hierarchy between humans and non-humans and blurring the boundaries between the two through the exchange of characteristics between them. Moreover, it is interesting to note



that there is a sense of “inclusive or collective learning” as a background that establishes exchanges during agricultural activities (Braga and Suarez, 2018). ANA thus, emphasizes collective and mundane participatory learning that overcomes cognitive, economic, and cultural connections with its emphasis on the socio-materiality aspects of the consumption scene and its surroundings’ resilience. Participatory Learning and Action (PLA) is part of a family of methods that enable local people to analyze, share and enhance their knowledge of life and situation, and to plan, prioritize, act, monitor, and evaluate. The methods evolved during the 1980s and 1990s to find ways to facilitate participation by communities in international development strategies, rather than rely on top-down projects designed and led by outsiders (Chambers, 1997).

Agriculture’s goal in Nigeria is to provide supportive resources to build and sustain mankind, environmental resilience against climate change, and the nation’s economy, irrespective of geographical location or social status in society (FAO, 2016; Ogen, 2007). However, agricultural practices in Nigeria are predominantly peasantry with less information and communication technological (ICT) drives, as the traditional system of cultivation is the dominant practice. Though the role of new ICTs in development and so-called digital divides were discussed and debated in the 1980s and 1990s, the accelerated diffusion of digital technologies around the turn of the century greatly increased the possibilities for global information sharing and accelerated agricultural development (Castells, 1999). According to Heeks *et al.* (2003), ICTs and digitization can be viewed as tools to satisfy the change needs like “needs which improve access to innovations, increase productivity and economic opportunities available therein. Contemporary agricultural practices and extension systems in developed countries such as Israel, Britain, Germany, China, Japan, and America, are hybridized and hi-tech driven. The hybrid media system is understood as a ‘transitions’ the concept stresses the interconnection and interdependence of all relevant media and avoids dichotomous thinking about the media field such as radio, newspapers, television, websites, social network sites, User-generated platforms, blogs, and search engines are all part of that digital transformation (Chadwick, 2017).

However, the use of ICTs and digitization in Nigeria is low, more than 80% of the practitioners are smallholder farmers and rural domiciles, and this number of farmers’ accounts for 90% of Nigeria’s agricultural produce (Onagwa, 2016). Moreover, to achieve the set goal in the past, a series of agricultural information dissemination strategies such as radio, television, and print media were employed to raise adequate revenue for the agricultural sector and increase the food supply in Nigeria via Agricultural Resource Outreach Centre (AROC) in the NAERLS adopted villages/ schools. As a result, the full participation of some agricultural stakeholders particularly the agricultural extension system in Nigeria was not secure, the farmers have limited access to requisite information and the digital tools for climate-smart agricultural practices available in the global space (Afolabi, 2010). Nigerian rural farmers as in any other developing country are yet to move from their peasantry to commercial farming level, as the food production growth trend is not increasing either totally with or surpassing the population growth rate (National Bureau of Statistics [NBS], 2021). Thus, the paper trail on the concept of AROC, ICTs, and Digitization, x-rayed the Actor-Network Approach (ANA) by Callon, its application, and the implications to stakeholders’ utilization of the SMTs for agricultural extension, and the ANA criticisms in the context. More so, mirror the implications of the Digital Participatory Learning and Action for Agricultural Extension (Di-PLA4AE) and conclusion.



## **MATERIALS AND METHODS OF THE RESEARCH**

The data collected were from a primary source research observation through an elicitation diary data method. Also, data for the AROC in the NAERLS-adopted villages/ schools were through focus group discussions, key informant interviews, and direct observation of the phenomena across the three Agro-Ecological Zones of Nigeria, namely: Kaduna State (North); Niger State (North-Central); and Abia State (East); randomly and purposively selected the location of the NAERLS-adopted villages/ schools for the article.

### **AGRICULTURAL RESEARCH OUTREACH CENTRE (AROC)**

Agriculture belongs dominantly to the global rural demography with a total land of 911,000 sq. km and about (80%) of this is available for various agricultural purposes including arable land, permanent crops, pastures, and irrigated land (FAO, 2016). Atala (2009), has it that the goal is to provide resources and food to sustain mankind irrespective of geographical location or social class. To achieve the set goal, a series of agricultural strategies were employed to raise revenue and adequate food supply in the country, thru the intensification of innovative agrarian programs using varied extension approaches such as AROC. The NAERLS Agricultural Resource Outreach Centre (AROC) is to disseminate proven agricultural technologies and innovations from all the National Agricultural Research Institutions (NARIs) to adopted villages farmers and schools across the six agroecological zones in Nigeria. This is undertaken by many strategic outreach programs on technology transfer and adoption through process research, extension publications, and electronic media packages such as radio, television, and print media. AROC also plays a pivotal role in the coordination of agricultural events like agricultural shows, field days, and field and hygiene training to help improve farmers farming practices to increase productivity and livelihood (Agricultural Research Council of Nigeria (ARC�), 2014. Retrieved 11<sup>th</sup> August, 2022 from <https://dailytrust.com/arcn-sets-up-outreach-centres>). The AROC is under the Adopted Villages Programme of the NAERLS and with little or no support from the Agricultural Research Council of Nigeria, the Federal Ministry of Agriculture and Rural Development (FMARD), and the West African Productivity Programme in Nigeria (WAAP-Nigeria) and any financial support from the World Bank (NAERLS, 2006).

### **Concept of ICT - Digital Transformation of Nigerian AROC**

Information and Communication Technology (ICT) - Digital transformation is a technological advance believed to have revolutionized the agricultural practices of one-to-many viz-a-viz. According to Gateway (2010), this has enabled the synchronicity of messages, thus enhancing communication efficiency and effectiveness of information delivery via electronic signals. Digital transformation is one of the impacts of globalization that has helped in changing how several activities in varied sectors particularly the practices in the agriculture sector are done for development purposes all over the world. According to Adejo and Haruna (2013); Ezech (2013, A), many ICT facilities exist such as smart radio, smart television, and smart telephones are sourced and obtainable personally from the open market yet, the most readily available ICT facilities are not accessed, owned, and utilized by most farmers. According to the Food and Agriculture Organization of the United Nations, the basic ICTs for connectivity like phones are now more affordable and accessible to people in rural areas (Trendov *et al.*, 2019). ICTs, enhance the performance of any communication interfaces on which virtually every sector now relies for their activities in the contemporary. More so, competitiveness within the global interface could not have been made possible without the interconnectedness of digital institutions and people. Moreover, developing countries that are largely agrarian have continued to strive to find relevance



at the international frontiers with the power of the ICTs. ICT is perceived as the power and major driver of the world's economics.

The ICT's- digital transformation capability is fundamental to the participation and engagement of farmers in the modern information society. The World Summit on the Information Society in 2013 held in Geneva, Switzerland (WSIS) also recognized the importance and principles of ICTs and encourages public-private partnerships to maximize the use of ICTs as an instrument to improve production and facilitate cooperation and effective use of collected scientific information and data for a specific purpose (WSIS, 2013). According to Adio *et al.* (2016); Suchiradipta and Saravanan (2016); Ashwani (2020), the purpose of encouraging farmers to utilize ICT facilities is to help farmers change their process of sourcing agricultural information for efficient agricultural practices, thereby, generating more income for poverty reduction and better level of living. However, the levels of the utilization of these digital facilities as the means of access to agricultural information among farmers in developing countries were found to be generally low in farming activities.

In this vein, the Nigerian government set up the National ICT for Development Strategic Action Plan Committee, to develop a new ICT policy for development as the digitization action plan/roadmap for the nation's AROC. Henceforth, ensure that this agency provides the needed services for a sustainable intervention and environment for creating affordability and accessibility to digital gadgets and training. Additionally, concise ICT policies and the understanding of the practical uses, and digitization could be integrated with the rural developmental needs of the communities nationwide as well as cut across all sectors and create more efficacies in the agricultural sector for increased productivity (National Information Technology Development Agency NITDA, 2011).

### **ACTOR NETWORK APPROACH**

The theory emerges as an object-oriented ontology whose main purpose is to redefine sociology through the 'sociology of associations, one of ANA's main goals is to discover new institutions, procedures, and concepts capable of collecting data and regrouping social relations through qualitative research (Latour, 2012; Martin and Shouten, 2014). ANA is a highly influential account within the sociology of science that seeks to explain social order, not through an essentialized notion of "the social" but, through the networks of connections among human agents, technologies, and objects (Couldry, 2008).

Indeed, there is an increase in the use of the ANA in various fields of social sciences research. ANA attempts to "open the black box" of science and technology by tracing the complex relationships that exist between governments, technologies, knowledge, texts, money, and people. Importantly, ANA challenges some common epistemological convictions by rejecting essential subject/object, culture/nature, or society/technology distinctions. Entities, either people or technologies are not fixed and do not have significance in and of themselves. Instead, both achieve significance through relations with other entities. Moreover, it can be used to explore either the way of or understanding how research has an impact on people and it emerged over the past twenty years as a major conceptual force in social science (Latour, 2012).

### **Actor Network Approach Implications of the Digitization**

Actor-Network Approach emerges as an object-oriented ontology whose main purpose is to redefine sociology through the "sociology of associations". The goal of ANA is to:

- i. discover new institutions,
- ii. change procedures,





- iii. concepts capable of collecting data, and
- iv. regrouping social relations through qualitative research (Adapted from Latour, 2012; Martin and Shouten, 2014).

The rationale herein is to solve the puzzle, the theory challenges some common epistemological convictions by rejecting essential subject/object, culture/nature, or society/technology distinctions. Entities, either people or technologies are not fixed and do not have significance in and of themselves. As a substitute, both achieve significance through relations with other entities. More so, than focusing on multiple actors, ANT critically allows a renewed look at subject-object relations thereby, terminating the hierarchy between humans and non-humans and blurring the boundaries between the two through the exchange of their characteristics (Martin and Shouten, 2014).

**Actor Network Approach emphasizes/ Criticism:**

1. collective and mundane learning that overcomes cognitive, economic, and cultural connections with its emphasis on the socio-materiality aspects of the consumption scene and its surroundings.
2. the need to adjust the focus on group formation given the sense of living in the same collective ecosystem.
3. delineating and forming groups, though, is challenging for the researcher in the field of new media study.

ANA implies that it promotes an approach that emerges from the field avoiding previous theoretical frameworks to explain certain social realities. In this sense, it stimulates different researchers to abdicate from the explanations offered by theories produced in another field of study (Latour, 2012; Martin and Shouten, 2014). ANA helps equalize dialogues of researchers around the world by insisting on the exhaustive investigation of the actors and their direct connections. Moreover, the theory adds value with its findings of what is singular as well as what is universal in research reality. In context with ANA, things are more than mere tools, backgrounds, or stages on which human social actors play their main roles. No actor is more important than another and this perspective is what shapes several heterogeneous networks that aggregate, divide/ destabilize, re-organize and/ or disintegrate. In consonance, Couldry, 2008; Hoffman and Novak, 2016) are of the view that ANA is appropriate when studying new realities of technology-driven development in contexts such as the SMTs4AE. For example, the cases of devices that interact with each other and in certain cases, create consequences that are not obvious to human apprehension and understanding. ANA offers resources to capture not only the implicit or unconscious layer of human knowledge but, also the material agency of things that promote relationships with far-reaching consequences. For example, the cases of devices that interact with each other and in certain cases, create consequences that are not obvious to human apprehension and understanding (Couldry, 2008; Braga and Suarez, 2018).

Despite the significance and variances, brought into human and technological relation research by ANA. It receives much criticism for its political positioning in the face of science, technology, and above all traditional sociology. However, the criticisms addressed in this theoretical approach are a healthy exercise in recognizing its limitations. Moreover, in proposing emphasis on the descriptions built by actants rather than on the explanations based on previous theories or the researcher's interpretations, Latour disputes the (modus operandi) method (how something operates or works or mode of operating) of scientific knowledge production (Braga and Suarez, 2018). A common criticism leveled at ANA is that, it is deceptive and to an extent does not intend



to build a new theory. According to Latour (2011) as cited in Couldry (2008) to avoid the twin pitfalls of sociologism and technologists; we are never faced with objects or social relations; we are faced with chains which are associations of humans and non-humans. He further posited that; nobody can agree as seen as neither a social relation by itself nor a technical relation. Ingold, an anthropologist interested in natural studies and advocating causes of material culture criticizes Latour, because, Latour fails to make a distinction between object and thing (Ingold, 2012). He emphasizes that “in place of the opposition between subjects and objects, confined to their respective domains of society and nature Latour (2004) as cited in Braga and Suarez (2018). Borgerson (2014) agrees to argue that, ANA incites a complexity of network effects that would invalidate the function of human perception. While, Ingold (2012) and Borgerson (2014), oppose the materialist perspective proposed by Latour, considering that, it creates relativity between the universe of human choices and values.

### **DIGITAL PARTICIPATORY LEARNING AND ACTION FOR AGRICULTURAL EXTENSION**

Digital Participatory Learning and Action Agricultural Extension (Di-PLA4AE) proponent is based on the innovation suggested by the Action-Network Approach in the context that is needed to adjust the focus on group formation given the sense of living in the same collective formation. Since the task of controlling delineating and forming groups is challenging in instituting digital transformation in the agriculture sector. The Di-PLA4AE approach usually is concerned with mapping communities and the profiles of the people, characterizing, or social aggregates from specific criteria such as segmentation. In general, this procedure if adopted as a starting point in AROC will guide against delineation and bridge the digital divide. Although, it demands the integration of the AROC into the digital hub (AROC hub) to create synergy among the stakeholders to source requisite agricultural information in a more participatory manner, and hybridize the means of related agricultural-info dissemination. Thus, creating a Digital Participatory Learning and Action for Agricultural Extension platform where people will participate voluntarily, take active steps, be open to new ideas and ways of thinking and doing things, open to dialogue, and exchange ideas in a non-judgmental atmosphere (Adapted from Chambers, 1997). According to Chambers (1997), the principles of PLA enable local people to analyze, share and enhance their knowledge of life and situation, and to plan, prioritize, act, monitor, and evaluate efforts to find ways to develop strategies, rather than rely on top-down projects designed and led by outsiders. ANA offers tools to overcome explanations based on demographic aspects for instance age, gender, and social status that have long been unable to account for the complexity of utilization phenomena (Braga and Suarez, 2018). Thus, the very practice of digitization for agriculture has revealed the fragility of this previous process of group forming. For example, in the cases of produce and methods adopted by agricultural stakeholders, particularly the farmers that are inconsistent with the innovations. Rather than using random explanations based on internal or aspirational motivations, ANA offers the opportunity to think of these surprising relationships in a more complex way including the incentives and barriers found in the networks and the contours of materiality (Couldry, 2008).

The features of ANA make it possible to recognize the importance of digital participatory learning and action processes and skill arrangements in the context of agricultural networking. Moreover, it is interesting to note that there is a sense of “inclusive or collective learning” as a background that establishes exchanges during agricultural activities. ANA thus, emphasizes collective and mundane learning that overcomes cognitive, economic, and cultural connections



with its emphasis on the socio-materiality aspects of the consumption scene and its surroundings (Braga and Suarez, 2018).

## CONCLUSION AND RECOMMENDATIONS

Globally, COVID-19 has had an overwhelmingly negative impact on the agricultural sector as in Nigeria. As a result, the full participation of agricultural stakeholders in the learning and implementation process was not secure due to the digital divide. Although the acceleration of digital transformation has been a little slow and existentially a threat to most sectors due to financial constraints in Nigeria. The survey conducted by the United Nations Development Programme (UNDP) in 2020, found that businesses in Nigeria, which were able to quickly transition to digital fared better and in some cases, experienced growth, in contrast to those who were unable to do so (UNDP, 2020). However, Nigeria has played a dynamic role in the global space regarding the digitization of agriculture, the provision of high-definition-network Internet service and digital gadgets to farmers, and acknowledging climate-smart agriculture. However, visibly, NAERLS does not take seriously acquiring or making available more of the digital tools for the AROC in the adopted villages/ schools. Many ICTs-Digital policies in Nigeria are non-inclusive, because digital tools are often deemed personal applications mostly acquired by large-scale farmers, and do not take into consideration the general participation of stakeholders as an important issue in the agricultural sector in the production process. Meanwhile, the task of controlling delineation and forming groups to participate voluntarily and take steps actively in AROC is challenging as well as instituting digital transformation in the agriculture sector. We believe the Di-PLA4AE will create more synergy among agricultural stakeholders based on the innovation as suggested by Actor Network Approach in the context, AROC needed to adjust the focus on group formation given the sense of living in the same collective formation for environmental resilience.

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