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Exploring Socio-Cultural Factors Impacting Agriculture in Information System Acceptance

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EXPLORING SOCIO-CULTURAL FACTORS IMPACTING AGRICULTURE INFORMATION SYSTEM ACCEPTANCE IN RURAL NIGERIA AFTER TERRORISM

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Abstract

Agricultural Information Systems (AIS) can provide several advantages for farmers in taking informed decisions regarding land, labour, livestock, and crop planning. However, there are not many empirical studies in examining the adoption of these AIS by farmers, especially in developing countries in Africa. This study adopts an unconventional socio-cultural approach in examining if the farmers think the use of AIS improves economic production, at the individual level of analysis. The purpose of this qualitative ethnographic study is to explore the socio-cultural success factors that improve employee acceptance of agriculture information system at some rural Nigerian farms. The results of this study could be disseminated to all rural Nigerian farm owners so they will know the critical success factors that improve employee acceptance of agriculture information system thereby increasing wheat production to reduce their national agricultural crisis. Another positive social change implication of the results of this on-going research would be to inspire researchers to replicate and extend this study in regions experiencing agricultural crises.

Keywords: Agriculture Information System, Farm Management, Crop Planning, Continuance Intention, Satisfaction, Expectancy Confirmation Theory.

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1.0 Introduction

Despite overcoming Boko Haram terrorist insurgency, Nigeria is in an agricultural production crisis, importing significantly more wheat, rice and sugar at unfavourable currency exchange rates than what they could grow (Fawole & Ozkan, 2018). According to the Nigeria Ministry of Agriculture and Rural Development (SenseAgric, 2018), their essential bulk wheat import to export ratio is growing at an unsustainable 11% annual rate. A further complicating factor is that many male farmers were lost due to terrorism not to mention that some women were captured and mistreated (Lamboll et al., 2018). The loss of men and women in the farming industry has had an unknown impact on agricultural production and software acceptance.

The general business problem is that wheat production is too low to sustain the national demand because Nigerian farm owners do not know the critical success

factors that improve employee acceptance of agriculture information system. A secondary problem may be a lack of resources due to Boko Haram terrorism (Lamboll et al., 2018). The specific business problem is that some rural Nigerian farm owners do not know the socio-cultural success factors that improve employee acceptance of agriculture information system in the context of a post-terrorism phase.

Agriculture is an essential contributor for economic growth, but emerging African nations significantly lag developed countries in effective food production and the outlook worsening (Michalscheck et al., 2018). According to Aker (2011), one of the reasons for this underperformance is the lack of adoption of advanced land use planning software, including agricultural information systems (AIS). Food supply insecurity and lack of self-sufficiency are significant issues for African countries. African countries met 89% of food production requirements in the 1960s, but this has gradually dropped to 75% by 2000 because of political, economic and environmental issues (Adeyemo, 2013). Many developing countries are now focusing on improving agricultural productivity through the use of information technology hardware and application software (Pinet & Papajorgji, 2014). The problem is we do not know if farmers in Western African countries would adopt and continue to use AIS.

We had previously conducted some quantitative empirical research to investigate the problem of agriculture information system acceptance preliminarily. We sampled rural farm employees in Nigeria. We used structural equation modelling to validate a software acceptance construct, and we found that several of the factors were significant. However, we were not able to explain what makes some farms more successful as compared to others, concerning improved agricultural production in the post-terrorism phase.

2.0 Literature Review

The theoretical reasoning of this research is anchored on Expectation-Confirmation Theory (ECT) which specifies how the regular usage of information technology could be sustained (Bhattacherjee, 2001). In the context of consumer behaviour, the study of intention to purchase or use a product can be explained using factors representing satisfaction, perceived usefulness, prior product/service experience, as well as other

variables including gender, socioeconomic status, education, age, and culture (Strang, 2018). However, when evaluating information technology, there is controversy in the literature about the predictors of customer behaviour, but satisfaction, perceived usefulness, and prior product/service experience are generally significant (Strang, 2018). In the case of AIS, users may recognize the technology to be useful, but it is unknown if they will continue to use this technology.

Successful implementation of agricultural information systems involves both access and usage of these information systems (Lu et al., 2015). Access to these information systems can be achieved by ensuring that adequate infrastructure is in place to ensure that farmers in rural areas have access to the technology. The usage of these information systems is harder to achieve as this process involves ensuring that the farmers understand and have adequate knowledge to use these information systems (Lu et al., 2015). Some of the factors that influence the adoption and usage of AIS in Sub-Saharan African countries, such as Nigeria and Ghana was the relatively higher levels of illiteracy because of which some of the stakeholders using these systems could not comprehend these systems (Chalemba, 2016). Considering the lower levels of education among a significant proportion of farmers in developing countries in Africa and Asia, achieving higher levels of usage of AIS is quite complex.

Several government and donor-funded projects have allowed implementation of AIS in several Sub-Saharan African countries, but the continued availability of these systems would imply that these systems need to be economically sustainable (Chalemba, 2016). The continual adoption and use of these systems would depend on the ability of farmers to maintain these information systems after the initial phase of funding by donor agencies is completed. According to Yong et al. (2015), the perceived usefulness of an information system also depends on the subject matter or technical content awareness of farmers, including their social situation, and infrastructure. Understanding the information needs of farmers is complicated, especially in an information-dependent sector like agriculture where farmers face new and slightly complicated problems on a regular basis.

By keeping the application of agricultural chemicals and fertilizers to an insignificant level, operating AIS improves cost-competitiveness (Husemann & Novkovic, 2014).

AIS also provides an avenue where the environmental impact is controlled, thereby, making it more sustainable as well as increasing the yield of harvest (Husemann & Novkovic, 2014). Accurate records management enhances accountability (Fountas et al., 2015). Specific data from farm management information, together with yield, quality, and production records collectively provide safety and security of food can also be put to use as valuable agricultural information systems. The use of the data by multiple farmers to achieve efficiency reduces production cost. Hence, the adoption and use of AIS can offer several advantages to Nigerian farmers.

The analysis of AIS in a specific farming system can facilitate the identification of essential components and structure of the system (Demiryurek, 2010). According to Demiryurek (2010), the different sources of information used by various components in the system, the understanding of how successfully the system works, and how to improve system performance can be understood through this process. Customer satisfaction is referred to as the state in which the expectations regarding the features of products are met while dissatisfaction is said to occur where a customer's hopes are dashed or expectations not met (Marić & Arsovski, 2010). Consumer satisfaction is a key determinant to the adoption and use of any information system. According to Oliver (1980), the two constructs that have a significant impact on consumer satisfaction are the performance-specific expectation and expectancy disconfirmation. Oliver (1980) explained that consumer satisfaction has a direct influence on attitude change and purchase intention. If a customer does not feel satisfied with a system or product, they are likely to not continue to purchase it or use it.

When studying attitudes about an existing system, researchers are interested in knowing the user intention to continue to use the system rather than the behavioural intention to purchase it, as would be the case in a marketing study. In this study, we operationalize continued use behavioural intent as continuance intention to use (CI). Therefore, the level of continued intention to use (CI) will be related and in the same direction as the level of customer satisfaction (CS) with an AIS system. Customers with low satisfaction of a product should have a low continued intent to use it and vice versa.

Motefakker (2016) further states that customer complaints are indicators of low customer satisfaction, but the absence of complaints does not indicate a high level of customer satisfaction (S). Customer satisfaction for a product or system is an overall end state view that a user forms as a result of using the system. Customer satisfaction is related to other factors that take place earlier in the process. A third factor, the confirmation experience (C), can explain the degree of assertiveness and confidence that the product performance meets specific performance requirements, which can later lead to customer satisfaction or continued use intention. The level of confirmation experience is closely associated with the continual usage of the system.

According to Motefakker (2016), the level of customer satisfaction (S) is related to confirmation experience (C) concerning how well the product meets specific performance requirements. According to Davis (1989), perceived usefulness (PU) refers to the extent to which a person believes that using a given modern technology will enhance her/his job performance. In Davis' (1989) framework, PU is hypothesized to be the direct predictor of behavioural intention to use the technology of interest as well as with satisfaction (Pollard, 2015). Studies have shown that PU is positively associated with and influences continuance-intention (CI) when considering any new technology (Pollard, 2015). The level of confirmation and perceived usefulness are positively connected which indicates that the use of AIS will further enhance agricultural efficiency and sustainability (Hamid, Zaidi, Abu Bakar, & Abdullah, 2016). Therefore, confirmation experience (C) will be positively related to and influenced by perceived usefulness (PU).

3.0 Research Approach and Methods

The researchers held a constructivist ideology, focused on collecting in-depth information to understand the meaning of the socio-cultural factors that impact acceptance of agriculture information system by Nigerian farmers. Given this ideology, qualitative data will be collected, including demographic indicators along with open-ended questions to draw out the conceptualized factors. Since there were few studies of AIS use in Nigeria, and it was not practical to construct an experiment, a purposive sample was used.

The purpose of this qualitative ethnographic study is to explore the socio-cultural success factors that improve employee acceptance of agriculture information system at some rural Nigerian farms. The target population for this study will be employees at three rural farms located in the agricultural-intensive plateau region of northern Nigeria. The central research question for this study is given below:

RQ: What are the socio-cultural success factors that improve employee acceptance of agriculture information system at some rural Nigerian farms?

3.1 Instrumentation

We will use structured open-ended interview questions to guide data collection, as listed below.

1. What agriculture information system do you use?
2. Why do you use or do not use agriculture information system?
3. Tell me about the positive and negative factors that impact your acceptance of agriculture information system?
4. How has terrorism impacted you use of software for agriculture production?
5. Could you tell me your non-confidential demographic factors: gender, marriage, languages, age group, experience level, education level?
6. Is there anything else you want to add concerning your acceptance of agriculture information system?
7. Is there any documentation I could have concerning your acceptance of agriculture information system?

The choice of ethnography rather than a case study method was made because we want to explore the socio-cultural factors. We already know that some farms are more successful than others. However, we do not know if the post-terrorism phase as impacted the social culture of rural farmers, or if other social factors are impacting the choice and application of software for crop planning. Case studies are the preferred strategy researchers employ when asking how or what questions (Yin, 2009). Case studies are ideal for identifying operational links among events over time (Yin, 2009). Ethnographic studies are unique in that they include fieldwork where all relevant participants are observed and interviewed informally rather than a specified number as in phenomenology or case studies (Strang, 2015).

Ethnography is the preferred methodology for this study because we intend to explore the underlying socio-cultural influences on cognitive behaviour of high performing rural Nigerian farmers who effectively use agricultural information systems. We will be able to effectively apply ethnography because all the authors are familiar with the methodology, we have access to the theoretical sample, and one of the researchers is fluent in the three languages spoken (as well as being an accepted member of the community). Thus, the research team is in a position to uncover deep underlying socio-cultural reasons that could explain what why and how the rural Nigerian farmers are more successful in accepting modern agricultural information systems than others in similar regions and post-terrorism circumstances.

3.2 Sample

The Jos area of Nigeria was of primary interest to the researchers. Jos is a plateau state bordered in the North-East by Bauchi State, in the North by Kano State, and in the North West by Kaduna State. In the South-West, it is bordered by Nasarawa State and in South-South by Benue State. The choice of Jos Plateau state for this study was based on the fact that it is an agricultural hub because of its favourable weather which supports crops all year. Additionally, most farm owners are using AIS. The Jos Plateau has an elevation ranging from 1100m to 1400m above sea level. The climate is characterized by two distinct seasons consisting of the rainy season spanning from April to October, and the dry season between March and November. The highest temperatures are usually recorded in March and May, while the lowest temperatures referred to as the Harmattan months are between December and January. The Jos Plateau accounts for over 75% of the total potato produced in Nigeria, other crops produced in the state include tomato, cabbage, carrots, lettuce, cucumber, green beans apple, grapes, yams, and onions. Cereal crops produced in commercial quantity (Ojo, 2005).

We do not know the sample size, but we estimate it will be at least ten farm employees. Bernard (2012) stated that the number of participants needed for a qualitative study such as ethnography was a number he could not quantify, but that the researcher takes what he can get it. Other researchers recommend a sample size of at least 4 participants for multiple case studies or ethnographies (Strang, 2015).

4.0 Anticipated Contributions of the Study

This on-going research is anticipated to make a contribution to a growing body of IS literature on the adoption of AIS by farmers. In fact, there are not many studies examining the adoption of AIS by farmers (Lu, Pan, Lu, Qin, & Wang, 2015). Thus, the current study addresses this gap in the literature by empirically studying the adoption of AIS in Nigeria by rural farmers using a model developed from ECT, which is a construct explaining how information technology use can be sustained (Bhattacherjee, 2001). In this study, we will take an unconventional socio-cultural approach to examine if farmers think agriculture software improves economic production, at the individual level of analysis. Food production is a necessity for survival, but it has been negatively impacted by unstable financial markets, climate change, political upheavals, and health pandemics, especially in African-based countries (Lamboll et al., 2018). Governments in developing countries across Africa are financially supporting the initial implementation of AIS, but these programs may be fatally flawed because investors do not assess the farmers' continued use intention. The findings from this study should assist governments in the countries across Africa in benefitting optimally from the use of AIS.

More than one researcher found that Nigerian farmers need to adapt modern information technology to improve the agriculture value chain efficiency (Fawole & Ozkan, 2018) and crop risk management (Lamboll et al., 2018). Some researchers studied the results of government funding to promote agricultural socio-economic benefits in developing countries, but it remains unclear how Nigerian farmers perceive technology or if they will continue to use it to improve production in the post-terrorism era (Fawole & Ozkan, 2018; Michalscheck et al., 2018). The findings from this study should help Nigerian farmers in adopting information technology to improve the agricultural value chain efficiency. Additionally, the results could inform government policy making concerning funding and training for the agricultural sector.

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