The Impact of ICT on Agricultural Development In The 21st Century

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ABSTRACT

The rural communities and some of the urban areas of Nigeria, due to inadequate infrastructure and services are not able to fully take part in the emerging information economy and this might have adverse effect on their output. Agricultural development requires effective implementation of information technology in other to enhance the agricultural production. This study entails carrying out evaluation of the impact that could be created in the use of computer in agricultural development. Sample data were collected using questionnaire from sample population of 65 farmers and agricultural scientists in Akwa Ibom State Agricultural Development Programme (AKADEP) and the hypothesis was tested using chi-square frequency test. It was concluded that computer plays a vital role and create much impact in agricultural development of any nation.

Keywords: Agriculture, ICT, Mechanization, ICTs, 21st Century.

1.0 BACKGROUND OF THE STUDY

The term agriculture in the wider sense involves crop production and its protection, livestock and animal husbandry, diary fisheries and elated activities such as soil and water management, irrigation, and drainage systems, agricultural engineering and post-harvest technology, agricultural extension, credit and co-operation, agricultural marketing, forests and many other related areas. Agriculture is however one of the fastest means of growing the economy of any nation; this is the reason most of the developed countries of the world embark seriously on agricultural development, so as to quicken their economy. Computer on the other hand is a technology that emerges as an emerging tiger to enhance operation in diverse areas including agriculture. It is an electronic device that accepts data and instruction using the input unit, process data in the system unit and brings out result from the output unit (James et al, 20l 1). Having considered the aspects that make up agriculture, information dissemination, processing as well as dissemination; all these aspects are necessary at all levels of production.

However, development in computer technology is taking place at mind boggling place and is bringing about revolution changes around with the advert of very powerful personal computers and user friendly software. Now, it has become possible for everyone to work on computers sitting right on their desks thus, providing the opportunities for computer application in agricultural development to have further increase. The paper emphasizes on the impact created by the application of computer and computer technologies in agricultural development in Nigeria.

1.1 STATEMENT OF THE PROBLEM

Agricultural developments require formulation, implementation and monitoring of research programs, backed by extension efforts and evaluation of development plans and programs. In the content of this, information processing is greatly required and manual processing will definitely bring out low productivity. This is the reason computer can play a positive role to automate the processing method, thereby bringing timely, effective and reliable result.

1.2 AIMS AND OBJECTIVES OF THE STUDY

The study aims at evaluating the impact created by computer and computer related technologies on the agricultural development. In order to meet this goal the following objectives are pursued:

i. To analyzed theuse of computer in agriculture.
ii. To examine the impact created by the emerging technology in agricultural development.
iii. To be ascertain on the level of application of computer on agriculture in vise via.

1.3 RESEARCH METHODOLOGY

The method used in this work is data collection by the use of questionnaire which will he used to analyzed descriptive statistics using chi— square to analyze and interpret the response.

1.3.1 RESEARCH HYPOTHESIS

The hypothesis that is used in evaluating the impact of computer in agricultural development are:

i. Information gathering and storage on multifarious aspects of agriculture is so much detailed with the help of computer.

ii. Computer and computer related technologies are the bedrock of development strike in agriculture of any country.

This point will be analyzed using the null and alternative hypothesis (i.e. the H_0 and H_1 respectively).

1.4 SCOPE OF THE STUDY

This study is limited to the evaluation of the impact created by computer technology on agricultural development in Nigeria.

1.5 DEFINITION OF TERMS

i. **IMPACT**: Simply means striking with force
ii. **COMPUTER:** Computer is defined as an electronic device that accept data and instructions using the input unit, process data in the system unit and bring out the result in the output unit .
iii. **AGRICULTURE:** is defined as the cultivation of soil for the growing of crops and animals to provide food, wool and other products for human consumption.
iv. **DEVELOPMENT:** Is a specified state of growth or advancement.
v. **E-AGRULTURE:** Is a global community of practice where people from all over the world exchange information, ideas, and resources related to the use of Information and Communication Technology (ICT) lfor sustainable agriculture and rural development.

1.6 REVIEW OF COMPUTER IN AGRICULTURAL DEVELOPMENT

Computer and its applications changed the face of most traditional occupations including agriculture, ranging from computerized milk collection and seed estimates to whether predictions and automated farmland assessment, computers have revolutionized farming practices (precti et al, 20 11). Technological advances have brought about drastic drainages in farming and animal husbandry resulting in tremendous increase in production capacity. The most common use of computer has been in replacing human effort and intervention in traditional farming machinery and other equipment.

The rural communities due to inadequate access to advanced telecommunication infrastructure and services may not be able to fully take part in the emerging information economy and as such a low turn out on their final produce becomes feasible; this of course is attributed to the absent of computer technology in their farming operations (parker etal, 1995). Computer technology which has changed through information technologies constitutes an equalizing effect for rural people traditionally away from development in information and technology. According to Abdur Rahman et al (2005), computer and computer related technology can cause timely access to market information via communication networks which also help farmers to make decisions about what crops to plant and where to sell their products and buy inputs. Apart from access to information, another important area of impact created by computer on agricultural development is on the aspect of agriculture which has sample surveys, design of experiment and biometrical techniques, in agricultural research statistics finds some of the very interesting applications which often led to a refinement of existing ones. The break through in agricultural statistics could only be obtained through the use of computer and computer software (Sharma,20l2).

1.7 APPLICATION OF COMPUTING TECHNOLOGIES IN AGRICULTURE

Nowadays, agriculture is not just about crop production or livestock farming and associated activities. The challenges brought forth by ecological factors affecting the environment need to be a major consideration for any kind of farming activity. Farmers need to preempt environmental impact due to climate and this is where modem technology comes to the rescue (Boz et al, 2004).

1.7.1 FARMLAND ASSESSMENT

Geographic information system (GIS) are being used for developing ranking systems that evaluate land and provide a state assessment to aid what is now known as precision agriculture. These hi-tech, interactive systems provide information based on a variety of factors such as soil conditions, drainage and slope conditions, soil P' and nutrients states, etc. prior to the use of these systems, farmers were often in the dark about soil output and unpredictable weather conditions affecting crop quality and profitability (Alvarez etal,2006).

According to Alvarez, precision agriculture provides farmers with control by predicting virtual information including fertilizers application and problems with drainage insects and weeds.

1.7.2FARM SOFTWARE

With regard to livestock farming, ready-made computers applications are available to track individual animals, storing and evaluating information such as age, health records, milk production, offspring productivity, and reproductive cycle status. This is often called hard recording. Similarly, most farm accounting software and other computer applications in agriculture provide services for record keeping, simulation of prediction based models using data, revenue and productivity estimation and reporting to aid in making decisions (Harden, 2010). Most farm software vendors provide an option to customize their applications to the specific needs of the farm or ranch.

1.7.3 E - AGRICULTURE

An emerging field of agricultural practices, c-agriculture focuses on coming up with innovative ways and best practices to usethe existing Information and Communication Technologies (ICTs) forsustainable agricultural development and food safety standards, particularly in rural areas. E-agriculture encompasses other related technological fields such as agricultural information, agricultural development and business (Michailidos, 2006). It aims to display all available technologies like computers, mobile computing, Satellite System, and Smart cards for the empowerment of farmers and strengthening of partnerships across the food value chain (Precti, 2011).

1.8 SAMPLE POPULATION

The sample population was drawn from randomly selected 65 farmers and agricultural scientists who are staff of Akwa Ibom State Agricultural Development Programme (AKADEP).

1.9 DECISION RULE

There is only one decision considered in this case which is stated as follows:

CASE:

H_0: *"Information gathering and storage on multifarious aspects of agriculture is so much detailed without the help of computer"*

H_1: *"Information gathering and storage on multifarious aspects of agriculture is so much detailed with the help of computer"*

In this case, H_0 is rejected if the chi-square calculation is greater than the chi-square table in each case.

1.10 METHOD OF DATA ANALYSIS

The method that is employed in this case is that of the chi-square test of independence using table of goodness to fit where actual frequencies occupy a single row or a single column and two variable are use (i.e. yes or no) to evaluate the row content 'V' and the column content 'C'. In this case, Fe could be computed using the formulae

$$Fe = \frac{\sum_{c=1}^{n} c \times \sum_{c=1}^{n} v}{\sum_{c=1}^{n} N}$$

Where C = column value
v= row value
N = Total of c and v

$$X^2_{calculation} = \frac{\sum_{c=1}^{n} (Fo-Fe)^2}{Fe}$$

The degree of freedom is computed as df = (p-1)(c-1)
Were c = Number of columns
p = Number of Rows

1.11 TEST OF HYPOTHESES AND JUSTIFICATION DECISION

The first question is "information gathering and storage on multifarious aspects of agriculture is so much detailed with the help of computer". 10 farmers says yes, 8 says No, 10 mechanized farmers says yes, 9 says no and 12 Agricultural scientists says yes whilst 10 says No and 6 were undecided. Base on this, the table is tabulated as follows:

Response	Farmers	Mechanize farmer	Agricultural scientist	Total
Yes	10a	10b	12c	32
No	8d	9e	10f	27
Total	18	19	22	59

$$Fe = \frac{\text{(column Total x (Row total)}}{\text{Grand total (N)}}$$

Cell a = $\frac{18 \times 32}{59}$ = 9.76 Cell b = $\frac{19 \times 32}{59}$ = 10.31 Cell c = $\frac{22 \times 32}{59}$ = 11.93

Cell d = $\frac{18 \times 27}{59}$ = 18.24 Cell e = $\frac{19 \times 27}{59}$ = 8.69

Cell f = $\frac{22 \times 27}{59}$ = 10.07

To computer x^2 table

Cell	fo	Fe	fo-fe	$(fo-fe)^2$	$\frac{(fo-fe)^2}{fe}$
A	10	9.76	0.24	0.056	0.0059
B	10	10.31	0.31	0.0961	0.0093
C	12	11.93	0.07	0.0049	0.0004
D	8	6.24	0.24	0.0576	0.0069
E	9	8.69	0.31	0.0961	0.0111
F	10	10.7	0.07	0.00049	0.004
				∑ = 0.034	

$$:. X^2 \text{ cal} = \frac{\sum_{c=1}^{n} (Fo-Fe)^2}{Fe}$$

$$= 0.0059 + 0.0093 + 0.0004 + 0.0069 + 0.0111 + 0.004$$

$$= 0.034$$

Computing the degree of freedom (df)

:. df (R-1)(C-1)
= (2-1)(3-1)
= 1 x 2
= 2

The level of significance = 0.05
x^2 cal. = 0.034

The critical value $= x^2$ table = 0.0201

DECISION RULE:
Since x^2 calculated valve which is 0.034 greater than x^2 tabulation which is 0.0201.The H_o is rejected and H_1 is accepted. Meaning that the application of computer in the gathering and storage of information on the multifarious aspect of agriculture will improve the quality and make the information more detailed.

1.12 SUMMARY
The research work was concerned with the evaluation of the impact created on the application of computer in agricultural development in Nigeria. Population sample of 65 farmers and agricultural scientists were randomly selected from Akwa Ibom State Agricultural Development Programme (AKADEP). Questionnaires were given to them and responses collected. The data were analyzed and tested using the chi-square frequency method and the calculated value was greater than the table value which leads to the rejection of null hypothesis which was accepted; thus providing the importance of computer and computer related issues in the 21stcentury.

1.13 CONCLUSION
Based on the research hypothesis developed and tested in this work,it has been prove correct that the impact of computer and computer related technology in agricultural development cannot be over emphasized in our generation. This means that agricultural development cannot make any head way without the proper application of computer.

1.14 RECOMMENDATION:

- Computer should be applied in processing agricultural information at all levels
- That the local farmers should be trained on the current technology so as to improve productivity.
- The computer and computer related technology should be implemented to the fullness in agricultural sector of nations.

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