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**TITLE OF PAPER: RANKING THE FACTORS AFFECTING ICT USAGE AMONG
YOUTH-LED AGRIBUSINESS IN DIFFERENT AGRICULTURAL
VALUE CHAINS IN NIGERIA (AHP APPROACH)**

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Introduction

- ▶ Impact of COVID 19 on the Economy
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Way Out

Digitization of Agricultural Businesses

Problem Statement

Information and Communication Technology (ICT) has become an essential source of innovation and economic improvement. In the agricultural sector, the application of ICT has become a critical part of the whole agri-business. In Nigeria, the agribusiness has been discovered as a potential that can be harnessed by its teeming youth population to curb the current high rate of unemployment in the country, reduce poverty and for economic development and sustainability. Despite the numerous positive impacts of the use of ICT in agribusiness, their usage are still being marred by numerous factors. Hence, the main focus of this paper is to rank and prioritize some of these identified factors based on their level of importance towards the success of agribusiness among youths in Nigeria for effective decision making by governments and other agribusiness stakeholders.

Research Questions

- ▶ What are the factors affecting ICT usage among youth agropreneurs in different Agricultural Value Chains (AVC) in Nigeria
- ▶ From the factors identified, which one has the highest priority among youths in different AVCs in Nigeria.
- ▶ Out of three popularly used ICT tools for agribusiness, which one has the highest priority among youths in different AVCs in Nigeria

2.0 Literature Review

What is Information and Communication Technology (ICT)

Eguavon (2016) defined ICT as an umbrella term which involves the use of any communication device or application encompassing radio, television, cellular phones, hardware, software, satellite systems amongst others as well as the various services and applications associated with them, such as video-conferencing and distance learning”

ICT tools are used for information processing, data monitoring, analysis, management and visualization

They are also used to convey information to a target audience in a particular and participative way.

The growth in ICT sector has brought tremendous development in many facets of life and the agricultural sector is not an exception.

The agriculture sector is a panacea for poverty eradication, economic growth and prosperity especially in low and middle-income countries (Sertoglu, Ugural, & Bekun, 2017).

Factors hindering agricultural development in Nigeria

Marketing, storage and processing, lack of good infrastructure, instability in prices of raw materials and other related products which inadvertently affects agricultural produce, unpredictable climatic conditions, inconsistency and non-inclusive government policies, lack of basic and adequate infrastructure, lack of education, oil boom and too much dependence on white collar jobs amongst many other critical issues.

Despite all these issues, agriculture still remains the highest employer of labour especially in a country that is plagued by political instability, economic recession as a result of the COVID 19 pandemic and high rates of youth unemployment.

Role of ICT in agri-business sector

ICT tools inherent attributes such as accuracy, high speed performance, reliability and capability to store very large amount of data as outlined by Yusuf, Afolabi & Loto (2013) have made it possible for their applicability to all human endeavours including agribusiness sector.

ICT tools helps in the analysis of

- ▶ Soil
- ▶ Crop
- ▶ Climate
- ▶ Market
- ▶ Inputs
- ▶ Infrastructures
- ▶ Demographic and Socio-economic data

Use of ICT tools in agriculture improves:

- ▶ Efficiency in resource management
- ▶ Data collection for predictive and diagnostic purposes
- ▶ Sharing of knowledge and technology transfer
- ▶ Improved productivity which means more income
- ▶ Bridges the gap between rural farmers and urban markets
- ▶ Improves the quality and spread of extension services to rural areas

Use of ICT in Agri-business

- ▶ Easily link producers (farmers) to buyers
- ▶ Reduce the issue of market accessibility and transportation,
- ▶ Instant sending and receiving of money,
- ▶ Access to knowledge,
- ▶ More customer base and so on.

Some of the areas in agri-business in which the use of ICTs are of immense benefits also include farm/business recordings for proper data management, communication as easy dissemination of information is critical to the success of any business, measurement of farm produce, soil analysis, obtaining geodetic data by using Geographic Information Systems (GIS) for proper land management and more recently in the use of diagnostic tools for diagnosing both plant and animal diseases especially in areas where human experts are not readily available (Igwe, Onu & Agwu, 2019).

Identification of factors affecting ICT usage among youth led agribusiness in Nigeria

Most of the factors identified in this work were based on the Theory of Reasoned Action (TRA) model proposed by Ajzen, I. & Fishbein (1980) and also found in Ali, Jabeen and Nikhitta (2016); Jin, Seong and Khin (2020); Nizar, (2016); Tata & McNamara (2016)

Behavioural Intention to Use: Sub attributes of this include Perceived Ease of use, Perceived trust and perceived usefulness

Socio Demographic Factors: These include age, level of education, income level, gender etc.

Business Orientation: These include Farm characteristics, knowledge of social networking technologies, number of Agricultural Value Chain (AVC) involved in

ICT Context: Factors under this include information quality, system reliability, accessibility and service care quality

3.0 Research Methodology

Analytic Hierarchy Process (AHP) Model for Ranking Attributes

AHP is a useful mathematical technique that is used to solve MCDM problems where a choice has to be made from a number of alternatives based on their relative importance (Asuquo, & Onuodu, 2016; Srichetta, & Thurachon, 2012).

It was developed by Saaty in the 70's from mathematical and psychological principles.

It relies on the judgments of experts to derive priority scales through pairwise comparison of decision elements at each level as shown in Figure 1.

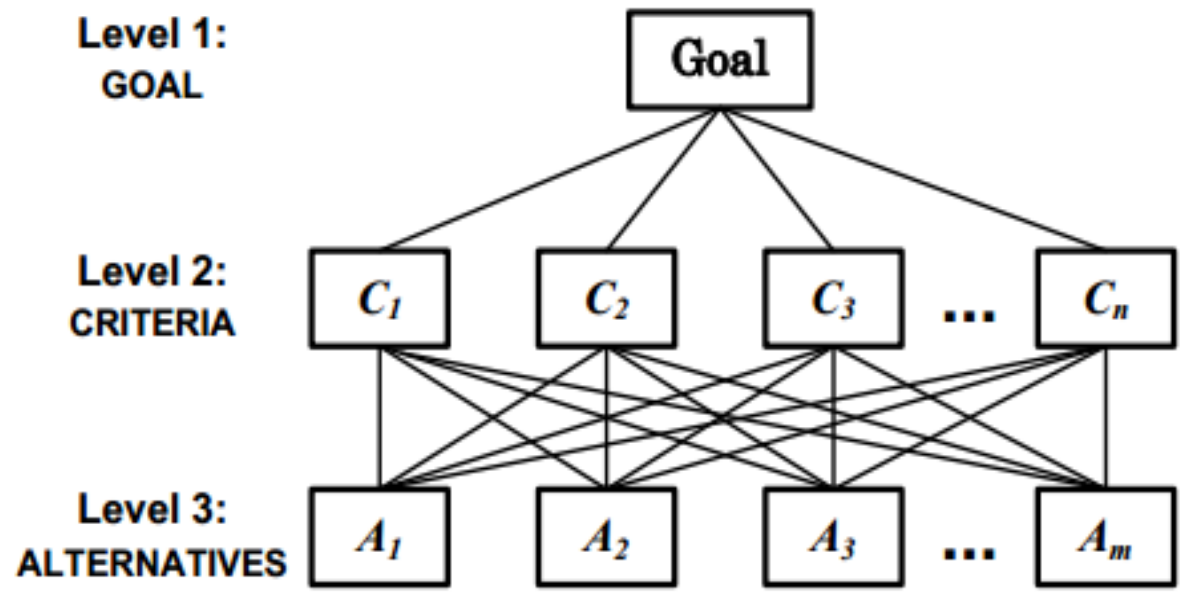


Fig. 1: Bacudio, L., Esmeria, G. J., & Promentilla, M. A (2016)

Steps in AHP Model

- ▶ Define the unstructured problem based on the criteria and alternatives.
- ▶ Construct a set of pair-wise comparison matrices among decision elements i and j by establishing priorities among them based on a preference scale.
- ▶ Compute the consistency ratio to determine the acceptability or otherwise of the chosen criteria or alternative. This is given in equation 2
- ▶ If CR is less than 10%, then the matrix can be considered as having an acceptable consistency
- ▶ Estimate the relative weights of the decision elements using eigenvector method
- ▶ Aggregate the relative weights
- ▶ Perform Sensitivity analysis
- ▶ Make a final decision

Hierarchical Model Used for Ranking Purposes

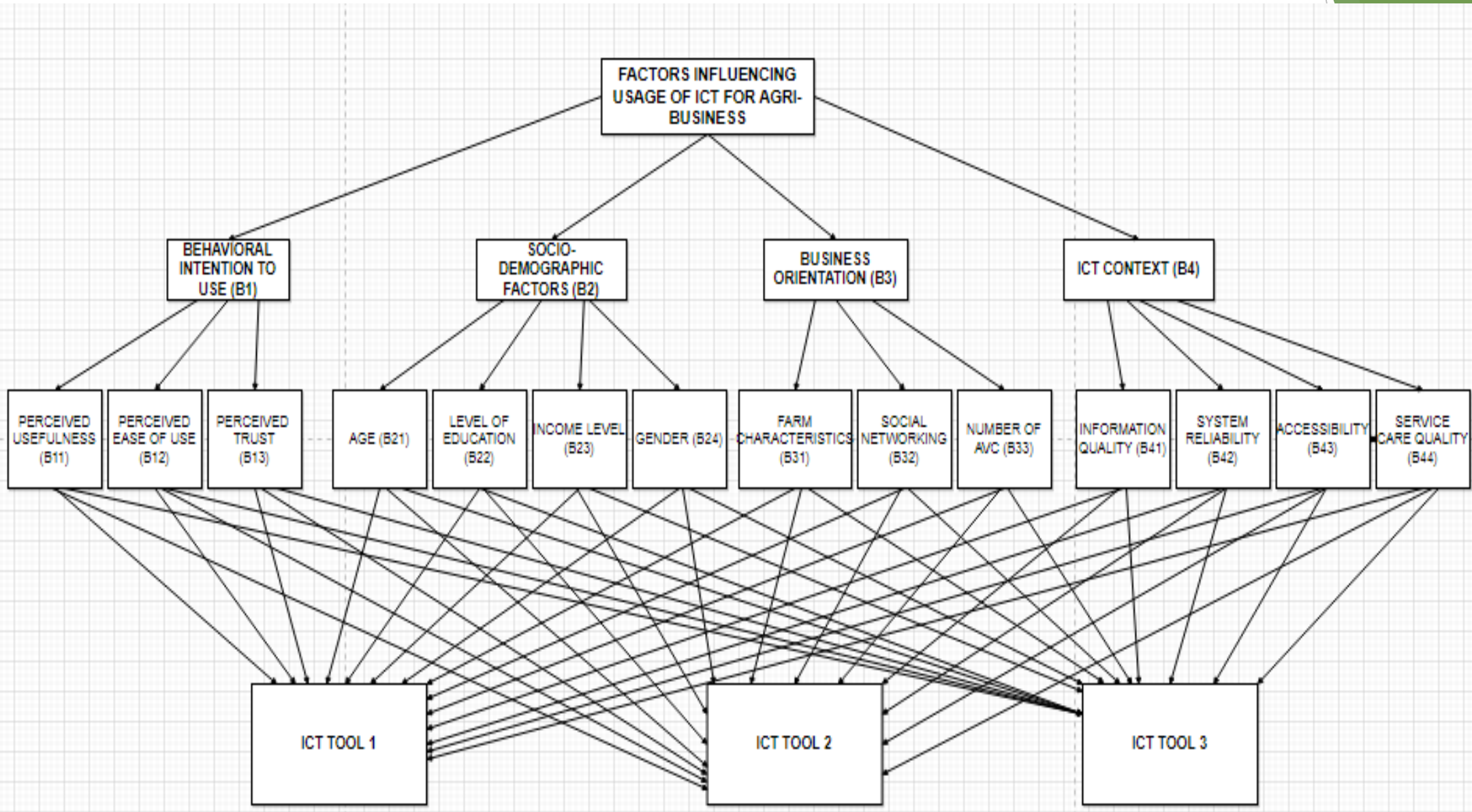


Fig 2: AHP Hierarchical Model

Problem Identification and Formulation

A general multi-criteria decision problem with m alternatives A_i ($i=1, 2, \dots, m$) and n criteria C_j ($j=1, 2, \dots, n$) can be briefly expressed as:

$$D = [x_{ij}]_{m \times n} \text{ and } W = [w_j]_n, \text{ where } i=1, 2, \dots, m \text{ and } j=1, 2, \dots, n. \quad \text{Equation (1)}$$

In equation (1), D is the decision matrix (where x_{ij} denotes the rating or performance of i -th alternative A_i with respect to j -th criterion C_j), and W is the weight vector (where w_j denotes the weight of j -th criterion C_j , m is the number of compared alternatives and n is the number of the criteria).

From the hierarchy in Figure 2, the main goal is to get a crisp value after evaluation. Priority weights were given to each criteria and sub-criteria for optimized decision making.

The study was carried out in Mokoloki Local Community Development Area (LCDA) in Obafemi Owode Local Government (LG), Ogun State, Nigeria.

The major food crops of the area includes cassava, rice, cocoyam, plantain, maize and vegetable, while palm produced and cocoa form the major cash crops.

Primary data was obtained purposively and randomly both from youths with ages ranging between 18 and 35 years according to the Nigerian national youth policy (2019-2023). The data was obtained through the use of the specially prepared AHP questionnaire and administered by the researchers themselves.

As a result of the sensitive and complex nature of the measuring tool, it was required that respondents understand some basic ICT tools and the meaning of each criteria and sub-criteria specified in the hierarchical model.

In the selection of respondents, the AVCs considered include agricultural input, agro-processing, agro- production, agro-marketing and agro-distribution/agro-transportation. Decisions of participants were analyzed with the web based AHP tool developed by Goepel (2018).

4.0 Analysis of Results and Discussion

Factors affecting usage of ICT among youth-led agri-business in different AVCs Ranking Group Consensus Results

The data in Table 1 shows the percentage and level of consensus of all judgements made by the participation

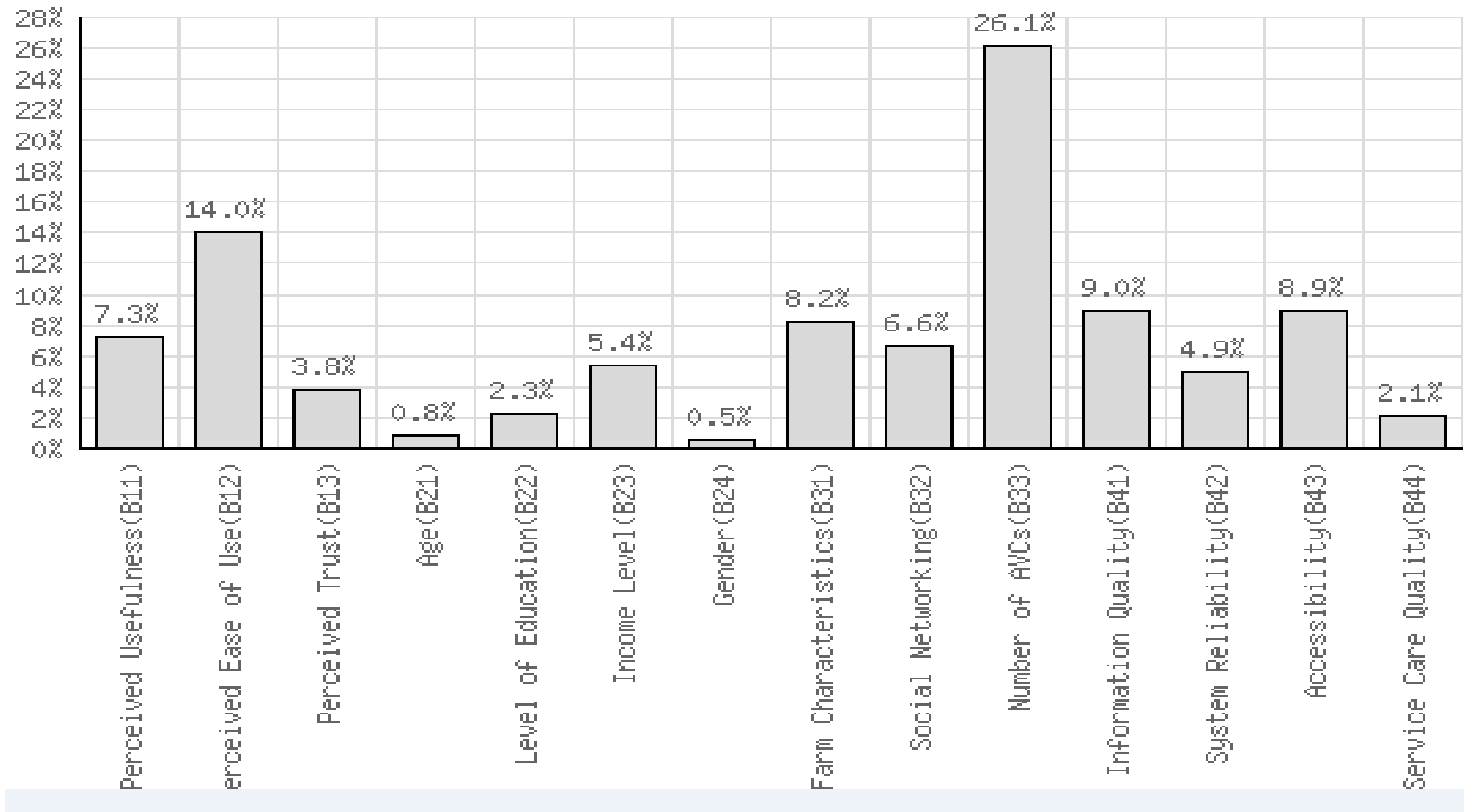
Table 1: Group Consensus Results

Node	Group CR (%)	AHP Group Consensus (%)	AHP-OS Scale
Influencing factors of ICTs usage	0.8	54.0	Low
Behavioral Intention to use (B1)	0	54.5	Low
Socio Demographic Attributes (B2)	1.9	88.4	Very High
Business Orientation (B3)	1.7	61.9	Low
ICT Context (B4)	0.9	61.7	Low

Table 2: Decision Hierarchy with Consolidated Priorities.

Level 0	Level 1	Level 2	Global Priorities (%)
	B1 = 0.252	B11 = 0.292	7.3
		B12 = 0.558	14.0
		B13 = 0.150	3.8
	B2 = 0.090	B21 = 0.094	0.8
		B22 = 0.254	2.3
		B23 = 0.595	5.4
		B24 = 0.057	0.5
	B3 = 0.408	B31 = 0.201	8.2
		B32 = 0.161	6.6
		B33 = 0.639	26.1
Influencing factors of ICT Usage	B4 = 0.250	B41 = 0.362	9.0
		B42 = 0.198	4.9
		B43 = 0.357	8.9
		B44 = 0.083	2.1
			Overall Total = 100.0

Figure 3 shows Consolidated Global Priority Bar Chart



Evaluation of Existing Popularly used ICT tools with the AHP Model

Table 3 and figure 4 show the Alternatives Evaluation Result by Participants

ICT Tools	Tool 1	Tool 2	Tool 3	CR _{max} (%)
Weights of Alternatives	70.3%	11.7%	18.0%	8.3%

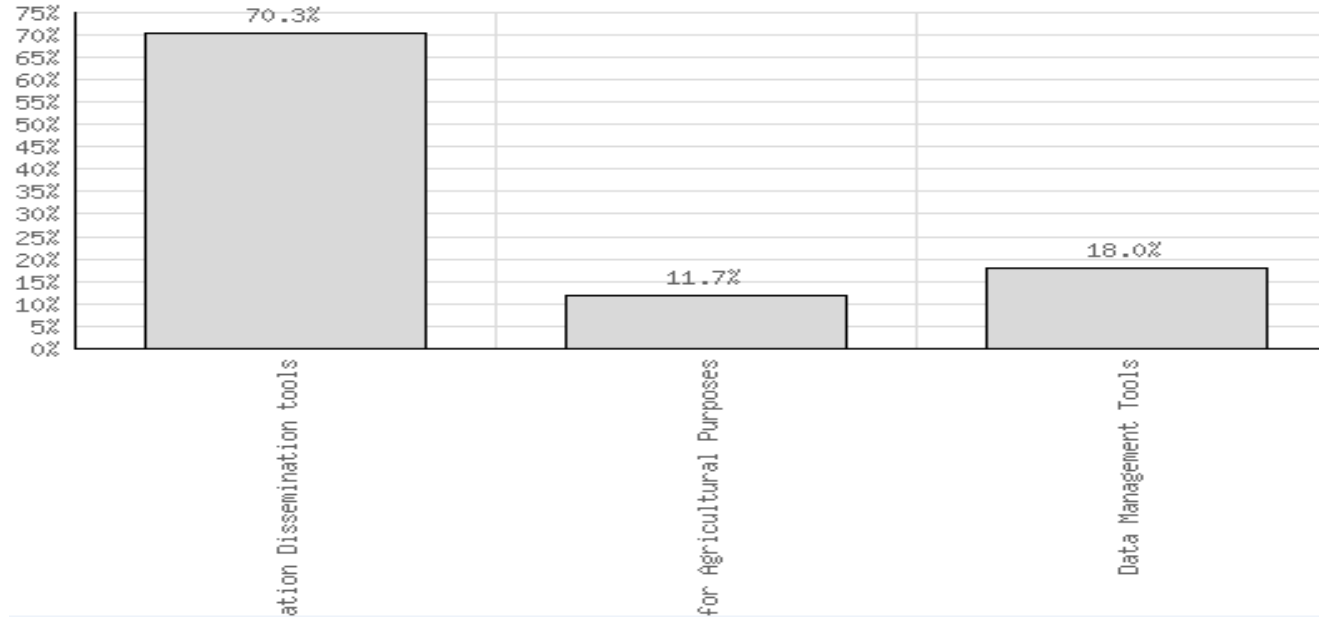


Table 4: Alternatives Analysis Results based on the AHP Model

Criterion	Global Priority (%)	ICT Tool 1 (%)	ICT Tool 2 (%)	ICT Tool 3 (%)	CR (%)	Group Consensus (%)
B11	7.3	0.536	0.323	0.141	0.2	64.5
B12	14.0	0.730	0.079	0.191	6.9	98.4
B13	3.8	0.614	0.074	0.312	0.8	72.4
B21	0.8	0.548	0.082	0.370	0.5	65.4
B22	2.3	0.746	0.068	0.186	8.3	99.8
B23	5.4	0.723	0.078	0.200	6.5	99.6
B24	0.5	0.736	0.089	0.175	0.8	95.1
B31	8.2	0.615	0.177	0.208	8.3	47.4
B32	6.6	0.758	0.068	0.174	6.7	99.6
B33	26.1	0.727	0.114	0.159	1.2	94.0
B41	9.0	0.762	0.142	0.097	0.7	94.7
B42	4.9	0.729	0.068	0.204	7.1	99.6
B43	8.9	0.714	0.066	0.220	7.1	99.1
B44	2.1	0.750	0.077	0.173	6.3	98.7
	Total=100.0	AER=70.3	AER = 11.7	AER = 18.0		

5.0 CONCLUSION AND RECOMMENDATIONS

The study identified 14 factors affecting the usage of ICT among youth-led agri-business in different AVC in Nigeria based on existing literatures.

As a result, a hierarchical model which had three levels was developed for the identified factors. Level 1 was the goal of the study, level 2 consisted of four criteria which included Behavioural to use (B1), Socio-demographic factors (B2), Business Orientation (B3) and ICT Context (B4) while Level 3 consisted of 14 sub-criteria respectively.

All these factors were ranked using the Analytic Hierarchy Process (AHP), a technique based on mathematical and psychological principles. This approach was used as a result of the complex nature involved in evaluating both the quantitative and qualitative factors identified simultaneously.

Relevant weights for all identified factors were determined using Saaty's eigenvalue and eigenvector approach.

Opinions were elicited from decision makers which comprised of youths between the ages of 18-35 years old. Consistency ratio for all participants were computed to get reliable and valid opinions.

Based on results of analysis, Business Orientation had the highest priority weight with 40.8%, Behavioural Intention to Use had 25.2% followed very closely by ICT Context with 25% while Socio-demographic factors had the lowest weight with 9%.

This result shows that factors like age, income level, level of education and gender has low impact when it comes to the usage of ICT tools among youth-led agri-business in different AVC based on the participants response and there was high consensus among them.

From the socio-demographic factors, gender ranked the least with 5.7% which indicates that making decisions as to using ICT by youths in different agri-business is not affected by gender issue. Three ICT tools which include Agricultural information dissemination tools (Tool 1), diagnostic tools (Tool 2) and Data management tools (Tool 3) were all compared and evaluated using the model and results showed that Tool 1 ranked the highest with a weight of 70.3% followed by Tool 3 with 18% while Tool 2 had the lowest rank with a weight of 11.7%.

There was a high consensus amongst the participants based on the ICT factors except for decisions taken on perceived usefulness and farm characteristics.

Generally, the agricultural sector in Nigeria is not without its challenges coupled with the high cost of raw materials, transportation amongst others.

ICT usage comes with its own unique challenges because in a country where there is persistent high cost of electricity, high cost of ICT devices and gadgets, poor connectivity and unreliable internet of mobile network services, absence of or limited ICT literacy, weak awareness of the potentials and applications of ICT in agribusiness, the implication is that government agencies and other stakeholders have a lot to do.

The COVID-19 pandemic has further dealt a huge blow to world economies and Nigeria is not an exception. There is a general increment in prices of foodstuffs and common household items, unemployment and reduction rate in family income is at its highest but the pandemic also presents a big chance for African nations, especially Nigeria, to invest heavily in highly innovative tools and technologies to improve agricultural businesses which has the chance to reduce unemployment rate, ensure food security and economic sustainability in a post COVID-19 era.

It is recommended based on the result of this study to ensure that youths who are involved in different agricultural businesses have access to affordable ICT tools, governments and policy makers should make policies that support or encourage the use of ICT for agriculture extension services, research, youth entrepreneurship and sustainability.

They should educate youths in agri-business on the numerous benefits that comes with the usage of ICT tools for agri-business.

The use of ICT in agriculture should be incorporated in school curriculums and more so, there is urgent need for youths in agri-business to be educated on how to use some of the more popular trending ICT tools for information dissemination and diagnostic purposes especially those who are in the rural areas and women as gender has been identified to have a low influence on the usage of ICT among youths in agri-business in different AVCs.

This study can be extended by considering other factors not mentioned in existing literature but still have a huge influence on ICT usage by youths. Furthermore, it is suggested that identified factors can also be ranked using other Multi-criteria Decision Making (MCDM) approaches and for the results obtained to be compared so as to be able to determine the differences or relationships between other MCDM techniques.

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THANK YOU ALL FOR YOUR RAPT ATTENTION

QUESTIONS?????????