

*Full Length Research Paper*

# **Policy initiatives for improving the contributions of university agricultural education and extension institutions to environmental and sustainable development in agriculture**

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Received 7 May, 2020; Accepted 27 May, 2020

**This study determined policy initiatives for improving the contributions of university agricultural education and extension institutions to environmental and sustainable development (ESD) in agriculture. The study was carried out in Cross River State. Survey research design was adopted for the study. The population for the study of 534, comprising 195 registered farmers who have continuously participated in ADP farmer field school training from the State; 70 graduate extension personnel; 167 final year agriculture students and 102 lecturers. Agricultural education programme in the Universities in Cross River State was used for the study. The study adopted a triangulation technique involving mixed methods of data collection. Both instruments were face validated by three experts in the field of agriculture with a reliability coefficient of 0.83 obtained through Cronbach alpha reliability method. Data collected were analyzed using mean, standard deviation and independent t-test statistic. The study identified (17) policy initiatives that could improve the contributions of agricultural education and extension institutions to ESD in agriculture in Cross River State. It was recommended among others that the identified policy initiatives should be integrated into university agricultural education and extension institutions and properly implemented.**

**Key words:** Policy, initiatives, improvement, agricultural education, environmental and sustainable development.

## **INTRODUCTION**

Agricultural education and training program provides ideal environment for the impartation of quality knowledge and skills in various fields of agriculture. Agricultural education, according to Osinem (2005), is a

process of imparting agricultural knowledge, skills and attitudes to learners for the purpose of expanding agricultural activities. The author explains that the discipline involves imparting various skills in agriculture to

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learners in primary, secondary, colleges of agriculture and universities. In the opinion of Olaitan (2017), agricultural education is a programme of study developed for providing the learner with pedagogical and technical skills to enable the individual teach relevant aspects of agriculture to learners in a specific level of education such as primary, secondary or tertiary levels. The author explained that the programme is organized in such a way that the technical skills acquired through this programme can help the individual become self-employed in relevant areas of production agriculture. In the context of this study, agricultural education refers to a programme of study developed for providing teaching and technical skills to students and farmers to become responsive to wise use of natural resources sustainably.

Tertiary level agricultural education as the highest level in the organization of agricultural education and training is suitable and capable of influencing policy decisions and development at State and national levels. Alawa (2015) posits that agricultural education and training at the university level provides the human resources base that sustains the operations of other levels of agricultural education. Similarly, Maguire (2000) states that higher education in agriculture and natural resource management plays a particularly significant role in national development. The author explained that agricultural education at this level has sound scientific and professional credibility and plays major roles in sensitizing the public, students, professionals, field workers, farmers and consumers to environmental problems, including policy and decision makers. Agricultural education at tertiary level can guarantee environmental and sustainable development in agriculture.

Environmental sustainability entails prudent use of natural resources at present with a conscious concern for the future. This involves the inclusion of content areas into the curriculum of agricultural education and training in universities and extension outreach programmes. Environmental and Sustainable Development (ESD) contents, according to Alawa (2016), are themes that are ecologically non-degrading, socially acceptable and economically viable in agricultural education and extension programmes for the acquisition of knowledge, skills and attitudes consistent with sustainable use of natural resources for improved agricultural production. The author explains that ESD content areas must be ecologically non-degrading, socially acceptable and economically viable which are included into university agricultural education and training programmes for the learner to acquire knowledge, skills and attitudes consistent with sustainable use of natural resources for improved agricultural production.

University agricultural education and agricultural extension institutions in Nigeria have mandates to include such contents into their programmes in the various specializing fields of agriculture such as crop science,

animal science, extension and rural sociology, forestry, fisheries and wildlife, farm mechanization, soil science among others. This explains why the National Policy of Education re-emphasized the need for all tertiary institution in Nigeria to integrate technical knowledge and skills necessary for sustainable agricultural, industrial and economic development (Federal Republic of Nigeria (FRN), 2013). In recognition of this policy provision, Olaitan (2017) commends government efforts at ensuring that agricultural education is offered at primary, secondary and tertiary levels of education in Nigeria. In confirmation of the integration of environmental and sustainable development themes in tertiary level agricultural education and extension programmes, Alawa (2015) reports research evidence of the inclusion of these content areas in the curriculum of university agricultural education and extension outreach programmes in Nigerian. However, the inclusion of these contents into university agricultural education and extension outreach programs without adequate policy initiatives to monitor the implementation may jeopardize such government educational concern and threaten sustainable development in agriculture in Nigeria.

The basic idea in an environmental policy is to secure the environment and its biodiversity. Gordon (2012) states that environmental policy necessarily provides the framework for environmental thinking towards reshaping the surrounding variables on environmental resource use and management. Sustainable environmental development requires meeting the pressing needs of all people and extending opportunity to satisfy their aspirations for a better life and ensures a developed world with secured and healthy environment for all; human beings, animals and plants alike (Ndubuisi-Okolo et al., 2016). In realizing the importance of environmental sustainability and the need to protect and preserve the environment, Nigerian government has formulated some environmental policies such as National Policy on Erosion and Flood Control, The Prevention of Pollution of Sea and Land 1954 (Amended 1962), Petroleum Regulation 1967, Oil in Navigable Waters Decree No 34 1968 among others. Other sustainable development policies since the 1980s are Structural Adjustment Program (SAP), Poverty Reduction Program, the National Economic Empowerment and Development Strategy (NEEDS), State Economic Empowerment and Development Strategy (SEEDS), National Directorate of Employment (NDE) among others. Regrettably, it appears the more these environmental policies are formulated, the more the Nigerian environment is degraded, particularly in the Niger Delta region where Cross River State is an integral component. In Cross River State in particular, successive governments have made concerted efforts through the formulation of policies on natural resource use and environmental management such as Operation Green, Anti-deforestation, Anti-debushing, Anti-mining among others. University agricultural education and extension

outreach programs in the State have also integrated this policy focus into their curriculum in response to the needs of the society for students and farmers to be taught. Despite all these efforts, the contribution of university agricultural education and extension institutions in Cross River State to environmental and sustainable development in agriculture is still a big challenge as cases of nutrient depletion, deforestation, bush burning, erosion and flooding and others are persistent hence, the need to identify policy actions that could enhance the contributions of these institutions to environmental and sustainable development in agriculture.

The potency of environmental policies is heavily reliant of key actors on the implementation paradigm. Borak and Peak (2013) contend that the right of the principle of equity and justice rest upon fair treatment of all people irrespective of differential variables such as biological, physical, economic and social characteristics with respect to environmental policy and practice. To the authors, the safety of the environment is a principal responsibility of mankind so all humanity is a custodian to its stewardship. Arokoyu and Ibani (2004) argue that major actors of governance in Nigeria demonstrate elite formation which is related to its colonial history in which the indigenous elite was excluded from the commanding heights of the economy, the process of decolonization and independence, whereby economically weak but politically powerful elites pursue economic and selfish ends. In the submission of Onakuse and Eamon (2007), the major causes of the failure of these programs and reforms hinge on corruption, political divide, lack of continuity, a weak private sector, dearth or absence of due process, and ethnicity. Other pitfalls that usually confront government policies include absence of consistent enabling framework on finance, funding and infrastructure on small and medium enterprises, inadequate transportation networks and power supply that support development effort and delivers multiplier effects on other sector within the country (Ogujiuba et al., 2013). Amidst these issues, the bottom line remains that environmental resources are to be used on a sustainable basis hence, the need for renewed policy actions on national resource use.

Makinde (2005) observes that policy makers must demonstrate in the first place a strong grip of the social, economic, political and cultural variables in which any policy is to operate if such a policy is to succeed otherwise it will suffer from implementation gap syndrome. The author explains that ignorance of the policy formulators has bedeviled the operators of it with a serious administrative deficiency syndrome otherwise known as implementation gap. On their part, Ubleble and Gbenemene (2017) argued for a policy review on the national policy on environment. They suggest that intended review should endeavour to adhere to the United States environmental policy particularly where environmental responsibilities are distributed among the

executive, legislative and judicial arms of government. They further explain that incorporation of the Senate and House of Representatives Committees into discharging environmental responsibilities can break the bottle necks that create implementation gaps which is a major hindrance in the case of Nigeria.

The incentives to innovate and adopt better technologies as well as to invest in agriculture depend on the overall policy on environment. Anderson (2000) observes that agriculture is a sector where government intervention is pervasive but the objectives, instruments and resulting support vary from country to country. The author explained that high-income countries have provided relatively high support to their agricultural sector while low income countries globally taxed their agricultural sector. This trend the author concluded has contributed more to a decline of net taxation of agriculture than specific support policies. World Bank (2012) posits that a successful strategy for sustainable agricultural productivity growth requires significant improvement in macroeconomic, structural and agricultural policies and institutions to provide the necessary incentives to farmers and the private sector to increase investment and build the necessary capital. The organization explained that the required investments to achieve sustainable agricultural productivity growth encompass knowledge, human and physical capital and both on-farm investments in agriculture and off-farm investments for agriculture. The organization further advised policy makers in developing countries to move beyond a plethora of interventions and policies towards a coherent policy framework that facilitates and stimulates all actors, including smallholder and other private investors to invest and foster the accumulation of productive human and natural capital.

McNeely and Scherr (2001) identified key areas for policy actions as the characteristics of the natural resource base and farming systems of the poor; farmers' awareness and assessment of the importance of environmental degradation; availability of sustainable production technologies and their suitability for the poor; farmers' capacity to mobilize investment resources through their own assets and networks and economic incentives for conservation management and investment. Others the authors contended are security of tenure and rights of access to resources by the poor; the level of institutional capacity within communities to support adaptive responses by the poor and degree of political inclusion of the rural poor in decisions affecting resource policies. Similarly, Pretty (2002) states that to promote sustainable agricultural production, consideration should be made for key policy as investment in public research and extension systems for adapting and transferring technologies; provision of technical assistance and capacity-building for ministries of agriculture and natural resource management; investment in both dry land and wetland water management system to increase water

productivity; engagement in debate with recipient countries over appropriate land reforms, as poor people cannot be expected to invest in asset building especially of natural capital if they have no guarantee over long term access to their land; promotion of support for agricultural development programmes that build rural social capacity particularly for women to access credit and microfinance; development of new approaches for supporting small-scale agribusinesses in rural areas so that food commodities can be value-added before leaving the local economy such as loan guarantees, underwriting debt, providing equity funds and grants for social infrastructure and community projects; mobilization of support for urban agriculture and working with farmers' and rural people's organizations to develop better methods for accessing market information. Others are adoption of a regional approach and emphasize structural reforms and support within specified regions to maximize synergies between different sectors of policy making departments; ensuring that policy making is evidence-based by developing good monitoring and lesson learning systems; integration of the concept of agricultural sustainability into poverty reduction policies in particular and measurement of all agricultural and rural development strategies against the primary target of mass pro-poor farm based progress; provision of long-term support as there is no simple step for agricultural development; increasing support for research which in some disciplines is increasingly being privatized and driven to specialize in the farming systems of the rich, rather than addressing the need for sustainable intensification of farming for the employment-intensive poor. United Nations (1992) reports that major adjustments are needed in agricultural, environmental and microeconomic policies at both national and international levels in developed as well as developing countries to create the conditions for sustainable agriculture and rural development through educational initiatives, utilization of economic incentives and the development of appropriate and new technology that guarantee stable supplies by vulnerable groups and production for markets, employment and income generation to alleviate poverty and natural resource management and protection. Food and Agricultural Organizations (2011) maintains that sustainable land management practices such as reduced tillage, maintenance of a protective organic soil cover, crop rotation to enhance nutrient levels, pests' management, integrated nutrients and water management techniques which are associated with both environmental and productivity benefits are necessary inputs for sustainable development in agriculture. Furthermore, Wonah (2017) suggests the formulation and implementation of public policies, particularly environmental policies that have direct positive bearing on the lives of the people. The author explains that States can achieve this feat when they are fully democratized where people must participate

in the formulation and implementation of environmental policy and their interests and welfare taken into consideration. To reposition agricultural education and training for diversification of the economy sustainably, Olaitan (2017) suggests for the establishment of occupational agricultural colleges to reflect agricultural practices in the forest zone, recruitment of pedagogically trained lecturers and review of the land use decree to enable graduates acquire land for agricultural occupation without discrimination and political threats. It is therefore against this backdrop that informs the researcher's interest to identify policy initiatives for improving the contributions of university agricultural education and extension programmes to environmental and sustainable development in agriculture.

## **THEORETICAL FRAMEWORK**

This study adopted the systems theory as its theoretical backdrop. Systems theory was developed by Ludwig Von Bertalanffy in 1968 to provide an analytical framework which facilitates the understanding of dynamics of inter-groups relationships. The theory states that every system consists of elements and processes that interact among themselves for the attainment of organizational goals/objectives. The elements otherwise known as objects, events, patterns and structures are measurable things that can be linked together while the processes or activities/relationships change the elements from one form to another. In a system, the elements or processes are grouped into sub-systems in order to reduce the complexity of the system. A dysfunction in any of the system elements could affect the attainment of organizational goals/objectives. Systems theory thus, defines the boundaries of the system under consideration and the hierarchy of aggregation levels.

Since systems theory stresses the working together of system elements for improvement and attainment of system objectives, it is therefore relevant to this study. Environmental and sustainable development in agriculture has three different but interrelated components, that is, ecological, economic and social dimensions with different contents and policy provisions. If these content areas are fully integrated without good policy provisions, the entire agricultural education and extension system may not achieve set goals. The identification of policy initiatives as intended in the present study is a core sub-system of the entire sustainability of agriculture unraveled through agricultural education and extension outreach system.

### **Objective of the study**

The study specifically seeks to determine policy initiatives that could improve the contributions of agricultural education and extension institutions to environmental and

sustainable development in agriculture in Cross River State.

## METHODOLOGY

The study adopted descriptive survey research design. Descriptive survey research design, according to Ali in Alawa and Udida (2015), is a design in which group of people or items are studied by collecting and analyzing data from a few people or items considered to be representative of the entire group. The study was carried out in Cross River State. The population for the study was 534, comprising 195 registered farmers who have continuously participated in ADP farmer field school training from the agricultural zones of the State; 70 graduate extension personnel; 167 final year agriculture students and 102 lecturers of agricultural education programmes in the Universities in Cross River State. The entire population was used in the study because it was manageable by the researchers and provides better grounds for proper generalization of findings. The study adopted a triangulation technique involving mixed methods of data collection, that is, quantitative and qualitative methods. A 17-item questionnaire developed by the researchers and tagged Policy Initiatives for improving the Contribution of Agricultural Education and Extension Institution Environmental and Sustainable Development in Agriculture Questionnaire (PICAEEIESDAQ) was the instrument for collection of quantitative data. The instrument had two sections; A and B. Section A solicited demographic data of the respondents while section B sought information on policy initiatives using a four point scale of strongly agree; agree, disagree and strongly disagree. The highest level in the scale had 4 points and the least received 1 point. The qualitative data were collected through FGDs on respondents. Two types of validity, that is, face and content validity were done on the instrument by three experts. One of the experts each was from Crop Science; Agricultural Economics and Extension Departments in the Faculty of Agriculture and one from Agricultural Education unit of the Department of Vocational Education of University of Calabar. A content validity index of 0.81 obtained was appropriate (Davis, 1992). Cronbach alpha reliability method was used to determine the internal consistence of the questionnaire and a coefficient of 0.83 was obtained. Five hundred and thirty four (534) copies of the questionnaire were administered on the respondents with the help of four trained research assistants. Five hundred and nineteen (519) copies of the (PICAEEIESDAQ) were retrieved and analyzed using mean, standard deviation and independent t-test from SPSS version 20 to answer the research question and test the null hypothesis at  $p > 0.05$ .

For the research question, the real limits of numbers were used to interpret the mean values of items. Thus, any item with a mean score of 3.50 to 4.0 was regarded as strongly agree; while items with mean scores of 2.50 to 3.49 were regarded as agree. Similarly, any item with a mean score of 1.50 to 2.49 was regarded as disagree, and items with means scores of 1 to 1.49 were regarded as disagree. The standard deviation was used to determine the closeness or otherwise of the opinions of the respondents from the mean and from one another. Any item with a standard deviation of 1.96 or below indicated that the respondents were close and therefore, the item was valid while any item with a standard deviation above 1.96 indicated that the respondents were not close to the mean and therefore, the item was not valid.

The qualitative data were collected through Focus Group Discussion (FGD) with respondents from both institutions, that is university agricultural education and Agricultural extension outreach programmes. The FGD was guided by the objective of the study and involved key informants in university agricultural education (senior lecturers and above) and agricultural development

programme (senior extension personnel from levels 13 to 16). The justification for involving these categories of stakeholders as participants was based on working experience. The FGDs were held once with staff in universities in the State while one meeting each was held with key informants in ADP across the three agricultural zones of the State. The trustworthiness of qualitative data was established through prolong engagements with participants, triangulation, peer debriefing and data collection was logical, traceable and documented (Lincoln and Guba, 1985). The FGD data generated were analyzed through the development of codes (themes), patterns, and establishment of relationships based on the patterns.

## RESULTS

The results of this study were obtained from the research question answered and hypothesis tested using data collected and analyzed.

### Research question

What are the policy initiatives that could improve the contributions of agricultural education and extension institutions to environmental and sustainable development in agriculture in Cross River State?

### Hypothesis

There is no significant difference between the mean ratings of the agricultural education programmes of Universities (AEPU) respondents and Agricultural development programme (ADP) respondents on policy initiatives that could improve the contribution of agricultural education and extension institutions to environmental and sustainable development in agriculture. Data for answering the research question and testing of hypothesis are presented in Table 1.

Table 1 presented the mean ratings of respondents on policy initiatives that could improve the contributions of agricultural education and extension institutions to environmental and sustainable development in agriculture. The data indicated that the 17 policy initiatives had their mean values ranging from 2.87 to 3.36. This implies that respondents agreed that in order to improve the contribution of agricultural education and training institutions to ESD in agriculture in Cross River State, environment policy document should address efficient resource use and management; promote long term report for agricultural development; integrate agricultural sustainability into poverty reduction programmes; increase support for research and development in agriculture; support urban agriculture; promote support for agricultural development programmes that build rural social capacity particularly for women to access credit and microfinance and obtain inputs from farmers and rural peoples' organization to develop better

**Table 1.** Mean ratings and t-test analysis of the responses of UAEP respondents and ADP respondents on policy initiatives that could improve the contribution of agricultural education and extension institutions to ESD in agriculture in Cross River State (N=519).

1	2	3	4	5	6		7		8	
					AEPU respondents		ADP respondents		t-cal	p-value
					$\bar{X}_1$	SD <sub>1</sub>	$\bar{X}_2$	SD <sub>2</sub>		
	Environmental Education and Sustainable development policies in agriculture should:									
1	Ensure efficient resource use and management	3.30	0.72	A	3.72	0.70	3.70	0.73	<b>0.30</b>	0.73**
2	Promote long-term support for agricultural development.	3.33	0.71	A	3.62	0.69	3.59	0.72	<b>0.33</b>	0.74**
3	Ensure the integration of agricultural sustainability into poverty reduction programmes.	3.36	0.71	A	3.73	0.71	3.71	0.73	<b>0.36</b>	0.72**
4	Increase support for research and development in agriculture	2.88	0.41	A	2.90	0.41	2.88	0.43	<b>0.23</b>	0.83**
5	Ensure evidence-based monitoring and lesson learning systems	3.21	0.68	A	2.98	0.43	2.89	0.44	<b>0.21</b>	0.82**
6	Ensure adequate support for urban agriculture	2.94	0.41	A	2.88	0.44	2.87	0.44	<b>0.24</b>	0.79**
7	Promote support for agricultural development programme that build rural social capacity particularly for women to access credit and microfinance	3.34	0.70	A	3.72	0.71	3.70	0.73	<b>0.35</b>	0.75**
8	Obtain input from farmers and rural peoples' organization to develop better methods for accessing market information	3.31	0.71	A	3.72	0.71	3.68	0.74	<b>0.32</b>	0.73**
9	Strengthen public and private extension and advisory services	3.32	0.74	A	3.71	0.72	3.70	0.74	<b>0.30</b>	0.72**
10	Make agricultural education and training more attractive and relevant through the development of individual capabilities and human capital	3.20	0.71	A	2.90	0.42	2.86	0.44	<b>0.23</b>	0.78**
11	Correct negative environmental externalities like climate change, desertification and emission of greenhouse gases by farmers	2.87	0.45	A	2.86	0.41	2.85	0.42	<b>0.28</b>	0.81**
12	Recognize gender issues in agricultural production	2.87	0.43	A	2.88	0.42	2.87	0.43	<b>0.23</b>	0.80*
13	Reposition land tenure rite to enable farmers embark on long term conservation plan	3.30	0.74	A	3.69	0.71	3.67	0.73	<b>0.21</b>	0.73**
14	Promote economic incentives for conservation and management of resources by farmers and other stakeholders	3.45	0.70	A	3.71	0.71	3.69	0.74	<b>0.34</b>	0.74**
15	Consider population issues in natural resource use and management	3.35	0.72	A	3.69	0.70	3.65	0.73	<b>0.31</b>	0.72**
16	Involve the rural poor farmers in decision making on matters affecting natural resource utilization and conservation	3.36	0.76	A	3.72	0.72	3.70	0.73	<b>0.33</b>	0.71**
17	Encourage non-agricultural alternatives to reduce the pressure on ecological resources.	2.92	0.46	A	2.86	0.41	2.85	0.42	<b>0.36</b>	0.83**
	<b>Grand Value</b>	3.19	0.63		3.37	0.58	3.34	0.66	<b>0.29</b>	0.77**

Note: N<sub>1</sub>=269; N<sub>2</sub>=250;  $\bar{X}_1$  = Mean of group one,  $\bar{X}_2$  = Mean of group two, SD<sub>1</sub> = Standard Deviation of group one, SD<sub>2</sub> = Standard Deviation of group two; p  $\alpha$  .05, df = 517; \*\* = Not significant; A=Agree.

methods for accessing market information. Others are correction of negative externalities like climate change; desertification and emission of greenhouse gases; recognition of gender issues; repositioning of land tenure rites to enable farmers to embark on long term conservation plan; promote economic incentives for conservation and management of resources; consider population issues in natural resource use; involve the rural poor farmers in decision making and encourage non-agricultural alternatives to reduce the pressure on ecological resources.

The standard deviations of the 17 policy actions that could improve the contributions of agricultural education and extension institutions to environmental and sustainable development in agriculture (column 4) ranged from 0.41 to 0.76 and were less than 1.96 (95% confidence limit). This indicated that the respondents were not far from the mean and from one another in their responses thus, adding value to the reliability of the mean.

Result from the FGDs showed many key informants expressed desire for the review of the existing policy on

the environment with the inclusion of inputs such as gender issues in agriculture; population explosion and natural resource use; farm insurance, adequate funding/budgetary provisions for agricultural education and training and ADP extension system; funding of research and utilization of research finding; poverty and resource utilization and subsidization of farm inputs. Others according to the participants include involvement of NGOs in the funding of agricultural education and extension programmes; enhancement of welfare packages, provision of post-harvest storage facilities; removal of bureaucracies on land acquisition for agriculture; entrenchment of stringent laws on natural resource use and management and the involvement of inputs from land users. A participant from University agricultural education institution had this to say:

*“...the policy on environment is just presented to us as a document without inputs from users and enabling conditions for implementation. Whether you like it or not university agricultural education and training has the capacity to impart quality knowledge and skills on natural resource use and management. When we teach our students, they fall back home to educate their parents who are the land users. Educating the youths on sustainable management of environmental resources is the best thing we are doing in agricultural education programs because the future of Nigerian agricultural development belongs to them. A review of the existing policy on environment with the integration of these suggested inputs and provision of enabling facilities for teaching would be a right step”*

Similarly, a participant from the Cross River agricultural extension institution said:

*“...we work with farmers who are directly involved in natural resource use and we can influence their attitude positively to reduce degradation of the environment. The only problem we have is the fact that our institution is not positioned adequately to facilitate this role. We are not involved in policy formulation process and as such the interest of farmers is not always reflected in the document. A review is therefore eminent with the inclusion of inputs from extension personnel and farmers to ensure prudent use of environmental resources”*

It can be seen from the results obtained that both methods of data collection (quantitative and qualitative) are complementary and justify the involvement and experience of respondents used for the study in the phenomena investigated.

The result of the test of hypothesis (columns 6 to 8) revealed that the 17 ESD policy improvement initiatives had p-values that ranged from 0.71 to 0.83 and were greater than 0.05. With this result, the null hypothesis was upheld. This implies that there was no significant difference in the responses of the two groups of

respondents on the 17 ESD policy initiatives that could improve the contribution of agricultural education and extension institutions to environmental and sustainable development in agriculture in Cross River State. The implication of this result is that respondents are in agreement and did not differ in their responses on policy initiatives that could improve the contributions of agricultural education and training and extension institutions to environmental and sustainable development in agriculture in the State. The indifference exhibited by students and lecturers in the agricultural education programmes of universities and farmers and extension personnel in ADP extension system of Cross River State is a pointer to the fact that they considered ESD themes very imperative and desired policy provisions that could empower their institutions to contribute to sustainable agricultural production. They could not allow their natural differences such as institutional background/work environment, educational level, location and experience to influence their responses to avoid a possible disconnect from the global dream of sustainability in agricultural production.

## DISCUSSION

The finding of the study showed that the seventeen policy initiatives identified could improve the contributions of university agricultural education and extension institutions to environmental and sustainable development in agriculture in Cross River State. The policy initiatives include efficient resource use and management; promotion of long term report for agricultural development; integration of agricultural sustainability into poverty reduction programmes; increased support for research and development in agriculture; support for urban agriculture; promotion of support for agricultural development programmes that build rural social capacity particularly for women to access credit and microfinance and obtain inputs from farmers and rural peoples' organization to develop better methods for accessing market information. Others are correction of negative externalities like climate change; desertification and emission of greenhouse gases; recognition of gender issues; repositioning of land tenure rites to enable farmers to embark on long term conservation plan; promote economic incentives for conservation and management of resources; consider population issues in natural resource use; involve the rural poor farmers in decision making and encourage non-agricultural alternatives to reduce the pressure on ecological resources. The finding agrees with World Bank (2012), Pretty (2002) and McNeely and Scherr (2001), that advocate for sustainable agricultural productivity growth anchored on repositioning of the agricultural policies and institutions to provide the necessary incentives to farmers and the private sector to increase investment and build

the necessary capital. The authors submit that to promote sustainable agricultural production, provision should be made for key policy issues as investment in public research and extension systems for adapting and transferring technologies, engagement in debate over appropriate land reforms, security of tenure and rights of access to resources by the poor; promotion of support for agricultural development programmes that build rural social capacity particularly for women to access credit and microfinance; development of new approaches for supporting small-scale agribusinesses in rural areas with a strong advice on policy makers in developing countries to move beyond a plethora of interventions and policies towards a coherent policy framework that facilitates and stimulates all actors, including smallholder and other private investors to invest and foster the accumulation of productive human and natural capital. The findings further support Food and Agricultural Organizations (2011) that suggested inputs for sustainable development in agriculture to include sustainable land management practices such as reduced tillage, maintenance of a protective organic soil cover, crop rotation to enhance nutrient levels, pests' management, integrated nutrients and water management techniques.

The finding partly agrees with Olaitan (2017) who recommended for the establishment of occupational agricultural colleges to reflect agricultural practices in the forest zone, recruitment of pedagogically trained lecturers and review of the land use decree to enable graduates acquire land for agricultural occupation without discrimination and political threats in order to reposition agricultural education and training for diversification of the economy sustainably. The identification of policy initiatives objectively by respondents support Wonah (2017)'s submission that the formulation and implementation of public policies, particularly environmental policies that have direct positive bearing on the lives of the people have to be achieved through democratic principles where people must participate in the formulation and implementation of environmental policy and their interests and welfare taken into consideration. Furthermore, The identification of policy initiatives that are ecologically non-degrading, socially acceptable and economically viable in content agrees with Alawa (2016) who states that ESD content areas must be ecologically non-degrading, socially acceptable and economically viable that are included into university agricultural education and training programmes for the learner to acquire knowledge, skills and attitudes consistent with sustainable use of natural resources for improved agricultural production. The finding further justifies Maguire (2000)'s submission that higher education in agriculture and natural resource management plays a particularly significant role in national development. The author explained that agricultural education at this level has sound scientific sensitizing the public, students, professionals, field workers, farmers and consumers to environmental

problems, including policy and decision makers.

From the finding, it shows clearly that the policy sub-system of environmental and sustainable development in agriculture has challenges and is responsible for the low contribution of agricultural education and extension institutions to environmental and sustainable development in agriculture. This tends to agree with the theoretical backdrop of the study (Systems theory) which is anchored on effective functioning of system components. The finding thus, has implications for government of Nigeria and Cross River State in particular to urgently consider a review of the policy on environment with the inclusion of these initiatives identified by stakeholders in agricultural education and extension institutions that are duty bound to impart quality knowledge and skills to land resource users.

## Conclusion

The entire policy architecture of an institution provides a framework that guides the operationalization of such organizations. With particular reference to agricultural education and extension institutions, government through relevant regulatory agencies has made concerted efforts at providing such frameworks but neglect the fact that policies are time bound, subject to proper implementation and periodic review. Issues of sustainable development in agricultural production are naturally revolutionary hence, the need to revisit them periodically. The study determined policy initiatives for improving the contributions of university agricultural education and extension institutions to environmental and sustainable development in agriculture. It is a known fact for sure that what guarantees the future of agricultural production in Nigeria generally and Cross River State in particular is the adoption of sustainable cultures in agricultural operations by land resource users. It is therefore the hope of the researcher that if these policy initiatives are integrated into University agricultural education and extension outreach institutions, sustainable development in agricultural production could be improved through their training functions on their respective target audiences.

## RECOMMENDATIONS

It is therefore recommended based on the findings and conclusion reached in this study that the identified policy initiatives should be integrated into university agricultural education and extension institutions and properly implemented to ensure compliance and development of sustainable cultures in agricultural production in Cross River State.

## CONFLICT OF INTERESTS

The authors have not declared any conflict of interests.

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