Mainstreaming Climate Smart Agriculture into Agricultural Extension Curricula in West Africa: The Roles of Sasakawa Africa Association

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Abstract

This paper describes the roles of Sasakawa Africa Association in mainstreaming climate smart agriculture into agricultural extension curricula. This is predicted on the fact that Sasakawa Africa Association introduced demand-driven curriculum in agricultural extension in thirty universities in 11 countries in Africa for experiential and competence based training that are responsive to needs of farming communities. A thematic and content analysis of the curricula were carried out to ascertain the mainstreaming of CSA. The mainstreaming was an off shoot of the strategic plan of Sasakawa Africa Association through the decentralised workshop with faculty members in ten universities in Nigeria and Sierra Leone. In each university, lecturers in the faculty of agriculture, alumni of Sasakawa Africa Fund for Extension Education, staff of Agricultural extension agencies and representatives of farmers organisations were interviewed for the inclusion of perceived concepts into the curricula. In most universities, course/module titles were changed and concepts and keywords were introduced into the synopsis of curricula. Interdisciplinary expertise were designed to deliver the curricula. Another prominent feature of the mainstreaming was the introduction of skill- based and hands- on activities located within farming communities for training and interventions on value chain actors needs. The mainstreaming covered all stages of the value chain from input to consumption with emphasis on climate smart responses in the areas of weather, water, crop, nutrient, energy and knowledge/ institutions.
The mainstreaming of climate smart agriculture into agricultural extension curricula guarantees improved the knowledge and dissemination of CSA since agricultural extension services remains the most used source of information to value chain actors despite the pluralistic extension landscape. This will also harness the potential if youths and women as the food future food systems respond to climate change.

Keywords: climate smart agriculture, thematic analysis, Sasakawa Africa Association, curricula, agricultural extension.

Introduction

The IPCC Fourth Assessment Report (2017) affirmed that climate change can be limited by suitable adaptation and mitigation measures creating public awareness from various institutions local, regional, national and global levels. Climate smart agriculture (CSA) practices have been identified as major mitigation measures (Food and Agriculture Organization, 2017). Improving the capacity of local institutions and communities to adapt to current climate vulnerability is building resilience and capacity to deal with future climate changes and risk (Least Developed Countries Expert Group. 2012). The Higher Education Institutions (HEI's) through their contributions to the agricultural development of a country, plays an important role in preparing and providing leadership to promote effective strategy for climate

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change adaptation and promote sustainable development. Central to the roles of HEIs is the curriculum of the academic program for instruction which can be enhanced and developed through the process of review, examination, modification, revision, institutionalization and implementation. Agriculture education curriculum program implies systems thinking in which inter-related concepts combines practical, in-the field knowledge with a scientific understanding of the agriculture ecosystem such as soil, crop, livestock, pest management, agro-forestry, human nutrition and community food systems as well conservation practices. Agriculture education curriculum is dynamic like any other, thus it must not only be a planned learning outcome but responsive to the demands of means and ends.

Increasingly, climate change is becoming more daunting challenges to agricultural production as risks and uncertainties increases along the food-value chain. There is therefore a need for graduating agricultural students to be highly knowledgeable with the challenges posed by climate change to be able to contribute to resilience development by communities, shape and sustain future policy-making. There is need for researches on climate change to go beyond adaptation and mitigation intervention strategies and ensuring that faculty and students should be able to contribute to the development of the body of knowledge as regards climate change, through thorough knowledge of the various International Conventions and Protocols surrounding climate change such as UN Framework convention on climate change (UNFCCC), Kyoto protocol and a range of other informal partnerships, dialogues and frameworks for collective actions.

Mainstreaming climate change into the curricula of tertiary agricultural institutions requires concrete scientific data based on African experiences to be infused into the curricula. The curricula can be handled as a separate subject or infused and integrated into the various, and degrees or qualifications could also be selected with the greatest potential to deliver on mainstreaming climate change into tertiary agricultural and natural resources management education. The mainstreaming of major developmental concepts (gender, climate change, natural resources management among others) have been supported by different international and national Non-Governmental Organisations.

Sasakawa Africa Association is an International Non-Governmental Organisation that has been on the African continent for more than 3 decades through the response to the ravages of pronounced famines in many African countries between the late 1970s to early 80s, particularly in the Horn of Africa. Mr Ryoichi Sasakawa, founder and former Chairman of the Nippon Foundation preferred a lasting solution beyond food aids, which explored the philanthropism, political will and scientific power through Dr. Norman Borlaug together with the former US President Jimmy Carter and the establishment of Sasakawa Africa Association (SAA) (SAA, 2021). The main-focus of SAA has been on effective extension system to efficiently deliver improved technologies to farmers. Within this context SAA was designed to improve and enhance extension services through capacity building of extension staff and enhancement of field extension services on major staples food crops within the areas of operation (SAA, 2021).

In 2021, SAA launched a new strategic plan for activities to be responsive to increasing food insecurity, and damaging impact of climate change on agriculture, SAA, in order to fulfil the aspiration of Africans, is aiming to contribute to the creation of a resilient and sustainable food system in Africa by placing regenerative, nutrition focused and market-orientated agriculture at the center of its technology intervention strategy. The effective implementation of this new strategy is expected to help improve the food, nutrition and income security of Africa's smallholder farmers". The strategic foci are Regenerative Agriculture (RA), Nutrition-sensitive Agriculture and Market-oriented Agriculture. Accordingly, SAA affiliated university programs should incorporate nutrition related classes in their extension program curriculum. The conventional activities of SAA continue on the 3 major strategic foci of the new plan (SAA, 2021)

Sasakawa Africa Fund for Extension Education (SAFE) an offshoot of SAA since 1991 provided in-country, demand-driven training programs. Mid-career extension agents are equipped with the necessary knowledge, skills and competencies to effectively and efficiently disseminate crucial agricultural information and technology to farmers; which has mainstreaming value chain into curriculum of 31 universities in the training of mid-career extension personnel in 11 countries of Africa (SAA, 2020). In this way, as a form of on-the- job training extension officers would be able to upgrade their knowledge, technical and human leadership skills due to the fact that the mainstay of the SAFE Initiative are: lifelong learning, demand-driven curricula, experiential learning and leadership development.

Oladele (2020) stated that the steps in introducing Sasakawa Africa Fund for Extension Education (SAFE) demand driven curriculum to universities include: "identify universities with expressed interest, conduct need assessment, organize stakeholders workshop for prioritization and validation of need assessment, develop and sign memorandum of understanding (MOU) with universities and/agricultural colleges and relevant partners, develop responsive curriculum, review & seek approval of curriculum, develop relevant modules, organize workshops for lecturers, partners and students on supervised enterprise projects (SEPs), advertise and enroll mid-career students, establish enterprise centers and sign contractual agreements, conduct supervised enterprise project and carry out regular technical backstopping and visit".

The introduction of demand-driven curriculum is the major intervention on curriculum of agricultural extension education. Demand-driven education places emphasis on society need-driven -needed skills; utilizes vibrant industry-based pedagogy and enhances the conversion of learning to earning by learners (Deegan & Martin, 2017). Demand-driven curriculum as outcomes-based education and Competence Based Education such that in both descriptions the curriculum is tailored enhance the manifestation of skills needed to perform specific work-related tasks and trainees are able to demonstrate mastery of specific competencies required in a defined profession (Suvin, 2018). The major steps in the development, review and revision process of agricultural extension curriculum are "revitalization and transformation approach and processes involving all concerned stakeholders and prospective candidates". These steps engender participation of several stakeholders and has altered lecturers' perception on supply-driven curriculum development.

Table 1: List of SAFE demand–driven agricultural extension programmes in West Africa

Universities	**Title of curriculum**	**Trainees**
Ahmadu Bello University Zaria	BSc Agriculture (Extension Services)	Mid-career
Bayero University, Kano	BSc Agricultural Extension and Community Development	Mid-career
Adamawa State University, Mubi	BSc. Agricultural Extension and Innovations	Mid-career
Usman Dan Fodio University Sokoto	BSc Agriculture (Dryland Farming Extension)	Mid-career
University of Ilorin	BSc Agricultural Extension and Community Development	Mid-career
Federal University DutsinMa	BSc Agriculture Livestock Extension	Mid-career
Obafemi Awolowo University	BSc Agriculture (e-Extension and Community Engineering)	Mid-career
Bowen University	B.Sc. Agricultural Extension and Social Engineering	Mid- career and High school
Michael Okpara University of Agriculture	BSc Agricultural Extension and Community Development	Mid-career

University of Cape Coast Ghana	BSc Agricultural Extension	Mid- Career
University of Cape Coast Ghana	BSc Agricultural Extension and Community Development	Pre Career
University of Cape Coast Ghana	BSc Agribusiness	Pre Career
Njala University Sierra Leone	BSc Agricultural Extension (Post harvest and Value addition)	Mid- career and High school

Source: Naibakelao, D. (2020) Report on Sasakawa Africa Fund for Extension Education (SAFE). https://www.saa-safe.org/elfiles/vwHklqiG/REPORT%20SAFE%20FINAL.pdf

Sasakawa Africa Association led in the application of action research in agricultural extension education to establish extension services outcomes, results of interventions and prove field facts as effects of extension services. Rahimi, and Askari- Bigdeli, (2016) described action research as limited intervention in the operational real world to introduce change on practices as a results of the outcomes of the intervention. Similarly, Sasakawa Africa Association introduced the Enterprise center and Supervised Enterprise Project (SEP) to extension education. "SEPs is an in-situ tool for capacity development and technology transfer mechanism underpinned by action research through which trainees develop capacity (knowledge and skills) on the specific technology in question and simultaneously transfer technology to the community " (Oladele, 2020). The enterprise center is a "space where innovation development and dissemination processes are explored by students, farmers, lecturers and researchers for training and practice purposes with emphasis on commodity value chain activities and skill acquisition towards agribusiness development to generate income and a business incubation center for both students and farmers.

Objective of study

The main objective is to describe the roles of Sasakawa Africa Association in mainstreaming climate smart agriculture into agricultural extension curricula in West Africa.

Materials and Methods

The study was carried out in 2021 through a decentralized workshop in each of the SAA partner universities. The demand-driven curriculum is faculty wide programme but domiciled in the Department of Agricultural Extension. Systems Thinking as a course is central in each of the curriculum and thus the involvement of every department in the faculty of agriculture as well department of agricultural engineering, food and Nutrition as well as food science or technology depending on the nomenclature in each university.

A total of 434 participants were involved in the curriculum review workshop which include lecturers, alumni of Sasakawa Africa Fund for Extension Education, staff of agricultural extension agencies and representatives of farmers organisations were interviewed for the inclusion of perceived concepts into the curricula. The existing demand-driven curriculum for each university were examined through thematic and content analysis in terms of the indicators and practices articulated in the SAA strategic foci on Regenerative Agriculture (RA), Nutrition-sensitive Agriculture and Market-oriented Agriculture to contribute to the creation of a resilient and sustainable food system in Africa. These indicators were treated as synonyms of CSA practices as derived from the review of FAO Climate-Smart Agriculture Sourcebook (2nd Eds.) (FAO, 2017). The elements of the assessment indicators are climate change profile, climate-smart agriculture and problematization, development programs on CSA, projects on CSA (focus on projects identified in the program of action), monitoring, evaluation; and communication plan,

terminology count. The qualitative criteria employed in this study allowed for comparison between each curriculum and the assessment indicators, however, germane to this assessment was an aim to identify strengths, gaps, and weaknesses to inform improvements in mainstreaming CSA into the curriculum. Validity and reliability were ensured through triangulation with individuals (Santos, Ribeiro, Cristina, Silva, Ivisson, & Ferreira. 2020). Triangulations were carried out with responses from other categories of staff within each university.

Results and Discussions

The content analysis and discussions on the curriculum based on the assessment indicators led to the inclusion of CSA concepts and dimensions into the curriculum (Table 2). May of the key concepts in the assessment indicators were lacking in the existing curriculum before the mainstreaming workshop. In most universities, course/module titles were changed and concepts and keywords were introduced into the synopsis of curricula.

Specifically, the following were mainstreamed into the curricula: climate change profile, climate trends, past, present, future and climate change impacts were integrated; while in the area of climate-smart agriculture and problematization -problems/priorities of water management, climate-smart livestock production, climate-smart crop production, climate-smart soil and land management, climate-smart forestry, climate-smart fisheries and aquaculture, genetic resources for food and agriculture, sustainable food systems and value chains were added. Naibakelao, et al (2017) reported that to improve the capacity of extension agents, there is need to integrated CSA into curricula of tertiary institutions in Africa.

In Table 2, the component of development programs on CSA incorporated goals, objectives and strategies for goals and objectives related to CSA problematization to curriculum and the section on projects on CSA (Focus on projects identified in the Program of Action) such as projects on water management, climate-smart livestock production, climate-smart crop production, climate-smart soil and land management, climate-smart forestry, climate-smart fisheries and aquaculture, genetic resources for food and agriculture, sustainable food systems and value chains, implementation period for annual projects, funding sources for annual projects and implementation agencies for annual projects were merged to the curriculum. This agrees with findings of Diko, et al (2021).

Table 2: CSA indicators before and after curriculum review

Indicators	**Descriptors in Curriculum before review**	**Descriptors in Curriculum after review**
Climate change profile	Climatology	Climate trends—past, present, future
	Agro-meteorology	Climate change impacts
Climate-smart agriculture and problematization	Soil and water conservation	Climate-smart water management
	Livestock Production	climate-smart livestock production
	Crop production	climate-smart crop production
		climate-smart soil and land management
		climate-smart forestry

	Introduction to Fisheries and Aquaculture	climate-smart fisheries and aquaculture
		climate-smart genetic resources for food and agriculture
	Value Chain analysis	climate-smart sustainable food systems and value chains
Development programs on CSA		CSA priorities or problems
	Climate Change	CSA goals and objectives
		CSA strategies
Projects on CSA (Program of Action)	No descriptors	water management projects
		climate-smart livestock production projects
		climate-smart crop production projects
		climate-smart soil and land management projects
		climate-smart forestry projects
		climate-smart fisheries and aquaculture projects
		genetic resources for food and agriculture projects
		sustainable food systems and value chains projects
		implementation of CSA projects
		funding sources for CSA projects
		agencies for CSA projects
Monitoring, evaluation; and communication plan	Programme planning and Evaluation	strategies to monitor and evaluate CSA projects
		strategies to disseminate information about CSA
		Extension approaches and models for CSA dissemination
Terminology count	Few mentions of Climate Change	High mentions of "Climate Change"
	Non-mention of CSA	High mentions of "CSA"

Similarly, Table 2 shows that modules were made to integrate the projects on CSA (Program of Action) in terms of clear strategies to disseminate information about CSA, while in the area of monitoring, evaluation; and communication plan, clear strategies to monitor and evaluate CSA projects were listed. The Terminology count in terms of number of mentions of "Climate Change" and "CSA" significantly improved after the mainstreaming activities. To enhance the functionality of the mainstreaming process, interdisciplinary expertise was designed to deliver the curricula. Another prominent feature of the mainstreaming was the introduction of skill- based and hands- on activities located within farming communities for training and interventions on value chain actor's needs. The mainstreaming covered all stages of the value chain from input to consumption with emphasis on climate smart responses in the areas of weather, water, crop, nutrient, energy and knowledge/ institutions. Dougill et al (2017) emphasized the same in the mainstreaming of conservation agriculture in Malawi.

Conclusion

The mainstreaming of climate smart agriculture into agricultural extension curricula guarantees improved the knowledge and dissemination of CSA since agricultural extension services remains the most used source of information to value chain actors despite the pluralistic extension landscape. Participants were able to learn the framing and conceptualization of CSA projects. This will also harness the potential of youths and women as the food future food systems respond to climate change. The mainstreaming as a capacity development approach has a lot of implications for employability and entrepreneurship among extension agents and farmers, through the features of responsiveness, synergism, and participatory inclusiveness.

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