SKILLS ACQUISITION IN AQUACULTURE FOR A GREEN ECONOMY IN AKWA IBOM STATE

BY

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Abstract

The study examined the acquisition of skills by aquaculture farmers and the contributions of aquaculture towards a green economy in Akwa Ibom State. Two research questions were raised and two null hypotheses were formulated to direct the study. The survey research design was adopted for the study. The population of the study consisted 126 (52 farmers and 74 attendants) aquaculture farmers and farm attendants in Akwa Ibom State. The purposive sampling technique was used to sample all the 126 aquaculture farmers and farm attendants. Data collection was carried out with the use of a researcher-developed instrument tagged 'Aquaculture Skills and Green Economy' (ASGE) Questionnaire. The instrument was duly validated and trial tested. Data collected were analysed using Cronbach's alpha method. This gave a reliability coefficient of 0.89. The research questions and null hypotheses were analyzed using means and independent t-test. The findings of the study indicated a high level of skill competencies utilization in aquaculture production; and a significant level of contributions by aquaculture to a green economy in Akwa Ibom State. On the basis of this, it was concluded that aquaculture farmers in Akwa Ibom State possess the relevant skills needed in the industry and that it contributes significantly to a green economy in the State through employment creation, income generation and poverty reduction. It was recommended among others that, Akwa Ibom State Ministry of Agriculture and Rural Development should invest more in agriculture by encouraging farmers' involvement in aquaculture production.

Keywords: Aquaculture, Skills Acquisition, Skill Competencies Green Economy, Farm Attendants, Employment Creation, Income Generation, Poverty Reduction.

Introduction

Farming is known to require training and not just education. There is therefore the need for aquaculture farmers to acquire on-the-farm practical knowledge that will be applicable to their work, if they must contribute meaningfully to a green economy development. Aquaculture is an important sub-sector of Agriculture. Aquaculture, the farming of aquatic organism in land and coastal areas, involving intervention in the rearing process to enhance production and the individual or corporate ownership of the stock being cultivated, could be vital in adequate fish production, sustainable development and greening the economy of a nation. This study examined the acquisition of skills by aquaculture farmers and the contributions of aquaculture towards a green economy in Akwa Ibom State.

The Concept of Aquaculture

Aquaculture production is recognised to be of particular importance to developing countries, as a potential driver of local and national economic development and for the critical role that fish plays in the food and nutrition security of people, including the poorest. The demand for fish products is rising daily as a result of the rising world population that is expected to reach 9.3 billion by 2050 (Conway, 2012). Capture fisheries is becoming a subject for conservation while aquaculture assumes greater importance as a means to replace lost capture fisheries production globally. Aquaculture is central to livelihood, providing food, income, employment as well as a range of social and cultural values and benefits. The benefits of aquaculture become particularly important when placed in the context of current food production challenges, social change and growing climate change uncertainties today.

Aquaculture has the potential for providing significant volumes of fish and other aquatic food for human consumption, creating substantial employment and reducing poverty, often in remote areas. Aquaculture development in most countries bridge the gap between fish demand and supply, and it is a catalyst to food security, hunger reduction and poverty alleviation through economic generation. In Nigeria, annual national fish demand stands at about 27 million metric tons while domestic fish production is about 800,000 metric tons, and less than 30% of the total annual fish consumed by Nigerians are produced locally (Abbas, Damisa & Ahmed, 2015). Aquaculture in Nigeria seems to be ignored by policy makers and development professionals even though it has huge prospects in alleviating poverty, malnutrition, serves as a source of foreign exchange earnings and also means of sustainable community development. Nigeria is endowed with many large rivers, man-made lakes, creeks and about 200 nautical miles of marine water under the exclusive economic zone. Despite this, the performance of the fishery sub-sector is still far below expectation with inadequate domestic fish supply. Nigeria still imports fish into the country to supplement local fish production and spends about ₦125 billion annually on the importation of fish (Nnodim, 2018). The current import dependent situation is deemed to be unfavorable and non-optimal to the Nigerian economy considering the aquaculture potentials of the country. The continuous importation of fish portends a grave danger to Nigeria in term of foreign exchange earnings, loss of employment opportunities especially the rural community, and thus aggravating the poverty level. It is a major setback to sustainable fisheries

development and greening of the Nigerian economy.

As noted by Inoni, (2016), the bulk of domestic fish production in Nigeria is from capture fisheries which are not sufficient to satisfy the ever growing demand for fish in the country. The decline in yield of natural fish stocks is an indicator that fish stocks have reached the point of maximum sustainable yield since the number of catch from capture fisheries is declining. Factors implicated in the decline of capture fisheries include climate change, oil spillage and discharge of industrial wastes into river which results in pollution of river where people fish from, over fishing and rudimentary technology of fishing. Aquaculture (the farming of aquatic organism in land and coastal areas) involving intervention in the rearing process to enhance production and the individual or corporate ownership of the stock being cultivated, remains the only feasible option that can sustain adequate fish supply for sustainable development and greening the economy of Akwa Ibom State, and Nigeria in general.

The Concept of Green Economy

Despite the important contributions of aquaculture, global debates and discussions on fisheries and aquaculture issues and policies appear to be dominated by concerns over environmental sustainability, overfishing, overcapacity and greening the economy. This introduces the concept of green economy.

greener. greener economically, politically, socially, financially and in agricultural production. Nigeria and all the federating States should not be an exemption. The concept of green economy encompasses every aspect of national life. The rapid deterioration of the environment and worsening climate situation due to human activities have increased the necessity of relying upon new and unique policies, such as the Green Economic policies, as effective environmental management tools for sustainable economic development. Green economy emphasizes economic development which enhances general human development in its many dimensions. Green Economy can be viewed from various perspectives including political, social, technological, security, renewal resources and conservation and environmental sustainability (Stavrakakis, 2017).

The concept of green economy aims at restoring the lost harmony between human beings and nature. It is a model, claiming that sustainable economic growth requires a balance between the environmental impact of economic growth and the assimilative capacity of the environment. In other words, green economy believes that directing economic recovery along greener guidelines will not only help the recovery itself to be successful, but it will also help achieve

the long term objective of promoting a sustainable economic development. As such, it is a model of economic growth compatible with not only preserving, but also improving the environmental quality (Musu, 2010). This concept can be basically understood as a term which refers to any theory of economics that views human economic activity as embedded within ecosystems (Matthews & Boltz, 2012). It is an economic theory that pursues economic growth based on sustainability with the environment, energy, health and general well-being, strengthened with good governance, regulation, technology and education.

The development strategy of green economy could be encapsulated as sustainability or sustainable development. This is an essential element in green economy, which presents a viable solution to improve economic development and control environmental deterioration. Aquaculture would only contribute to a green economy of a nation, if its practice and development is compatible with the preservation and improvement of the environmental quality of where it is carried out. This requires the acquisition of the relevant skills in aquaculture that are environmentally friendly. In order for aquaculture to facilitate the development of a green economy, it must be practiced in such a way that it contributes maximally to sustainable environmental and economic development of the state and nation. Sustainable development refers to conservation of the natural resource base and the orientation of technological and institutional change to ensure continued supply of human needs for present and future generations. Sustainable aquaculture development integrates bio-ecological, economic and social dimensions of aquaculture to sustainably improve the well-being of all the people engaged directly or indirectly in it. This requires the acquisition of the relevant skills in aquaculture.

Acquisition of Relevant Skills in Aquaculture

Fishery development has always been a priority to Nigerian governments, with objective being the attainment of self-sufficiency in this sector of food production. This could be achieved through fish farm development, fish seeds and feed mill development, fish pen and cage culture development, and fish post-harvest management and marketing programmes. Aquaculture as a subsector in fish production requires relevant skills and competencies. The acquisition of these skills is indispensable for the development of this subsector and sustainable agriculture in Akwa Ibom State. Some of these skills according to Olaitan (2011) are discussed below:

Planning Skills

Planning is pre-requisite for success in any enterprise. Planning involves critical

and logical thinking, creativity and steadfastness towards achieving an objective (Olaitan, 2011). It is the identification of various resources and activities to be involved in carrying out of project with appropriated budget and time schedule. Planning activities may include the following:

i. stating the objective of the project
ii. identifying material resources necessary for the project
iii. identification of sources of financing
iv. identification of sources of skills to be involved
v. budgeting for the project
vi. benchmark and time schedule.

Farm planning is a deliberate attempt by a farmer to arrange and document enterprise activities in order, before implementing them. Activities involved in aquaculture planning include:

i. choosing objectives of fish enterprise
ii. communication of objectives
iii. identification of assumptions and assessment of the future
iv. surveying of resources like soil, water quality, and availability of fish seeds.

Other steps in fish enterprise planning include:

i. establishing of policies,
ii. identification of alternative course of action, choosing course of action, creating procedures and rule
iii. establishing of budget for the farm, e
iv. stablishing of time-table for the farm enterprise and establishment of standard for products.

Prospective farmers in any fish enterprise should state their sources of income for operation, identify personnel as well as consumers or markets for the fish.

Fish Breeding and Hatching Skills

Breeding in the opinion of Allard (2016) is the art and science of changing plants or animals genetically. Fish breeding therefore is the art and science of propagating fish with the purpose of improving inherent qualities desired by man in order to make profit, safeguard endangered species and reproducing fish that were previously unavailable to farm. The prospective farmer should consider:

i. the choice of a suitable site to locate a hatchery;
ii. the target consumers of the excess fingerlings to be produced;
iii. the production target for the year;
iv. the preferred species within the locality, and feeding habits of the preferred species.

The various activities involved in the process of artificial propagation of fish include:

i. Selection of brood fish from nature or from fish pond

ii. Rearing of brood fish
iii. Inducing final maturation and ovulation with hormone treatment.
iv. Procurement of ripe eggs by stripping
v. Procurement of milt by dissection of a male donor.
vi. Artificial fertilization.
vii. Incubation and hatching of eggs.
viii. Rearing of larvae and fry. (Food and Agriculture Organisation, 2017).

Pond Construction and Management Skills

Pond according to Allard (2016) is a body of water enclose in a concrete or earthen pit with an inlet and outlet structure for growing fish. It can be shallow or deep with varying dimension (length, width and depth). Steps in pond construction include surveying of land, marking out the area of the pond, measuring and marking out the walls, excavating the pond bottom if necessary, building the drainage system, building the water inlet, building the walls and sealing the pond bottom and walls.

In the view of Ita (2014), a major prerequisite in fish rearing is the choice of a suitable site for fish pond construction. While Kumar (2012) maintained that fish should be properly fed with natural fish food (phytoplankton) that is made available by fertilization of the pond. An adequate amount of good quality supplementary feed is essential for maintaining healthy growth of fish. Supplemen[illegible] artificial food or from natural ingredients. Ponds and the fish in them must be taken care of every day. The farmer should ensure that the following activities are carried out daily.

i. Checking for leaks
ii. Cleaning filters
iii. Observe the fish
iv. Feed the fish
v. Watch for predators

Fish Preservation and Marketing Skills

Preservation has to do with preventing or slowing down of the changes involved in spoilage. According to Ihekoronye and Ngoddy (2015), the principles involved in preservation include scrupulous cleanliness and hygiene in handling the fish caught; immediate freezing to at least -10oC; the freezing time should not exceed two hours, glazing to prevent drying; and storage of the frozen fish well below -16oC. Harvested fish should be preserved immediately in order to prevent spoilage and subsequent loss of fish. Eyo (2011) listed some methods of preservation of fish to include salt curing and fermentation, fish drying, fish smoking, prevention of losses in stored dried fish, fish freezing, cold storage of fish, fish canning and fish preservation by irradiation. These are some of the relevant skills in aquaculture that have to be acquired by farmers for sustainable aquaculture development that would

contribute optimally towards a green economy.

Statement of the Problem

The performance of the fishery sub-sector in Nigeria is still far below expectation with inadequate domestic fish supply. As observed by Nnodim (2018), Nigeria still imports fish into the country to supplement local fish production and spends about N125 billion annually on the importation of fish alone. The situation is not different in Akwa Ibom State despite its geographical location. Aquaculture in Nigeria seems to be ignored by policy makers and development professionals even though it has huge prospects in greening the economy through its numerous benefits such as poverty alleviation, reduction in malnutrition, a source of foreign exchange earnings and also means of sustainable community development. The current import dependent situation in fish production is deemed to be unfavorable and non-optimal to the state and national economy considering the aquaculture potentials of the country. This portends a grave danger to Akwa Ibom State in terms of foreign exchange earnings, loss of employment opportunities especially the rural community, and thus aggravating the poverty level. It is a major setback to sustainable fisheries development and greening of the state economy. The problem of this study therefore is inadequate skills acquisition in aquaculture for the greening of the state economy. acquisition by aquaculture farmers in the state and the contributions of aquaculture towards a green economy in Akwa Ibom State.

Purpose of the Study

This study examined the acquisition of skills by aquaculture farmers and the contributions of aquaculture towards a green economy in Akwa Ibom State. The study sought to:

1. Determine the skill competencies utilized in aquaculture production in Akwa Ibom State.
2. Determine the contributions of aquaculture to a green economy in Akwa Ibom State.

Research Questions

The following research questions were formulated to guide the study:

1. What are the skill competencies utilized in aquaculture production in Akwa Ibom State?
2. What are the contributions of aquaculture to a green economy in Akwa Ibom State?

Research Hypotheses

The following null hypotheses were formulated to direct the study:

1. There is no significant difference in the mean rating of responses by aquaculture farmers and farm attendants on skill competencies

utilized in aquaculture production in Akwa Ibom State.

2. There is no significant difference in the mean rating of responses by aquaculture farmers and farm attendants on the contributions of aquaculture to a green economy in Akwa Ibom State.

Methodology

The study examined the acquisition of skills by aquaculture farmers and the contributions of aquaculture towards a green economy in Akwa Ibom State. The survey research design was adopted for the study. The population of the study consisted 126 (52 farmers and 74 attendants) aquaculture farmers and farm attendants in Akwa Ibom State. The purposive sample all the 126 aquaculture farmers and farm attendants. Data collection was carried out with the use of a researcher-developed instrument tagged 'Aquaculture Skills and Green Economy' (ASGE) Questionnaire. The instrument was duly validated and trial tested. Data obtained from the trial test were analysed using Cronbach's alpha statistics and it yielded a reliability coefficient of 0.89. The research questions and null hypotheses were analyzed using means and independent t-test at 0.05 level of significance.

Data Analysis and Results

Research questions were answered using means.

Research Question 1

What are the skill competencies utilized in aquaculture production in Akwa Ibom State?

Table 1: Mean Rating of Responses by Aquaculture farmers and farm attendants on Skill Competencies Utilised in Aquaculture Production in Akwa Ibom State

S/N	Skill Competencies	Mean		Remarks
		Farmers	Attendants	
1.	Aquaculture planning	3.6	3.4	Agreed
2.	Fish breeding and hatching	2.6	2.2	Agreed
3.	Pond construction and management	2.9	2.8	Agreed
4.	Fish preservation and marketing	3.1	2.9	Agreed
5.	Formal education and training on aquaculture	3.2	2.6	Agreed
6.	Apprenticeship / workshop attendance	3.4	3.5	Agreed
	Average Mean Score	**3.1**	**2.9**	

N = 126; Cut-off point = 2.5

Table 1 indicates that all the identified skill competencies are utilized in aquaculture production in Akwa Ibom State. The mean scores of both the aquaculture farmers and farm attendants are above the cut-off point of 2.5, except in fish breeding and hatching were the attendance record a mean score below the cut-off point. However, the magnitude of the mean scores indicate that the

Research Question 2

What are the contributions of aquaculture to a green economy in Akwa Ibom State?

Table 2: Mean Rating of Responses by Aquaculture farmers and farm attendants on the Contributions of Aquaculture to a Green Economy in Akwa Ibom State

S/N	Aquaculture Contributions	Mean		Remarks
		Farmers	Attendants	
1.	Food security	3.6	3.5	Agreed
2.	Provision of employment	3.7	3.6	Agreed
3.	Poverty alleviation	3.4	3.2	Agreed
4.	Supply of nutritional needs	3.6	3.6	Agreed
5.	Source of foreign exchange	2.8	2.6	Agreed
6.	Political stability	3.1	2.9	Agreed
	Average Mean Score	**3.4**	**3.2**	

N = 126; Cut-off point = 2.5

Table 2 shows that aquaculture contributes highly to a green economy in Akwa Ibom State. All the mean scores of both the aquaculture farmers and farm attendants are above the cut-off point of 2.5 in all the identified areas. The magnitude of the mean scores indicate a high level of contribution of aquaculture towards the greening of the State economy.

Hypothesis 1

There is no significant difference in the mean rating of responses by aquaculture farmers and farm attendants on skill competencies utilized in aquaculture production in Akwa Ibom State.

Table 3: Independent t-test Analysis of the mean rating of responses of aquaculture farmers and farm attendants on skill competencies utilized in aquaculture production in Akwa Ibom State

S/N	Skill Competencies	$\bar{X}_1$	$\bar{X}_2$	t-cal	Remarks
1.	Aquaculture planning	3.6	3.4	1.58	NS
2.	Fish breeding and hatching	2.6	2.2	1.66	NS
3.	Pond construction and management	2.9	2.8	1.18	NS
4.	Fish preservation and marketing	3.1	2.9	1.22	NS
5.	Formal education and training on aquaculture	3.2	2.6	1.44	NS
6.	Apprenticeship / workshop attendance	3.4	3.5	1.54	NS
	Average	**3.1**	**2.9**	**1.44**	NS

** Significant at .05 level; df = 124; N_1 = 52; N_2 = 74; Critical t-value = 1.96.*

Data analysis in Table 3 revealed that the 6 identified skill competencies utilized in aquaculture production in the State had t-values less than the critical t-value of 1.96 at 0.05 level of significance and 124 degrees of freedom. The null hypothesis of no significant difference between the aquaculture farmers and farm attendants on skill competencies utilization was therefore retained. The implication is that all the identified skill competencies are utilized in aquaculture production in Akwa Ibom State.

Hypothesis 2

There is no significant difference in the mean rating of responses by aquaculture farmers and farm attendants on the contributions of aquaculture to a green economy in Akwa Ibom State.

Table 4: Independent t-test Analysis of the mean rating of responses of aquaculture farmers and farm attendants on the contributions of aquaculture to a green economy in Akwa Ibom State

S/N	Aquaculture Contributions	$\bar{X}_1$	$\bar{X}_2$	t-cal	Remarks
1.	Food security	3.6	3.5	1.41	NS
2.	Provision of employment	3.7	3.6	1.34	NS
3.	Poverty alleviation	3.4	3.2	1.16	NS
4.	Supply of nutritional needs	3.6	3.6	1.28	NS
5.	Source of foreign exchange	2.8	2.6	1.46	NS
6.	Political stability	3.1	2.9	1.48	NS
		3.4	**3.2**	**1.36**	NS

** Significant at .05 level; df = 124; N_1 = 52; N_2 = 74; Critical t-value = 1.96.*

The analysis in Table 4 indicated that the calculated t-value of both the aquaculture farmers and farm attendants on the identified contributions of aquaculture to a green economy in Akwa Ibom State had t-values less than the critical t-value of 1.96 at 0.05 level of significance and 124 degrees of freedom. The null hypothesis of no significant difference between the aquaculture farmers and farm attendants on aquaculture contributions to green economy in the State was therefore retained. Considering the magnitude of the mean scores, the implication is that aquaculture contributes highly to a green economy in Akwa Ibom State.

Discussion of Findings

Data analysis in hypothesis one revealed no significant difference in the mean rating of responses by aquaculture farmers and farm attendants on skill competencies utilized in aquaculture production in Akwa Ibom State. The magnitude of the mean scores by both the farmers and the farm attendants indicates a high level of skill competencies utilization by aquaculture farmers in

Akwa Ibom State. This finding is supported by Olaitan (2011), Allard (2016) and Ita (2014). According to these scholars, skills competencies required in aquaculture farming include planning skills, fish breeding and hatching skills, pond construction and management skills, fish preservation and marketing skills. The aquaculture farmer would not be proficient in the business without acquiring the basic skills. Most of the aquaculture farmers in Akwa Ibom State have acquired skills in the different areas and subject their farm attendants to training sessions in order to be effective.

Findings in hypothesis two indicated no significant difference in the mean rating of responses by aquaculture farmers and farm attendants on the contributions of aquaculture to green economy in Akwa Ibom State. The high magnitude of the mean scores portrayed a high level of contributions of aquaculture to a green economy in the State. This finding is in line with Abbas, et al (2015) and Inoni (2016). As pointed out by these scholars, aquaculture contributes to a green economy in Akwa Ibom State as it is a source of food production, employment generation and poverty reduction. It is also a source of reduction in malnutrition, a source of foreign exchange earnings and also means of sustainable community development. Aquaculture farming give employment to many youths in Akwa Ibom State both as farmers and farm attendants. It is a source of regular fish supply to hotels and restaurants in the State.

Conclusions

Based on [illegible] concluded that aquaculture farmers in Akwa Ibom State possess the relevant skills needed in the industry and that it contributes significantly to a green economy in Akwa Ibom State through employment creation, income generation and poverty reduction.

Recommendations

On the basis of the conclusion drawn, the following recommendations are made:

1. Akwa Ibom State Ministry of Agriculture and Rural Development should invest more on skill acquisition in aquaculture by farmers and the utilization of such skills in aquaculture production to enhance the greening of the state economy.
2. Workshops, seminars, supervisory services and financial support should be provided to aquaculture farmers in order to improve their contributions to a green economy in Akwa Ibom State.

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