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Inadequacies in Fish Farming system in Southeast Nigeria: A Hindrance to Agricultural productivity Enhancement

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ABSTRACT
Aquaculture is the fastest growing food production sector in the world with annual growth in excess of 10 percent over the last two decades. This is also known as aquafarming. This is a prominent farming system in Nigeria and its southeast region alike which involves the controlled cultivation of fish. However, in Southeast Nigeria, there are several inadequacies in the fish farming system that hamper productivity. One of the primary reason for these shortcomings is the negligence of farmers in adequately organizing and spatially orienting activities within the farm. The primary aim of this study is to examine the consequences of such inadequacy and place emphasise on the need for enhancing agricultural productivity to meet inevitable need of man for food and providing the required amount for the masses. This can be achieved through better spatial orientation in fish farming systems. This can also be used as a prototype for fish farm designs in the southeast region and Nigeria as a whole. The disciplinary focus area of this study is Architecture and as such; content based analysis was used and looked into previous studies done in the subject matter by different authors.
Keywords: Anambra, population, fish, farming, architecture

INTRODUCTION

Reay's (1979) defines aquaculture as "Man's attempt, through inputs of labour and energy, to improve the yield of useful aquatic organisms by deliberate manipulation of their rates of growth, mortality and reproduction" appeals from a biological perspective. This however made some omission on the key component that distinguishes it from hunting: the concept of ownership or the extension of access and exploitation rights. The recently revised definition of aquaculture used by the UN Food and Agricultural Organization states that aquaculture as the farming of aquatic organisms including crocodiles, amphibians, finfish, molluscs, crustaceans and plants, where farming refers to their rearing to their juvenile and/or adult phase under captive conditions. Aquaculture also encompasses individual, corporate or state ownership of the organism being reared and harvested. (Rana 1998).

For present purposes we assume the key criteria distinguishing farming from hunting are:

- There is some form of intervention(s) to increase yields; and
- There is either ownership of stock or there are controls on access to and benefits accruing from the interventions.

The long accepted view of how and why agriculture began and spread has recently undergone some revision (Harris, 1996: Diamond, 1997; Tudge, 1998). While the established view remains that it started some 10 - 12 000 years ago there is a growing recognition that different peoples adopted food production at different times. While some cultures, such as the Chinese, developed agriculture independently, others learned from neighbouring colonizers while a few, such as the Aboriginal Australians, appear never to have acquired agriculture at all (Flannery, 1994).

Fish farming, also known as aquaculture, has emerged as an important sector within the agricultural industry, contributing to global food security and economic development. In Southeast Nigeria, this farming system is plagued by inadequate practices which results in the inability of enhancement of effective productivity.

A review of the various food production systems reveals Fish Farming as an important strategy in the global fight against hunger, malnutrition and poverty, particularly in the developing nations including Nigeria. Fish Farming is considered as the provider of the direly needed high quality animal protein and other essential micronutrients.

One of the primary reasons for shortcomings in fish farming in Southeast Nigeria stems from farmers and their inadequacies in organising activities within the farm. This refers to the spatial orientation of fish farming activities. It encompasses the proper planning, design, and implementation of various components within the farm with the aim of optimising productivity. Unfortunately, this is not the case in most farms in the southeast as it is usually overlooked. The consequences of poor spatial orientation in fish farms has several effects in key areas that are vital for the successful operation and productivity. These areas include pond design, water management, feeding practises, disease prevention and management, and knowledge transfer and training.

The lack of proper pond design is a significant inadequacy observed in many fish farming systems in Southeast Nigeria. Farmers often neglect factors such as pond shape, size, depth, and layout, which are essential for maintaining optimal water circulation, oxygen supply, and waste management. As a result, fish health and growth are compromised, leading to reduced productivity and economic losses.

Inadequate water management practices further contribute to the inadequacies in fish farming systems. Negligence in regularly testing water quality, monitoring oxygen levels, and maintaining suitable water parameters can lead to the accumulation of toxins, elevated ammonia levels, and increased susceptibility to diseases. These factors hinder fish growth, survival rates, and overall productivity.

Feeding practices are also affected by the negligence of farmers in spatial orientation. Inappropriate feeding, such as overfeeding or providing inadequate nutrition, can result in water pollution, oxygen depletion, and poor growth rates. The lack of knowledge regarding balanced feed formulations and the failure to adjust feeding rates according to fish size and growth stages hinder the achievement of maximum growth and profitability.

Disease prevention and management are crucial for maintaining healthy fish stocks. However, the negligence of farmers in implementing biosecurity measures, maintaining quarantine systems, and conducting regular health checks increases the risk of disease outbreaks. Insufficient knowledge about disease symptoms, diagnosis, and treatment further exacerbates the problem, negatively impacting the productivity of fish farms.

Furthermore, limited knowledge transfer and training opportunities for fish farmers contribute to the inadequacies in spatial orientation. Insufficient access to updated information, research findings, and modern farming techniques restricts the ability of farmers to improve their practices and enhance productivity. The lack of government support and extension services further hampers the dissemination of best practices and expertise necessary for maximizing agricultural productivity.

Addressing these inadequacies and emphasizing the importance of spatial orientation in fish farming systems is crucial for the sustainable development of the sector in Southeast Nigeria. By prioritizing proper pond design and location, implementing effective water management practices, improving feeding strategies, enhancing disease prevention and management, and providing comprehensive knowledge transfer and training opportunities, fish farmers can overcome these challenges and unlock the sector's full potential.

In collaboration with government agencies, research institutions, and agricultural extension services, it is possible to empower fish farmers with the necessary knowledge and resources to enhance productivity, contribute to food security, and drive economic growth in Southeast Nigeria.

Aim of Study

The aim of the study is to sensitize farmers on farming practises that can bring about an increase in the productivity rate as suppose to the non-sustainable systematic farming system prominently used by farmers.

RESEARCH METHOD

This research investigated the inadequate fish farming practises in southeast, Nigeria and the architectural solutions to improving agricultural productivity to substantial amount in the region. The disciplinary area of focus is architecture as such, content base analysis was used to look into previous studies done in the subject matter by different authors.

FINDINGS

Rosewell Farms Limited, Okija, Ihiala Local Government Area, Anambra State. It was established in 2008 and owned by Mr. Azubuike Chidi. It has a capability of housing 50,000-layer birds and producing 320 crates of egg every day and 12, 000 broilers per circle (plate 1).

Plate 1. Picture showing the layout of the layers' pen, located at Okija, Ihiala local government of Anambra state

Source: Agwuka Ugochukwu Stanley (Retrieved March 6th, 2023).

Plate 2. Picture showing the typical manual pen layout.
Source: Agwuka Ugochukwu Stanley (Retrieved March 6th, 2023).

Mohaz Integrated Farm Complex, Ihiala, Ihiala Local Government, Anambra State. It was established in 2011 and owned by Mr. Michael Ohazulike. It has the capability of housing 50,000 layer and 20,000 broilers but currently housing approximately 23,000 layer producing 320 crates of egg every day and 12,000 broilers per circle (Plate 3).

Plate 3. Picture showing a typical fully automated layers' pen
Source: Agwuka Ugochukwu Stanley (Retrieved March 14th, 2023).

E.M. Farms Limited, Umunya, Oyi Local Government Area, Anambra State. The facility was established in 2011 and owned by Mr. Dozie Mbaneto and Mr. Clem Nwogbo. The farm can house between 20, 000 to 30, 000 birds (Plate 4).

Plate 4. Picture showing the layout of the multi-storey layers' pen.
Source: Agwuka Ugochukwu Stanley (Retrieved April 15th, 2023).

Plate 5. Picture showing the layout of the multi-storey layers' pen.
Source: Agwuka Ugochukwu Stanley (Retrieved April 15th, 2023).

Upon visiting and observing the various fish farms, and after the interviews conducted with the staffs, it was observed that the planning and inadequate spatial organisation of structures in the farm hindered the easy flow of working activities between structures and staff duties. This therefore results in the adverse effect in production rate and thereby hindering productivity.

In selecting the location, a balance should be found between topographical and climatic conditions on the one hand and the business requirements on the other. For instance, poultry houses require almost the same climatic conditions as domestic buildings; so exposed areas prone to extreme weather should be avoided (Ernst and Peter Neufert, 1970). The position of the buildings with respect to each other, and relative to

any adjoining housing estates, and orientation to the prevailing wind direction must be carefully considered.

Vehicles should be able to move around the farm without needing to use public roads. However, an effective link to the public road network is obviously necessary to allow supplies to be brought in, and farm produce to be shipped out. Commercially, this connection is more important than arranging the farm buildings so as to be close to the fields.

In laying out the buildings, a minimum spacing of 10m should be maintained between all buildings, and 15m between the farmhouse and sheds (Ernst and Peter Neufert, 1970).

The poultry pen climate (temperature, air composition and humidity) has a decisive role in maintaining the health of animals and ventilation is, therefore, one of the most important considerations in animal housing designs. The objective of ventilation in livestock buildings are to supply the oxygen needed by the stock, remove waste (mainly heat, water carbon dioxide and ammonia) and keep down the level of airborne micro-organisms or pathogens. Ventilation systems may be natural, relying on convection and wind currents, or forced (mechanical), using fans to propel air through the building.

Other design considerations to be adopted in the design of fish farms in relation to the spatial system are as follows:

- Security: The design should be geared towards providing a safe and secure facility for its staff, animals, resource and equipment from damage, loss, theft and mutilation by implementation of security policies, procedures and plans.
- Lighting: This is the deliberate use of light to achieve a practical or aesthetic effect. Provision would be made adequately for both artificial and natural lighting systems. Both systems would be adopted for the visual appreciation of the users.
- Fire Safety: For fire control, fire rated construction materials would be used for the construction of the buildings. Adequate provision would also be made for firefighting equipment. Fire safety measures such as compartmentalization would be considered in the design.
- Ventilation: Adequate provisions should be made for ventilation and cooling systems e.g. large sized windows. The buildings should also be properly oriented to take good advantage of the wind.
- Flexibility: To accommodate long term resources for both current and evolving changes in agricultural designs, proper thought will be put into the design.
- Thermal Comfort: This is the condition of the mind that expresses satisfaction with the thermal environment. It is achieved when the heat generated by human and animal metabolism is allowed to dissipate. Air temperature and relative humidity are to be put under check as these affect thermal comfort.
- Zoning: It helps to co-ordinate the movement of the users and staff of the facility. Zoning would be done according to the functions carried out within the facility to achieve efficiency and functionality.
- Acoustics: This has to do with the aural comfort of a place. The buildings should meet the acoustic requirement of being noise free especially in the production area of the farm. The effect of noise can be reduced by planning measures such as locating noise generation away from requiring quietness, by isolating sound sources with sound containing partitions and doors, by absorbing sound with acoustic materials and generally by the incorporation of floor coverings and other materials which do not reflect sound.
- Sustainability: It seeks to minimize the negative impact of buildings by efficiency and moderation in the use of materials energy and the ecosystem at large.
- Choice of Materials: In this design, desirable materials would be used to achieve structural stability and aesthetics and comfort.
- Visual Quality: It is a multifaceted quality that depends on multiple attributes of an image or view. It also refers to the degree to which the visual experience satisfies the user of a particular place. The use of colours and other design elements can bring about a pleasant visual experience

for the users of this facility. Orientation and views should provide interest and stimulation and enhance environmental quality and character of the unit.

- Circulation: This is a key consideration in the creation of an appropriate atmosphere. It is essential to avoid overcomplicated or confused routes or access roads. Circulation spaces should be able to accommodate appropriate activities and should also be enlivened by natural lights, views to the outside and by facilitating social exchange. It should also be wide enough to accommodate for the movement of people and equipment.

CONCLUSION

As far as there is a presence of man, there would always be a constant need for food and nourishment. This is so because food is one of the most basic need of man and as such there is a need to provide facilities that can meet up to the this demand.

Fish is considered as one of the best sources of animal protein in view of its low cholesterol content. In Nigeria, fish used to be a major source of animal protein contributing to about 40 per cent of the animal protein consumed by the average Nigerian, but today, the price of local fish has risen far beyond the reach of the average Nigerian. This, therefore, calls for an urgent need to boost domestic fish production through intensive fish culture and research.

This makes it necessity non-negotiable. Fish farming is a form of aquaculture practice which involves the culture of fish. In addition to the provision of employment opportunities and cash income.

Recommendation

According to Pullin and Shehadeh, (1980) most of the farmers are lacking technical knowledge which must be remedied by realistic technical assistance which is to be addressed. To improve upon the solutions addressed in this article, it is important to consider the following recommendations to aid in fish farms in and out of the country.

- The Ministry of Agriculture in Nigeria is to use the proposed write up as a prototype to design for upcoming Fish Farms in Nigeria.
- Other West African countries in the tropics can adjust this prototype design to suit their culture.
- Designers are advised to use design elements that appeal to all the senses of the users.

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