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Influence of Farmer Knowledge and Skills on Performance of Fish Farming in Kwanza Constituency, Trans-Nzoia County, Kenya

Andayi Victoria

Masters Student, University of Nairobi, Kenya

Dr. Joash Migosi

Lecturer, Department of Open and Distant E-Learning Studies, University of Nairobi, Kenya

Abstract:

The purpose of this study was to examine the influence of Farmer Knowledge and Skills on Performance of Fish Farming in Kwanza Constituency - Trans-Nzoia County, Kenya. Despite the Kenyan government putting in tremendous effort to improve fish farming, fish production has been persistently going down in Kwanza sub-county in the last five years. A descriptive survey research design was adopted using both quantitative and qualitative methods. The study targeted all 401 documented fish farmers, both small and large scale, active and dormant; spread across the four wards of Kwanza Sub-county namely Keiyo, Kwanza, Kapomboi and Bidii wards. The study also targeted four ward fishery extension officers and the sub-county fishery extension officer. Krejcie and Morgan's sample size calculation was employed to get 196 fish farmers for the sample. Simple random sampling technique was used in selecting both active and past fish farmers with one or more fish ponds in every ward to participate in the study. Collected data was processed using Statistical Package for Social Sciences (SPSS) software. The findings indicated that farmer knowledge and skills had a significant influence on the performance of fish farming at 0.05 with unstandardized beta coefficient of 0.098. The study concludes that farmer knowledge and skills greatly influenced adoption of new farming techniques in fish farming. Extension services were equally influential on the performance of fish farming. As much as extension services positively influenced fish farming, the services were few and strained in some areas. This proved that adequate knowledge and skills are lacking in the study area. The county government should therefore make a point of employing more extension officers owing to public demand. The study recommendations include the view that community involvement ought to be embraced before a project is launched of the nature that proper monitoring and evaluation is done. Additionally, training seminars should be tailored to match such needs as pertains feasibility of the studies as well as that extension services by agricultural service support are really needed by farmers and a follow up to be carried out regularly. Finally, future researchers should dwell on extensive feasibility studies to be carried out in establishing proper demographic factors about a population for swift program initiation, implementation, monitoring and evaluation for targeted goals accomplishments.

Keywords: Fish farming, farm training, knowledge and skills, performance

1. Background

Production of aquatic products, especially fish has become an important agricultural sector as a main source of dietary protein for most people in the world (Hixson, 2014). The United Nations through the department of food and agriculture in its annual report stated that fish farming is one of the rapidly growing food production industries globally. The production of fish has increased in developing nations and the number of cultured species has also gone up. However, aquaculture in the world is still dominated by pink shrimp in South Africa, tilapia in Africa, carp in India and milkfish in Philippines (FAO, 2017). The same report warned that Kenya risks losing the highly valued Nile perch species if stringent measures are not taken by the government of Kenya to tame over-fishing and pollution in Lake Victoria. In many nations particularly in Africa, fish farming is done on small scale just for domestic use or taken to rural markets. To encourage commercialization of fish farming, the state department of fisheries has been formulating policies that will ensure sustainable fish production in Kenya. Part of policy implementation has been the spread of awareness among Kenyans to take fish farming as a viable business and best option to failed agricultural ventures. This government initiative has also attracted other development partners such as USAID, collaborative research support program (CRSP) into awareness campaign (Quagraine, Ngugi, & Amisah, 2010).

Mwangi (2008) portrayed fish farming households as the most secure households in Kenya due to the potential of the venture to earn them constant income. Because of this, fish farming development in Kenya has since been stimulated in the country to enhance people's livelihoods especially in rural areas. However, according to Mwamuye, Cherutich and Nyamu (2012), the number of active fish ponds started declining rapidly and by 1975, less than 38% of ponds were productive.

This was attributed to insufficient extension services, low quality fingerlings and incompetent extension officers. The low pond fish production continued until mid-1990s when the government of Kenya introduced the department of fisheries to specifically address the issue of fish development. Fish farming programs in the country have been launched severally since independence-1963 and failed terribly. According to the study done by Maina, Mbutia, Ngugi, Omolo and Orina (2014), fish production in the country had started declining as a result of many farmers abandoning the venture for other businesses. According to Trans Nzoia County Integrated Development Plan (2017), there is a decreasing trend in fish production in Kwanza Constituency. This situation therefore motivated the study to focus on the influence of Farmer Knowledge and Skills on Performance of Fish Farming in Kwanza Constituency - Trans-Nzoia County, Kenya.

1.1. Statement of the Problem

Despite the Kenyan government putting in tremendous effort to improve fish farming, fish production has been persistently going down in Kwanza sub-county in the last five years. Data from the Agriculture, Livestock and Fisheries ministry shows that contrary to fish production in the sub-county having a potential worth Ksh 50 million per year, it only managed to produce fish worth Ksh 3.9 million in 2017 (MOALF, 2015). Worse still, most of the fish farming projects started as an economic stimulus program by the government in Kwanza sub-county have stagnated or been abandoned. There is therefore need to establish the factors that strongly contribute to the low productivity of fish in kwanza constituency. Very few research projects have been based on Farmer Knowledge and Skills on Performance of Fish Farming in Kenya. A study by Njeru (2013) on factors influencing fresh water fish farming in Embu North District was based on ecological and marketing factors. Thus, there is still a gap in information as far as pond farming and crucial Farmer Knowledge and Skills on Performance of Fish Farming in Kenya is concerned. This study therefore, sought to establish the influence of Farmer Knowledge and Skills on Performance of Fish Farming in Kwanza Constituency - Trans-Nzoia County, Kenya.

1.2. Objective of the Study

This study was guided by the following objective:

- To determine the influence of farmer knowledge and skills on performance of fish farming in Kwanza Constituency - Trans-Nzoia County.

2. Literature Review

2.1. Conceptual Framework

A conceptual framework is basically a structure that comprises a summary that reflects the experiential, observational, synthetical or the analytical elements of a conceived research process. The relationship between these elements realizes the framework for specific expected results (Bogdan & Biklen, 2003). A dependent variable is a factor that is assumed to be influenced by the independent variable. This means that a dependent variable (output) is determined by the independent variables (input) is shown in Figure 1.

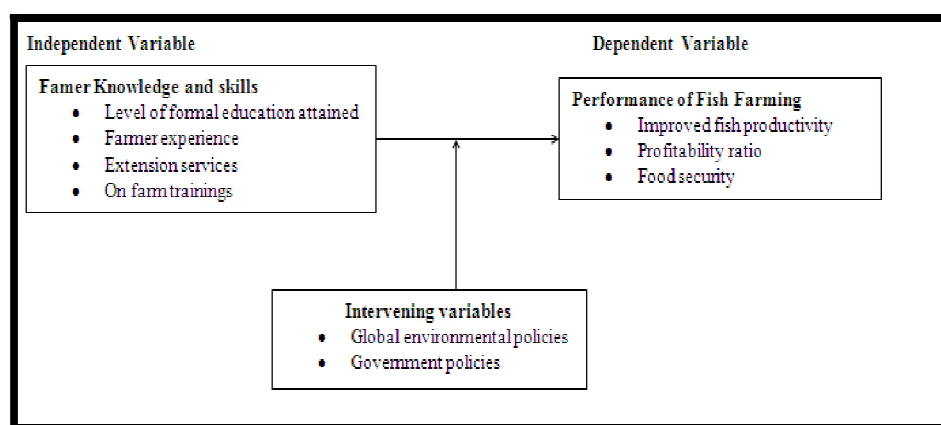


Figure 1: Conceptual Framework

According to Figure 1, it was conceptualized that the independent variable which include farmer education level would influence the dependent variable- performance of fish farming. On the other hand, performance of fish farming was evaluated in terms of improved fish productivity, venture profitability, food and security.

3. Research Design

Kothari (2004) defines a research design as "the organization for gathering and analysis of data in a way that aims to achieve relevance and meet objectives of the study". A descriptive survey research design was used for this study. A descriptive survey research design enabled the researcher to gather large quantities of qualitative and quantitative data at a particular time. The research design was considered suitable because it helps show the current state of fish farming in the Kwanza Constituency without changing the study variables.

3.1. Target Population

According to Mugenda and Mugenda (2003), target population is the total number of objects or individuals to which the researcher intends to study and make some generalizations about them. This study targeted all 401 documented fish farmers, both small and large scale, past (those whose projects stalled) and present; spread across the four wards of Kwanza Sub-county: Kwanza, Keiyo, Bidii and Kampomboi. The study also targeted four ward fishery extension officers and the sub-county fishery extension officer.

3.2. Sample Size and Sampling Procedure

The study employed simple random sampling. The sample size of the fish farmers in this study was 196. It was determined based on the Krejcie and Morgan's sample size table (Krejcie & Morgan, 1970).

4. Research Findings and Discussion

The purpose of this study was to investigate the influence of Farmer Knowledge and Skills On Performance of Fish Farming in Kwanza Constituency - Trans-Nzoia County, Kenya. The findings are presented successively.

4.1. Farmer Knowledge and Skills on Performance of Fish Farming

The first objective sought to establish the influence of farmer Knowledge and Skills on fish farming performance in Kwanza Constituency, Trans-Nzoia County. The respondents were asked whether farmer Knowledge and Skills influenced the performance of fish farming. They indicated their response as shown in Table 1

Knowledge and Skill Indicators	Mean	Std. Deviation
Formal education	1.1067	.30972
New technologies	2.4533	1.09659
On-farm trainings	2.8054	1.11911
Seminars/workshops	3.4600	1.26719
Farmer experience	3.5267	1.19673
Extension Services	3.6067	1.31024

Table1: The Mean Score on the Extent of Influence of Farmer Knowledge and Skill on Fish Farming Performance

From the findings, knowledge and skill factors influenced the performance of fish farming positively. The mean score ranged between 2.8 to 3.6 with an exception of new technology which scored the lowest with a mean score of 2.4. This points to the fact that most of the farmers are reluctant to adapt to new technology whereas some feared that the maintenance costs would be too high to manage. Extension services offered to the fish farmers had the highest influence on performance of fish farming with a mean of 3.60. The formal education level attained by the farmer had the lowest influence with a mean score of 1.11. Based on the study findings, the formal education level attained by the fish farmer didn't negatively affect the performance of fish farming. Most of the farmers had attained primary and secondary education with a few with college and university levels. This insinuates that the knowledge and skills obtained by the farmers over time as a result of experience played a major part in the performance of fish farming. Most farmers had not embraced new technologies while some were reluctant and preferred to stick to their old methods of farming.

In an interview conducted to the field extension officers, field days were organized for the farmers yearly. The farmer's education day was conducted yearly and knowledge could also be gathered from Agricultural shows. Information also obtained from the interview indicated that extension services were carried out daily but based on demand. Most respondents however said that they lacked adequate trainings to carry out sustainable fish farming projects. These results concur with Singas and Manus (2014) who assert that "lack of knowledge and skills, was among the problems facing fish farming projects. This could be the reason why many farmers are not performing well".

Information obtained from the interviews also revealed that Extension services were carried out on a small scale to the farmers based on request to the fishery extension officers. Extension programmes to the farmers were therefore inadequate because there were few extension officers with a large coverage area which put a strain on their service delivery. Most of the operational fish ponds were owned by farmers who had attained the knowledge and skills on a large part from experience, which is farming for more than four years. Fish farming field days were organized on occasional basis.

Extension services were of a significant positive influence on fish farming performance. Farmers provided with extension services performed well as compared to those who were not. These findings corroborate with Ngugi, Bowman and Omolo (2007) who reported that "poor government funding to aquaculture extension staff was a major factor affecting the performance of fish farming". The level of significance of the factors was however not indicated. Mwangi (2008) in his study report also pointed out that "inadequate technical services due to a limited number of government extension officers was the main impediment to aquaculture success in Kenya".

New technology had a low contribution to the performance of fish farming at a mean of 2.5. This is because change of technology is very slow and some of the farmers were not ready to adopt them. This derails the fish farming activity among the farmers. The interview report also depicts that adaptation to new technologies in Kwanza Constituency was hampered by hesitation of farmers to adopt new technologies on a preference of sticking to what they were already used to. The hesitation was also caused by the high cost of investment capital which includes pumping of water, filtration and

the high level of management. The new technologies included RAS (recirculating aquaculture system), aquaponics system and hanging ponds in greenhouses.

The interview further pointed out that most of the respondents had not even heard of the new methods and therefore had no options to choose from. These findings echo Chi and Yamada (2002) who find out that "They have not yet seen the demonstration or not understood or they were worried of low yield and also Old behavior of cultivation practices embedded in farmers for long periods, were not persuaded to use new technology."

These factors have contributed to the slow pace at which farmers are picking up the use of new technology. Adaptation and the use of technology can be efficient in promoting fish farming if extension officers help the farmers understand the advantages and constraints of fish farming. Organization of enough extensional services, seminars and training workshops and on-farm trainings are essential in promoting fish farming in most rural areas in Kenya. These findings are consistent with (Agbamu, 2000) who reported that "the clamors for higher productivity in fish farming can be achieved not only by coming up with improved technology but to properly organize sufficient extension services. This is when the impact of technology can have desired effects on fish farmers".

Most rural areas in Kenya are remote and dominated by poor fish farmers who cannot afford to sustain their projects without financial or material support. It becomes even worse when the farmers lack the skills to maintain their projects. This leads to stalling of fish projects and wastage of resources that were initially put into the project. Despite enormous resources and great potential, the integrated livestock-fish farming in Kenya has failed to take off due to social and economic challenges. Integrated livestock-fish aquaculture is confined to remote villages by few poor farmers with little knowledge, whose work in most cases is unreported even in national aquaculture statistics (Ogello, Mlingi, Nyonje, Charo-Karisa, & Munguti, 2013).

4.2. Regression Analysis

Regression Analysis was computed in order to establish whether there was a significant Influence between the Farmer Knowledge & skill on performance of fish farming

	Unstandardized Coefficients		t	Sig.
	B	Std. Error		
Constant(β_0)	1.792	.285	6.282	.000
Farmer Knowledge & skill (X_1)	.098	.047	2.070	.040

Table 2: Regression Model

From the finding of regression analysis, it was noted that the model had the following results: $\beta_0 = 1.792$ and $\beta_2 = 0.098$. At 5% (0.05) level of significance; Farmer Knowledge and Skills was statistically significant ($p < 0.05$). These results imply that Knowledge and Skills has a significant influence on performance of fish farming.

5. Conclusions

The study established that farmer knowledge and skills greatly influenced adoption of new farming techniques in fish farming. In some areas however, the farmers lacked the necessary skills of balancing fish feeds and maintaining fish ponds. With such knowledge, they can be able to balance and use locally available feeds that are easily accessible and affordable. Extension services were equally influential on the performance of fish farming. As much as extension services positively influenced fish farming, the services were few and strained in some areas. This proved that adequate knowledge and skills are lacking in the study area. The county government should therefore make a point of employing more extension officers owing to public demand.

5.1. Recommendations

Based on conclusions made from the study, these recommendations were made that:

- Community involvement ought to be embraced before a project is launched of the nature that proper monitoring and evaluation is done.
- Training seminars should be tailored to match such needs as pertains feasibility of the studies.
- Extension services by agricultural service support are really needed by farmers and a follow up to be carried out regularly. More extension officers should be employed by the county government to assist in dissemination of knowledge and skills in fish farming. This will also help farmers in the adaptation of new farming technologies that will improve production rates and also ensure food security.

5.2. Areas for Further Research

In accordance to this study findings, suggestions made for further research were that:

- Future researchers should dwell on extensive feasibility studies to be carried out in establishing proper demographic factors about a population for swift program initiation, implementation, monitoring and evaluation for targeted goals accomplishments.
- A study on factors affecting sustainability of small scale fish production should be investigated.
- A study on the influence of pests, predators and diseases on the production in fish farming.
- A study on factors affecting credit accessibility for fish farmers in Kenya

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