
The Perceived benefits of Fish Farming to Rural Communities: The Demotivating Factors of The Sector's Development in Busia County, Kenya

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ABSTRACT

Fish farming has and continues to play a vital role in improving nutrition and creating employment. The sociological aspects manifest in the household as well as the community were the focus in the study aimed at establishing the households and group networks in the development of fish farming in Busia County. In as much as there has been heavy investment in the fish farming industry, there have been a number of bottlenecks that slacken development. This paper seeks to point out the impediments to relationship between the realization of perceived benefits sought and the development of fish farming. The theory of reasoned action by Fishbein and Ajzen (1975) was used to explain the sociological relevance of the study. A survey research design that is cross-sectional in nature was used. The target population was that of farmers who registered, were actively involved in fish farming, as well as a number whom through their own initiative, ventured into the enterprise. Eight key informants were selected for the study. This study used a mixed-methods approach. The main statistical test that was used was Chi-square goodness-of-fit. The study findings pointed to the lack of relationship between perceived benefits and the development of fish farming in Busia County. Further, possible explanations revolving around the societal setup were picked out as the issues elucidating this. The study recommended that key components on conflict resolution and functionality should be included in the training, to be applied at family level. This would enhance the synergy and efficient functioning of the families as sociological units in the optimal development of the sector.

Key words: perceived benefits, development, fish farming, rational choice theory

INTRODUCTION

Fish farming has been argued to offer several benefits to farmers, their households and to the communities which practise it. This development has a number of advantages to community empowerment, particularly in rural areas (Pillay, 1993). The same sentiments are echoed by Boto, Phillips & D'Andrea (2013) who posit that the development world is of the position that fish farming is a formidable contributor to improved living for many households. This is because it provides high quality nutrition which is within financial reach for the lower economic classes in society. It also has played a major part in employment creation, income generation, and foreign exchange. It has also been considered a relatively low-risk intervention to community empowerment. The literature below sheds light on a number of benefits that the practice has to offer.

Fish Farming and Improved Diets

According to The United States Agency for International Development (USAID, 2013), fish is considered a major protein source. It is also a key source of vital amino acids, and vitamins in nutrition. The numbers of households that rely on fish for these vital nutrients number 2.6 billion worldwide. Some countries actually trade more volumes of fish than any other sources of animal protein. For the poor or marginalized communities living near water bodies along rivers, lakes, seas and oceans, fish is often their staple food because of its availability. For FAO (2017), the position is that fish and fish products play a vital role in food and nutritional security around the

world. Fish consumption provides distinctive benefits in terms of nutrition and health. It is therefore looked at as a key component in a balanced and healthy diet. There has been increased attention accorded to fish as a critical source of important nutrients in our dietary intake. This is not only limited to the fact that it provides high-value proteins, but also is a unique source of essential micronutrients and long chain omega-3 fatty acids.

Hishamunda, Cai and Leung (2009) opine that by providing diversified aquatic products, commercial fish farming can increase the stability of domestic food supplies and hence increases the country's resistance to transitory shocks that have negative impacts on food security. In addition, stable commercial fish farming production will help secure the incomes and jobs of its employees and hence increase the resistance of their households against transitory food insecurity. Andrew, Weyl, and Andrew (2003) also found that engagement in fish farming was driven predominantly by household consumption needs, and to grow income of the households.

Mwamuye, Cherutich and Nyamu, (2012) argue that Israel depends on fish farming to a significant extent which supplies more than fifty per cent of the locally consumed fish. China and India also get a quarter of the national fish consumed from farms. The United States of America and Japan are also substantially dependent on this source. Håstein, Hjeltnes, Lillehaug, Skåre and Berntssen (2014) mention that fish has for a long time played a central role in providing protein to humankind. This is the case with global estimates of fish farming supplying more than 30 per cent of fish consumed.

Gordon, Finegold, Crissman and Pulis (2013) further observe that fish serves a vital role in the dietary needs of the fishing communities and those that engage in fish farming in Sub-Saharan Africa. Those that engage in fishing sell their produce but also keep a portion to take home for their families to consume. The same happens with those who have fish ponds. After harvest, they save some for consumption at home. In many cases, a few pieces of fish are harvested for household consumption.

Improved Farmers' incomes and Fish Farming

The World Bank (2017) considers development in the agricultural sector to be one of the most powerful tools to reduce extreme poverty as well as buttress and reinforce shared success. This will see the various actors in the sector realize the goal of feeding a projected 9.7 billion people by 2050. Growth and development in the agriculture sector is two to four times more effective in raising incomes among the poorest in the society compared to other sectors. An analysis carried out in 2016 found that 65 percent of poor working adults made a living through agriculture. In order to enhance the production of this sector, the aspect of organization in farming cannot be downplayed as the meticulous planning is bound to give positive results.

Commercial fish farming supplies aquatic products for consumption, generates business profits, creates jobs, pays labour incomes, including wages and salaries, and provides tax revenues. Business profits, wages, salaries and taxes, which represent different levels of income from commercial fish farming and related industries contribute to the gross domestic product (GDP), which is a basic measure of economic performance. Business profits from commercial fish farming provide finance for investments and hence stimulate economic growth as well as provide savings from commercial fish farming employees. By creating jobs and providing wages and salaries, commercial fish farming helps alleviate poverty in general. Since this income can be used to purchase food items which would otherwise be inaccessible, commercial fish farming can improve food security in particular (FAO, 2009a).

Adewuyi, Phillip, Ayinde, and Akerele (2010) conducted a study titled "Analysis of profitability of fish farming in Ogun State, Nigeria". The study set out to describe the socioeconomic status of fish farmers, to determine the profitability of fish farming and to examine the determinants of fish output. The findings of the study concluded that fish production in Ogun state was economically viable. This was because of its capacity to create jobs, increase earnings as well as boost living standards of the people involved.

Rahman, Haque and Rahman (2011) carried out a study on the impact of fish farming on household income: a case study of Mymensingh District Bangladesh. The findings of the study revealed that incomes from this enterprise were of significance to the family incomes. This was in light of the fact that the study reported a 15.35 to 86.63 percent range in contribution to household incomes. From the study, it was evident that income from fish farming proved to be the most effective contributor when compared to other sources of revenue.

Perception of benefits: strengths and challenges involved

In some African countries, for example, Malawi, Kenya, Tanzania and Zambia, the importance of small fish species as a major animal source of food in the diets of rural populations living close to lakes is highly recognized and appreciated (Haug, Thomsen, Brantsæter, Kvaem, Haugen, Becher, and Knutsen, 2010).

The perceived benefits could potentially be affected by the duration taken for fish to attain maturity and get to the commercially viable weight required for the market. According to the Southwest Aquaponics and Fish Hatchery (2016), tilapia have a period of growth and development which start off at the stage of hatching and runs for approximately 240 days, or 34 weeks or equivalent to nine months. It is after this duration of time that the rate of growth flattens out for the rest of the tilapia's life. It generally gains only a few ounces per year. As for the catfish species, it takes about two years for the fish to get to a weight of 200 to 500 grams. This is according to Cheruiyot (2014), a lecturer in the Department of Animal Sciences at Egerton University, Kenya. These can be compared to other available sources of income and subsistence from the farm such as maize, which offer improved species that would mature in as short as four months according to the Kenya Agricultural Research and Livestock Organization (KARLO), previously known to as Kenya Agricultural Research Institute (KARI).

Another potential determinant that would affect the perception towards the benefits of the development of fish farming is the aspect of predation on fish. In a study carried out by Shitote, Wakhungu and China (2011) in Western Kenya on the challenges facing the development of fish farming in the region, it was noted that a majority (88.per cent) of fish farmers mentioned that their fish farms were affected by predators while those whose ponds were not affected by this menace were 11.7 per cent. These results bring to the fore the very fact that the issue of predation was a significant challenge to fish farming in the region. A Chi Square test carried out to also supported this finding as the value came to ($P < 0.01$). This demonstrated that indeed, there was a highly significant threat posed by predators. The same was also observed with the data obtained from focus group discussions. The most-commonly mentioned predators according to the findings from the study were kingfisher and other birds which accounted for 44.3 per cent, human beings (thieves) accounting for 26.3 per cent, crabs at 10.7 per cent, snakes accounting for 9.9 per cent and frogs at 5.2 per cent of the total predator percentage reported. According to Nyandat and Owiti (2013), in the Aquaculture Needs Assessment report on behalf of the Indian Ocean Commission, a similar finding is made in terms of focus on humans as predators as the study reported that the issue of theft of fish in ponds indeed was a menace for the Kakamega group that is located in Kakamega County in Kenya.

Value addition

Another potential issue that would affect the perceived benefits towards fish farming is value addition and the value chain. It can be argued that value addition to agricultural products is the process of increasing the economic value and consumer appeal of an agricultural commodity. This is according to Executive Director Reuel K. Virtucio of the Punla sa Tao Foundation in the Philippines in 2009.

There are a myriad of options in terms of value-addition and processing in fish farming at all levels of organizations- both large and small-scale. Value-added products have the ability to provide a number

of benefits; they offer a relatively higher level of safety in terms of hygiene, the preservative measures serve to increase the shelf-life of the products as well as help to maintain a high level of quality. Based on these benefits, it also helps to open up new market opportunities. It on the same note offers a solution for supply issues that are posed by value-added fish and shellfish products that normally undergo a number of steps in their processing that will serve to render the bacteria and pathogens inactive. This could include killing the micro-organisms. The inactivating or reducing of bacteria in a food generally leads to an extension in the shelf-life of a product. This therefore means that they can be transported to further destinations without going bad thus providing further market opportunities. The diminishing of fish and shellfish quality is normally caused by the decomposition of vital components of the raw material which are from endogenous enzymes or microbial action (Bernardo, 2009).

According to the Kenya Marine and Fisheries Research Institute (2017), by getting better quality products using value added production systems and through marketing of the fish and fish products to get to the national markets outlets such as supermarkets among other retail outlets, it is expected that more returns will trickle in. The fillets, slices, whole smoked and/or solar dried fish products form part of the extra value added. Also, the various processes like packaging, traceability, branding and labelling of the products contribute towards the value addition chain and affect final product outcome positively.

It has been argued that fish farming offers an upper hand both in the supply and product advantages over capture fisheries (Muir and Young, 1998; Eagle, Naylor and Smith, 2004). This is in light of the fact that the manner in which markets assign value to the fish produce is heavily reliant on the consistency and predictability of the production. This is attained on fish farms because they generally have far much more control over the key aspects of timing in terms of when to harvest, consistency in terms of size of fish harvested, and quantity of production in terms of the catch. This is highly unlikely when it comes to capture fisheries on the basis of the facts that the sector faces a number of constraints. These include the nature of production, which is usually variable,

uncertain in terms of making an actual catch as well as the aspect of the inability to increase the catch at will.

The basic value chain as opined by Gordon, Pulis and Owusu-Adjei (2011) goes through three main steps from the source of fish to consumer production, marketing and consumption. At each stage, they report that there are a number of essential goods and services that are required in order to realize the transformation and progression of the fish product through the chain and on to the end consumer.

Before fish gets to the consumer, it is important to note that it runs the risk of contamination. Fish caught from water that are free from pollution is usually clean and thus, the flesh is safe for human consumption. The challenge often starts when the fish is handled in a rough or an unhygienic manner. Equally, when there is poor control of temperature, then there is room for the fish to go bad (Gordon, Pulis and Owusu-Adjei, 2011).

According to FAO (2014), the following are some of the various ways in which fish from both natural water sources and farms can be contaminated. These are presented in the order based on the extraction/harvesting process all the way to the point of sale once they get to the market. First and foremost is during the fishing. This is bound to occur if nets are not checked for any left-over fish and cleared regularly, the produce faces the risk of loss in terms of quality due to spoiled or rotten fish. Equally, there is the potential risk of physical loss due to the actual predation from other fish.

Under the same issue of contamination, if the fish are not harvested with care, the flesh of the fish can end up being damaged through potential squeezing and ripping. Secondly, there is the process of the storage of the fish on board the vessels and containers in use. If fish harvest is kept without ice to keep the temperatures low or are not gutted to remove the intestines and other non-consumable parts of it, it will rapidly spoil. This most probably will be the case especially in high temperatures as well as when unsuitable storage containers are used. Also, fish harvest that is stored at the bottom of the boat can end up being stepped on. These ambient conditions

could lead to the spoiling of the product if it is not correctly preserved on ice. There is the risk of the fish falling prey to theft in ports or by the fish ponds or falling to the ground and getting contaminated or, being stepped on by passers-by (FAO, 2014).

In the marketing of fresh fish, the lack of ice to keep the fish cool and the lack of proper containers to keep the fish free from the elements and contamination has taken a toll on the quality of the fish. In some cases, the fish is left exposed on the ground and thus risks contamination from various sources ranging from dirt and insects. During the stage of processing and packaging, it has been noted that the quality of fish is bound to suffer if at all the processing is not done in an appropriate environment, for example on the floor and with the lack of the required hygiene measures put in place. These include clean water, no smoking during the processing of fish and the like (FAO, 2014).

During the storage stage, if at all the storage containers are not correctly used, for example if they are not properly closed, they will definitely not function appropriately in protecting the fish produce from high temperatures, insects, as well as exposure to various sources of contamination. In the distribution stage, the transportation of fresh fish for example in the trunk of a car or through the use of other modes such as donkeys, bicycles, motorcycles and the like without the use of ice and with the lack of adequate and proper packaging is bound to also expose the produce to high temperature as well as the risk of contamination with dirt, from insects among others (FAO, 2014).

There are various reasons as to why farmers miss out on value-addition and thus, the benefits that accrue from it. They are summarized in the quote below that represents the situation in Asia.

“In many developing countries here in Asia, we produce a wide variety of agricultural products, but have not yet optimized the economic benefits we can derive from them. This is due in part to inadequate knowledge of appropriate value-adding technologies coupled with poor infrastructure facilities and the absence of coherent policies to support such an

undertaking, especially in rural areas,” **Joselito C. Bernardo (2009)**

In light of the preceding literature, it was evident that the development of fish farming in Busia County has a number of aspects under perception that need to be investigated. A comparative assessment of a similar nature had never been conducted in Busia County before. This study therefore sought to fill this information gap.

OBJECTIVES OF THE STUDY

The study sought to investigate whether or not there is a relationship between the benefits associated with fish farming and the development of fish farming. These benefits include improved incomes and access to nutrition.

Theoretical framework

Theory of Reasoned Action (TRA) was used to anchor the study. This is a model that originated from the field of social psychology. Developed by Fishbein and Ajzen (1975), TRA aimed to draw a correlation between beliefs, views, norms, intentions, and behaviours of individuals. The theoretical perspective posited that a person's behaviour was determined by his/her behavioural intention to perform it. The prevailing view of a person towards an action was determined by his/her beliefs on the outcomes of this behaviour, multiplied by the person's evaluation of these consequences. This model therefore put forward a case of external stimuli influencing views by modifying the structure of the person's beliefs. Moreover, behavioural intention was also determined by the subjective norms that were themselves determined by the normative beliefs of an individual and by the individual's motivation to comply with the norms.

The theory of reasoned action further posits that all other factors which influenced the behaviour only did so in an indirect way by influencing the view or subjective norms. Fishbein and Ajzen (1975) referred to these factors as being external variables. These were such as the tasks involved, the capacity to comprehend the technology, the demands of setting

up the technology, the political influences, and the organizational structure, among others.

The theory of reasoned action was applicable to the study as it shed light on the individual views towards fish farming. This was in light of the tasks involved in the setting up and management of fish farms at household level as well as consumption. It also looked at the organizational structures within the household and how they were able to support the development of fish farming in terms of the distribution of roles. In spite of the strengths of the theory to contribute to the anchoring of the study, it had some minor shortcomings in terms of its incapacity to clearly bring on board the economic aspects of fish farming as well as its capacity to present a clear understanding on how frequency of consumption of fish farming would play out in influencing the development in fish farming.

METHODS

This study used a mixed methods research design that was cross-sectional in nature. This approach was suitable for this study because it possesses the attributes of generating insights that encapsulates both the aspects of depth/intensiveness and breadth/extensiveness. The research was conducted in Busia County. The choice of the site was informed by the reports on the vibrant fish farming activity taking place in the County. This was equally informed by the County having benefited from the Economic stimulus Pack (ESP). The registered fish farmers who benefitted from the ESP and were still working with the fisheries department were about 1,620. As of 2015, 55 percent (800) were active. (County Government of Busia-Fisheries Office, 2015). The farmers who were chosen for the study were selected using random sampling which allowed an equal chance to all and enable the study respondents get an equal chance of being selected. For the purpose of this study, a sample from the total number of households was chosen from farmers' groups. This was arrived at by the use of the equation 1 below (Yamane 1967).

Equation 1: Yamane formula to determine sample size

Where; **n** is the sample, **N** is the universe/population and **e** is the confidence level

$$n = \frac{N}{1 + N(e)^2}$$

$$n = \frac{800}{1 + 800(0.05)^2}$$

$$n = \frac{800}{3}$$

$$n = \underline{267}$$

This gave a total of 267 respondents to be interviewed. However, those that the research team was able to access randomly during the study who were beneficiaries of the ESP was 222. An extra 31 who went into fish farming upon funding themselves were also selected through random sampling. An additional eight key informants were selected for the study. These included three government extension officers, two chairmen of fish farmers' organizations, two fish farmers in the county that belonged to groups (clusters that farmers were put in to allow them access ESP support) and a chief.

The study used two research instruments. These were the standardized interview schedules for the survey to collect information from the farmers, and interview guides for key informants. These key informants were chair persons of the farmers' groups, one local area chief and county fisheries officers. The interview schedule was the standardized tool for purposes of the study with both open-ended and closed-ended questions. The schedule was divided into five subsections. The first was on background information of the interviewees and the following ones were based on the thematic areas emanating from the objectives that were selected to guide the research. Face-to-face interviews were conducted to collect data.

For the data analysis, there was transcription of qualitative data. These data were coded into categories as a way of organizing them before being thematically analysed and categorized to fit into the goals and objectives of the study. Some of these data were incorporated in the discussion and verbatim quotes given in support of the quantitative data. This served to ensure data triangulation. Some were also incorporated into the recommendation sections where relevant and applicable.

In this study, quantitative data after cleaning, were pre-coded and fed into the Statistical Package for Social Scientists (SPSS) software (Version 20) package for purposes of statistical analysis. Both descriptive and inferential statistical tools were used in the presentation and analysis of the quantitative data as described below. These quantitative data were in two categories; descriptive and inferential.

RESULTS

Background information

Age of Respondents. The research sought to find out the ages of the respondents who took part in the study. This was mainly aimed at getting to find out the farmers' distributions in terms of the various age brackets. It was observed that a majority of the farmers (37.9 per cent) were between the ages of 41 and 50. This was followed by the categories of those between 31 to 40 years in age (22.8 per cent) and 51 to 60 years of age (22.5 per cent). These made the top three of the six age brackets. Those who fell within the age bracket of 61 and above (11.02 per cent), 21 and below (3.27 per cent) and 21-30 (2.45 per cent) came bottom three. This was mainly attributed to a number of reasons. Those in the top half were better educated and enjoyed greater financial stability as compared to those in the bottom half. On the same note, they interacted more and had the energy to make decisions on the farms which included those that affected the fish farm enterprise.

They also made the largest share of the land owners who were the beneficiaries of the Economic Stimulus Programme. As for the bottom half, those at 61 and above in the region were mainly in the sunset years of their lives thus, according to Erikson and Erikson (1998) this is a stage of reflection where individuals at this stage want to look back at how they lived their lives. The effect therefore is that very few will interact, have the desire to invest and also want to engage in any entrepreneurial activities. They also are physically constrained by age and sometimes ill health. Those below 20 up to 30 are constricted in engaging in farming as a majority do not have a controlling stake in land ownership either through purchase or through inheritance. Those at the ages of 21 to 30 also were engaged in employment mainly in urban areas that limits their presence in the rural areas to allow them to take part in the fish farming enterprise.

Between 41 and 50 people who we say inherited land from their fathers and grandfathers, so when the ESP program came on board, these fish ponds were constructed in the lands they had inherited as the beneficiaries. This land was inherited from people around age 60 and above. The reason we do not have

people between the ages 30 and 40 is first, young people are still viewing fish farming and agriculture as an old man's job, a retiree's job. Farming is not attractive to this age group. 21 to 30 are still in school. **Interviewee Three**

Gender of Respondents. The research study also sought to find out the gender of the participants. In light of the fact that the fish farming enterprise was one that could easily be run by either gender, it was worth taking stock of the situation in Busia County. From the findings, it was noted that a majority of the farmers (79 per cent) who run the enterprise are men. Their female counterparts only control nearly a quarter (21 per cent) of the stake in the region. This confirms what Adewuyi et al., (2010) argue in that women in Ogun state of Nigeria have not featured so strongly in the enterprise. This is unlike the case where women are seen to be actively engaged in fishing, processing and marketing of fish from natural sources despite the fact that there are socio-cultural taboos against women who strive to earn their living in rural areas (Olufayo, 2012). The same observation is made in the case of Mozambique which sees the women in the sector directly employed in the labour force on prawn farms, approximately 30 percent are women, whose jobs are in the post-harvest functions or in management (FAO, 2006).

Despite the capacity of women to run the enterprise as well as their male counterparts, they remain the minority for a number of reasons. First, key decisions concerning the land are made by men, and even if the women are consulted, the final decision is made by the man. Ownership of key assets and enterprises are also controlled by the man thus limiting the woman's stake in it. Going by the returns from the economic activities that the average woman in Busia County engages in on a daily basis, the financial requirements that go into maintaining a fish farm may be out of her reach. This is also in lieu of other immediate needs like food for the family that compete for the same income.

The same sentiments are reflected in the interactions with key informants. They feel that women seem to have taken a back seat on issues of ownership of ponds as they prefer handling duties such as sales.

“Women just rely on fish trade since the men are the ones who harvest and have the fish ponds. The women agree with the husband on the commission per fish or kilo. So women tend of side-line themselves as they know that their role is just sell fish and men handle other things”. **Interviewee Four**
The issue of land still plays a major role here. Men are the land owners, women do not inherit land. When the program therefore started, the men were the target group and direct beneficiaries as they are the land owners. The women are just secondary players and are just left to feed the fish. The actual owners of the fish ponds and land are men and this is why women are largely excluded from this activity. You visit any homestead, you will find that the man is always away but it is the woman who regularly feeds the fish. She does it on behalf of the land owner. **Interviewee Three**

A Chi-Square goodness of fit test was performed to assess whether there was a relationship between the perceived benefits of fish farming and the development of the sector in Busia County. The chi-square test was statistical test of choice based on the need to test the inferred relationship between the variables in the hypothesis as mentioned above. The Statistical package for Social Scientists (SPSS) Version 17 was used to run the test. From the findings, there was no significant relationship between the two variables ($\chi^2 (2, N=214) = .187, p < .05$). See table 1).

Table 1: Chi-Square test for the relationship between the perceived benefits of fish farming and the development of fish farming

| The perceived benefits of fish farming | Development of fish farming | | | Total |
|--|-----------------------------|--------------|--------------|--------------|
| | Decrease | No change | Increase | |
| Low | 17 | 46 | 110 | 173 |
| | 9.8 | 26.6 | 63.6 | 100.0 |
| | 68.0 | 85.2 | 81.5 | 80.8 |
| High | 7.9 | 21.5 | 51.4 | 80.8 |
| | 8 | 8 | 25 | 41 |
| | 19.5 | 19.5 | 61.0 | 100.0 |
| Total | 32.0 | 14.8 | 18.5 | 19.2 |
| | 3.7 | 3.7 | 11.7 | 19.2 |
| | 25 | 54 | 135 | 214 |
| | 11.7 | 25.2 | 63.1 | 100.0 |
| | 100.0 | 100.0 | 100.0 | 100.0 |
| | 11.7 | 25.2 | 63.1 | 100.0 |

DISCUSSION

The first possible explanation to the lack of relationship between the perceived benefits of fish farming and the development of fish farming was the challenge that farmers faced on the technical aspects of proper pond management and post-harvest handling. This, therefore, made it difficult to realize the optimal output of the enterprises. In the case of Busia County, according to the accounts given by key informants, the noted shortcomings revolved around aspects such as feeding, ensuring proper water quality, and more so on the issue of post-harvest handling and value addition. The findings above are in tandem with those of the study carried out by Shitote, Wakhungu and China (2011), which attributes the output of fish farming as revolving around aspects of low investment, poor management and low yields.

On post-harvest handling, it was noted that farmers incurred losses out mainly due to the lack of storage facilities. As the harvest awaited delivery to the market, losses would be witnessed. This was reported by key informants who mentioned that the refrigeration facilities were out of reach for a majority of the farmers in terms of cost thus, Beyond Borders: Advances in Global Welfare
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increasing the probability of loss through this way. These findings agree with those of Gordon, Pulis and Owusu-Adjei, (2011) who posit that fish caught from water that are free from pollution is usually clean and thus, the flesh is safe for human consumption. The challenge often starts when the fish if handled in a rough or an unhygienic manner and equally, when there is poor control of temperature which increases the possibility of the fish to go bad.

The second possible explanation to the lack of relationship between the perceived benefits of fish farming and the development of fish farming was that a significant portion of harvested stock was being consumed at household level. This meant that there was a significant quantity that was harvested but never translated to economic returns. After the harvesting exercise, it was noted that some farmers gave away significant volumes to those who helped harvest as well gave or sold to neighbours at prices that are not competitive as they are not at par with the market rates. This adversely affected the volumes availed for sale at the competitive market rates. The above-mentioned issues are supported by the information obtained from a key informant interview quoted below.

I blame the entry of the ESP people, the primary role was to support the needs of the family with regards to food. They did not commercialize fish farming in any way. For example, if a farmer has one pond, he feeds his family with the fish and has very little left to sell.....The home consumption and sale would be most popular. This is because when farmers harvest, they call neighbours and may not offer competitive prices to the neighbours. Some even give out this fish for free to the young men helping them harvest. So, you can imagine from one pond, how much fish one may need just to give out to neighbours and those who have assisted you. So this is still a problem.

Interviewee Three

The above would go to show that in this case, the perceived benefits of fish farming would not significantly affect the development of the fish farming enterprise. Gordon, Finegold, Crissman and Pulis (2013) also argued that those that get their fish through fishing or through rearing them on their

farms, all kept a portion to take home for their families to consume.

The third possible explanation to the lack of relationship between the perceived benefits of fish farming and the development of the sector in Busia County was the aspect of predation and theft. Some of the farmers mentioned that there was a challenge with this menace as it presented itself from the wildlife and the human population around. This affected the morale of the farmers in that they sometimes ended up losing all the fish they had stocked in their ponds. The above-mentioned position is supported by the quote below.

Yes, since some farmers are poor and cannot fence their fish ponds. As a result, people can steal the fish and predators can also eat the fish. Animals can pass through and get to the fish. There are various birds in Bunyala that prey on fingerlings and fish. They can even eat all the fingerlings, resulting in no fish.

Interviewee Three

The above-mentioned position is shared by Shitote, Wakhungu and China (2011) who, through a study they carried out in Western Kenya reported that a majority (88.3 per cent) of fish farmers mentioned that their fish farms were affected by predators while those whose ponds were not affected by predators were 11.7 per cent.

Under the aspect of theft, it was noted that this was done by individuals found internally (within the household) and externally (from the neighbourhood). The study also found that there was the mention of people invading farms and stealing fish from the ponds. In as much as it was not widely mentioned by the farmers, it still came out as one of the potential issues that explained the lack of relationship between the perceived benefits of fish farming and the development of fish farming in Busia County. This phenomenon was practised by family members too. There are those who stole directly from the pond and sold their loot or stole a portion of the income from the sale of fish whenever they had a chance to. The following quotes support the above-mentioned position.

Yes, that is income, not all people have money. Stealing is there even within the family members. They can even steal the fish and sell without the

owners knowing because of the disparity of others not having, one has and you do not have..... Maybe in the village it is the only one and you know it has market. When someone steals fish, he sells straight away because it will not stay due to the demand.

Interviewee Six

When taking the fish to sell, they may steal from you by under quoting the kilos they sold and this is a big challenge. They may say they sold 200 kilos yet it was 240 or 250 kilos. **Interviewee Five**

The study findings are in accordance with what Nyandat and Owiti (2013) reported in the Aquaculture Needs Assessment report as one of the main issues in the Kakamega group that was based in Kakamega County, Kenya which clearly mentioned that theft of fish was an issue they often faced.

The above-mentioned explanations showing the lack of relationship between the perceived benefits of fish farming and the development of fish farming in Busia County are of key importance to the field of sociology. This is in light of the fact that issues of post-harvest handling point out to there being some inadequacies in the manner in which the social networks in the fish farming both at family and at group level operate. The same is also manifest in terms of explaining the challenges that come with value addition and how it contributes to the lack of relationship between the two variables in hypothesis one.

In addition to this, the aspect of there being high consumption at household level is symptomatic of weaknesses in the social networks at group/community level where farmers are expected to be sensitized on the need to focus on the regulation of consumption and availing more produce for sale. Equally, the aspect of weaknesses in social ties is manifest when incidences of predation and theft of fish are reported by farmers. This shows that some farmers experienced challenges in coordinating those around them to assist in providing security at the pond site. Similarly, the lack of trust within the family network amounts to theft of fish and/or the proceeds from the sale of it.

Study Implications

Policies should be put in place to promote the training offered to fish farmers to be inclusive of one or two of their family members. This will ensure that management of the fish farming enterprise by other family members is done from a point of common knowledge. Critical aspects that family members should be trained in are on pond management (feeding, fish behaviour), record keeping, as well as post-harvest handling. The ministries of education both at national and county level should also come up with basic programmes for schools in the County on fish farming so that they can enlighten the younger generation on the operations that go into managing fish farms. Of greater importance to the field of sociology is the need to have the trainings offered to farmers as well as their family members contain components that would promote conflict resolution and functionality/synergy within the units (family or groups/clusters).

The farmers who mostly are the owners of the fish ponds need to adopt a culture of involving their family members in the activities of the farm as much as possible. Resources allowing, the farmers should dig ponds to be owned by other family members. A significant percentage of the proceeds too should be controlled by them. The aim here, from a sociological perspective is to create a sense of cohesion and solidarity and by extension, secure their commitment to the enterprise. The farmers' groups should engage in a recruitment of fish farmers who operate devoid of group support and networks. This will serve to check the uncontrolled sale of fish mainly upon harvest and farmers will be expected to trade their commodities through the cooperatives.

Limitations

The study faced a number of limitations. The first and foremost was the element of suspicion by the farmers who were the main respondents, especially when it came to collecting information on the incomes from fish sales as well as on issues of the groups they had. They were however assured that the information they gave would remain confidential and would be used strictly for the purposes of the study. On the same aspect of suspicion, majority of the

respondents were hesitant to give information on the challenges they faced in their groups. This was overcome by sourcing for this information from the few who were willing to share on this as well as seeking the views of the key informants on the same.

The aspect of language barrier arose as Busia County is home to the Iteso/Itesot community who speak Teso. The services of a translator came in handy in order to facilitate communication for data collection. On the same note, the translators played the vital role of introducing the data collection team to the locals which then made the exercise easier. Some of the respondents wanted to be paid for having taken part in the study. It was however made clear to them during the debriefing that they would not get a monetary reward for participating.

CONCLUSIONS

Results of this study indicates that there was no significant relationship between the benefits of fish farming and development of the sector in Busia County. Three main factors may explain this observation. As indicated, many farmers had challenges on the technical aspects of proper pond management as well as post-harvest handling, making it difficult to realize the optimal output of the enterprises. The poor practices in post-harvest handling saw the farmers lose stock mainly due to the lack of storage facilities. Second, it was noted that many farmers consumed a significant portion of their stock at household as well as community level. Third, there was the aspect of predation and theft whereby some of the farmers mentioned that there was a challenge in dealing with this menace as it presented itself from the wildlife around. This affected the morale of the farmers in that they sometimes ended up losing all the fish stocked in their ponds.

The study therefore recommends that the farmers be taken through training sessions on pond management and post-harvest handling. This training should also be provided to their family members as they too play a critical role in the day-to-day running of the enterprise. It is also recommended that the farmers be taken through basic training on business and management practices so that they focus on running their fish farming enterprises to make profits as

opposed to meeting the community expectations of sharing/giving away significant portions of their harvests. Remedial to this too would be the need for farmers to move their produce to the market through cooperatives. This would compel them to stick to the laid down guidelines especially in terms of honouring the targets set for the farmers. Lastly, the farmers

should be encouraged to involve their family members more in the enterprise as well as ensure returns from the proceeds are shared in a considerate manner, recognisant of the efforts of the individual family members towards the development of the fish farm.

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