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## Impact of Fish Farming on Poverty Reduction in Zanzibar

**Ally Khamis Ali**

Ph.D. Student, Department of Public Administration,  
Zanzibar University, Tunguu, Zanzibar

**Nsubuga Haroonah**

Professor, Department of Public Administration,  
Zanzibar University, Tunguu, Zanzibar

### **Abstract:**

*The study focused on assessing the impact of fish farming on poverty reduction in Zanzibar. The specific objectives were:*

- To assess the effects of fish farming income on poverty reduction in local communities in Zanzibar, and*
- To analyze the effects of fish farming as a food source on poverty reduction in local communities in Zanzibar*

*The study adopted a descriptive design. The Primary data were used and were collected using close-ended questionnaires and face-to-face interviews. Qualitative data were analyzed thematically, while quantitative data were analyzed by Frequency tables, Mean and Standard Deviation, and Regression. The study concluded that fish farming impacts poverty reduction in Zanzibar as the results indicated fish farming income affected poverty reduction as depicted by high mean scores of the statements on poverty reduction and that fish income reduced poverty by 68.2%. Also, fish farming as a food source affected poverty reduction as depicted by high mean scores of the statements on poverty reduction and that fish farming as a source of food reduced poverty by 70.1%.*

**Keywords:** *Fish farming, poverty reduction, income generation*

### **1. Introduction and Background**

Fish farming raises fish commercially in tanks or enclosures such as fish ponds (FAO, 2014). It is well-known worldwide that fish contains higher protein levels and other essential minerals and vitamins. Thus, in terms of providing nutrition, improve the citizens' health. In the world, fish products support the livelihoods of more than 530 million people (Atukunda et al., (2017). Ride (2014) observes that human consumption of farmed fish is increasing day by day as more governments promote the science of fish rearing. It is believed that global fish farming is expanding at a rate of 6.2% every 5 years (FAO, 2021). Fish farming is credited with stimulating the development of rural communities (Stutzman et al., 2017). Countries such as the USA, India, Indonesia, etc., have promoted fish farming to improve the livelihoods of people in local communities. Other countries such as Kenya and Nepal have gone to the extent of forming SACCOs to organize fish farming in their countries. According to FAO (2021), fish accounts for 17-20 percent of the global population's intake of animal protein, minerals, and vitamins and supplies 25 percent of the total protein consumed in developing countries. The Revolutionary government of Zanzibar had developed a long-term framework to invest in long-term solutions to food security; one of the pillars of the framework was fish farming. Fish farming was taunted to expand economic opportunities in rural areas through employment creation and increasing food production.

Further, the government's objectives were to promote the populace in Zanzibar to enter into fish farming to create income and employment opportunities, improve the nutritional status of the constituents, and contribute to the development of local communities in Zanzibar. To accomplish that Agenda of fish farming, the government of Zanzibar developed a policy to improve fish farming in the country. The Policy aims at:

- Investing in fish farming by subsidizing fish feeds to increase affordability,
- Developing processing value addition industries and diversifying markets for farmed fish

Due to these efforts by the government, Fish farming has improved from 1.8 tons in 2017 to 14.1 tons in 2021 (DFD, 2022). However, despite this growth in fish farming, the impact of fish farming on poverty reduction in Zanzibar is rarely known. A few studies have been undertaken in the fisheries sub-sector on the challenges facing fish farming. However, there is a dearth of knowledge on the overall impact of fish farming on poverty reduction among the local communities in Zanzibar.

#### *1.1. Statement of the Problem*

Fish farming has been identified as a crucial area with a number of opportunities that could sustain individual livelihoods (Atukunda, 2017). Although fish Farming has been identified as an area of opportunity for economic transformation and poverty reduction, its overall impact on poverty reduction has not been well explained (Mwajande & Lugando, 2015). Fish production in Zanzibar improved from 1.8 tons in 2017 to 14.1 tons in 2021 (DFD, 2022). Despite the

increased rate of fish farmed production in Zanzibar, the information in literature scarcely explain its impact on poverty reduction. This raises a question: what is the impact of fish farming on poverty reduction? This question led to the design of this study to investigate the impact of fish farming on poverty reduction among fish farmers in Zanzibar.

### 1.2. Specific Objectives

- To assess the effects of fish farming income on poverty reduction in local communities in Zanzibar.
- To analyze the effects of fish farming as a food source on poverty reduction in local communities in Zanzibar.

### 1.3. Hypotheses

- H<sub>10</sub>: There are no effects of fish farming income on poverty reduction in local communities in Zanzibar.
- H<sub>1a</sub>: There are effects of fish farming income on poverty reduction in local communities in Zanzibar.
- H<sub>20</sub>: There are no effects of fish farming as a food source on poverty reduction in local communities in Zanzibar.
- H<sub>2a</sub>: There are effects of fish farming as a food source on poverty reduction in local communities in Zanzibar.

## 2. Theoretical Review

The study was informed by the Uncertainty theory of Profits. The uncertainty Theory of profits was developed by Frank Knight (1921). It holds that profits as a non-contractual residual accruing to the entrepreneur for his non-transferable function of bearing uninsurable future uncertainty. According to the theory, profit is the price paid for bearing uninsurable uncertainty. The uncertainty is caused by the following factors: competitors' behavior, innovations, and consumers' behavior (like taste, government policy interventions, wage and labor policies, the income of people, and movement of prices, technological changes, and natural disturbances). However, according to John et al. (2016), the theory has a major criticism that the total profit of an entrepreneur cannot be completely attributed to uncertainty alone. Several functions also contribute to the total profit, such as innovation, bargaining, coordination of business activities, etc. This theory was used in the study to explain the profits gotten by fish farmers in Zanzibar. Mwaijande et al. (2015) observed that this theory explained how an entrepreneur achieves profit. Therefore, the theory was suitable for studying the impact of fish farming on poverty reduction among fish farmers in Zanzibar as the theory advocates for profits from non-contractual residual accruing to the entrepreneur for his non-transferable function of bearing uninsurable future uncertainty.

### 2.1. Empirical Reviews

The study reviewed related studies done by previous authors in the field of fish farming:

Mwaijande & Lugendo (2015) studied setting out data and issues relating to fish farming in Tanzania. The objective of the study was to generate information to inform fish farming issues in Tanzania. The study focused on data informing how challenges facing the fishing sector should be reformed or sorted. A survey design was used to get the information from 293 respondents. The results developed data for many constraints affecting fish farming. The major challenge was that farmers lacked information about fish farming.

Swapnali et al. (2015), in their study on constraints and problems facing fish farmers, found that there were challenges affecting fish farmers in India. The principle component analysis was used to identify the significant variables. The main challenge found was a lack of information on where to obtain fingerlings and a lack of feeds.

Syed et al. (2011) studied the contribution of fish farming to the household income of the fish farmers in Bangladesh. The population was all farmers from the four sub-districts of the Mymensingh district. Data were collected using a questionnaire, and the results showed that fish farming contributed a range of 15.35-86.63% to household income. Thus, the study concluded that fish farming significantly contributes to the practitioner farmers' household income.

Tunde et al. (2015) examined the economic analysis of fish farming in the Saki-East Local Government Area (LGA) of Oyo State, Nigeria. A questionnaire was used to collect data. Analysis was done using descriptive statistics and regression analysis. The findings showed that the total revenue cost was N244364.30 k per cycle, whereas the total cost was N129379.52 k per cycle. This implied that fish farming was profitable. Furthermore, the regression analysis showed that fish farming had an economic impact.

Gamal et al. (2006) studied the factors influencing fish farming productivity in Behera, Egypt. Fifteen fish farmers participated in the study. The results showed that high prices of fish feed, declining fish prices, and lack of finance were found out to be the top ranking severe constraints facing fish farmers in that area. Therefore, the study suggests that the government needs to intervene by mitigating the factors to improve fish farming in Behera.

A study by Njeru (2013) on factors influencing Fresh Water fish farming in Embu North District in Kenya used descriptive research design, purposive sampling technique open and closed-end questionnaires to collect data. Pearson correlation was used, and the results found that the performance of fish farming was influenced by ecological factors such as fish species, water supply, temperature, nature of soils, and pollution.

### 2.2. Conceptual Framework

The conceptual framework is shown in figure 1.

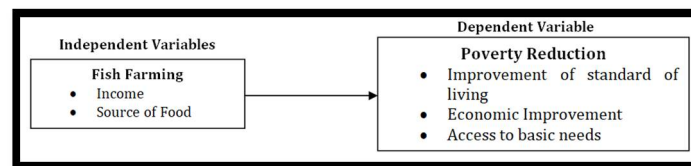


Figure 1: Conceptual Framework  
Source: Researcher, (2022)

### 3. Methodology

The study adopted the Descriptive Study Design. Descriptive design assisted the researcher in collecting data from a relatively larger number of cases at a particular time. The population of the study was three hundred (300) fish farmers from Central District. They include:

- 45 Fish Farmers from Watafaham association of Kikungwi,
- 50 from Maisha Siri of Uzi,
- 71 from Mwanzo Mgumu of Kikungwi,
- 58 from Mashallah of Unguja Ukuu,
- 76 from Zanzibar Shell of Chwaka

The sample size was determined by the formula suggested by Yamane (1967), thus giving a sample size of 85 respondents.

In this study, two sampling techniques were used, which are simple random sampling and purposive sampling. A simple random sampling technique was used to select a total of 85 respondents who participated in the study from each category. Simple random was used to give equal participation of each individual in the population. Purposive sampling was used to select the 10 respondents who participated in the interviews. In the interview, there were 2 respondents from each category of fish farmers. Questionnaires and interviews were used to collect data, and data were analyzed both qualitatively and quantitatively. Qualitative data analysis was done thematically, while quantitative data were analyzed using mean, standard deviation, and regression.

### 4. Results of the Study

#### 4.1. Response Rate

The researcher distributed 75 questionnaires to the respondents. Out of 75, 64 questionnaires were returned. This is equal to 85%. On the interview side, the researcher was expecting to interview 10 respondents for the study. However, only 7 out of them (70 %) participated in this study.

#### 4.2. Demographic Characteristics of the Respondents

This section provides a detailed analysis of the gender, age, level of education, and marital status of the respondents. These social attributes are relevant to this study since they enable the researcher to sense a clear picture of the information provided.

##### 4.2.1. Gender

Gender	Frequency	Percentage
Male	41	64.1
Female	23	35.9
Total	64	100.0

Table 1: Gender of the Respondents  
Source: Researcher (2022)

The data in table 1 shows that 41 (64.1%) respondents were males, while 23 (35.9%) respondents were females. The majority of the respondents were male. This denotes that there were more male participants in fish farming activities than female participants. Thus, the data shows that both genders participated in the study.

##### 4.2.2. Age

Category	Frequency	Percentage
20-29	19	29.7%
30-39	15	23.4%
40-49	20	31.3%
50+	10	15.6%
Total	64	100.0%

Table 2: Age of Respondents  
Source: Researcher (2022)

The information in table 2 indicates that:

- 19 (29.7%) respondents were of the ages of 20-29,
- 15 (23.4%) respondents were aged between 30-39,
- 20 (31.3%) respondents were aged between 40-49 and
- 10 (15.6%) of respondents were aged 50 years and above

The majority of the respondents were aged between 40 - 49. This indicates that most fish farmers are in their middle age, which is suitable to perform fish farming activities requiring strong energy. Age was an important aspect of this study as different ages have different opinions, and thus all ages were represented in the study.

#### 4.2.3. Marital Status of the Respondents

The respondents were asked to indicate their marital status. Table 3 shows the distribution of the respondents according to their marital status.

Category	Frequency	Percentage
Single	17	25%
Widow	7	14.1%
Married	39	60.9%
Total	64	100.0%

Table 3: Marital Status of the Respondents  
Source: Researcher (2022)

Table 3 shows that 39 (60.9%) respondents were married, 17 (25%) respondents were single, and 7 (14.1%) respondents were widows. Most of the respondents were married, which signifies that most of the fish farmers had families to take care of. Therefore, this aspect was essential to get the response on how fish farming impacted reducing the poverty of fish farmers in Zanzibar.

#### 4.2.4. Level of Education of Respondents

The researcher asked the respondents to indicate their level of education. The findings are presented in table 4.

Category	Frequency	Percentage
Primary education	16	25%
Secondary education	34	53.1%
Certificate or diploma	9	14.06%
Degree and above	5	7.81%
Total	64	100.0%

Table 4: Level of Education of Respondents  
Source: Researcher (2022)

The findings in table 4 show that 16 (25%) respondents had primary education, 34 (53.1%) respondents had secondary education, 9 (14.06%) respondents had certificates or diplomas, and 5(7.81%) respondents had degrees and above level of education. These results made us agree that the respondents could answer our questions in the questionnaire and interview correctly since they had formal education.

#### 4.3. Effects of Fish Farming Income on Poverty Reduction in Local Communities in Zanzibar

In this objective, the researcher wanted to understand the effects of fish farming income on poverty reduction in local communities in Zanzibar. Therefore, statements related to poverty reduction were given to the respondents. The response scale for the questions is given below:

- 1= Strongly Agree,
- 2= Agree,
- 3= Disagree,
- 4 = Strongly Disagree

Statement	Mean	Standard Deviation
My income has increased	4.40	0.65
I can afford health service	3.92	0.61
I own decent households	4.55	0.73
I can afford my children's school fees comfortably	3.67	0.15

Table 5: Fish Farming Income on Poverty Reduction  
Source: Researcher (2022)

The results in table 5 show the statements:

- My income has increased had a mean score of 4.40,

- I can afford health service had a mean score of 3.92,
- I own a decent household had a mean score of 4.55, and
- I can afford my children's school fees comfortably had a mean score of 3.67

The mean scores of the statements were high in all the statements, which meant that fish farming income had high effects on poverty reduction among the farmers. The results concurred with the results of Syed et al. (2011), who in Japan found that Fish Farming had impacted the poverty reduction among the farmers. The results were also similar to the results of Kassam (2013).

#### 4.4. Effects of Fish Farming as a Source of Food on Poverty Reduction in Local Communities in Zanzibar

This was the second objective. In this objective, the researcher investigated the effects of fish farming as a source of food on poverty reduction in local communities in Zanzibar. Statements related to poverty reduction were given to the respondents. The response scale for the questions was:

- 1= Strongly Agree,
- 2= Agree,
- 3= Disagree,
- 4 = Strongly Disagree

Statement	Mean	Standard Deviation
I can access three balanced daily meals.	4.09	0.85
My health has improved due to fish consumption.	3.63	0.73
My children easily get protein from fish	4.64	0.62
I can access proteins more easily from fish than from other animal meat.	3.76	0.16

Table 6: Fish Farming as a Source of Food on Poverty Reduction  
Source: Researcher (2022)

The results in table 6 show that:

- I can access three balanced daily meals had a mean score of 4.09,
- My health has improved due to fish consumption had a mean score of 3.63,
- My children easily get protein from fish had a mean score of 4.64, and
- I can access proteins more easily from fish than from other animal meat had a mean score of 3.76

The mean scores were all high, indicating that fish farming as a food source greatly affected poverty reduction in Zanzibar local communities. The results were similar to those of DFD (2022) and El-Naggar and Ahmed (2006). The findings were also in support of the results of FAO (2021).

#### 4.5. Regression Analysis

Regression analysis was contacted to find out the regression coefficients of the relationship between poverty reduction and the two predictive variables.

Model		Unstandardized Coefficient	Std. error	Standardized Coefficient	t	S.g
		B		Beta		
1	(Constant)	1.053	0.217		2.889	5.31E-03
	Fish Income	0.682	0.149	0.613	5.309	1.58 E-06
	Fish as a source of food	0.701	0.181	0.149	3.210	2.10 E-03

Table 7: Regression Coefficients  
Source: Researcher (2022)

The regression equation used was:  $Y = \beta_0 + \beta_1X_1 + \beta_2X_2 + \epsilon$ . Therefore, the equation becomes,  $Y = 1.053 + 0.682X_1 + 0.701X_2$ .

The regression analysis results established that all factors (Fish income and Fish as a food source) constant at zero poverty reduction was 1.053. In table 7, the findings show that taking all other independent variables at zero, a unit increase in fish income would lead to a 0.682 increase in the scores of poverty reduction and a unit increase in the scores of fish as a source of food would lead to a 0.701 increase in the scores of poverty reduction. In summary: Fish farming would reduce poverty by 68.2%. Thus, the study rejected the null hypothesis:

- $H_{10}$ : There are no effects of fish farming income on poverty reduction in local communities in Zanzibar, and accepted the alternative hypothesis,
- $H_{1a}$ : There are effects of fish farming income on poverty reduction in local communities in Zanzibar.

On the other hand, fish farming as a food source would reduce poverty by 70.1%. Thus, the study rejected the null hypothesis:

- $H_{20}$ : There are no effects of fish farming as a source of food on poverty reduction in local communities in Zanzibar, and accepted the alternative

- H<sub>2a</sub>: There are effects of fish farming as a food source on poverty reduction in local communities in Zanzibar. The results were similar to the results of FAO (2021) and James et al. (2014).

## 5. Conclusion

The study concluded that fish farming impacts poverty reduction in Zanzibar as the results indicated that fish farming income affected poverty reduction as depicted by high mean scores of the statements on poverty reduction and that the fish income reduced poverty by 68.2%. Also, fish farming as a source of food affected poverty reduction depicted by high mean scores of the statements on poverty reduction and that fish farming as a source of food reduced poverty by 70.1%.

## 6. Recommendations

The study recommended that the government should support fish farmers sustainably through various ways, such as fish feed subsidies. Also, the government should support fish farmers by widening up the market of fish and fish products.

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