

Tilapia Pond Farming: The New Driver of Blue Economy in Ifugao

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Abstract: *The province of Ifugao is listed by the National Statistical Coordination Board (NSCB) at number 7 with highest number of impoverished families in the Philippines with 47.5% poverty incidence. This condition of the province indicates the need to identify livelihood programs as alternative sources of income and nutrition to help alleviate its impoverished populace. Thus, this study sought to investigate the economic benefits of tilapia pond farming as a source of income in the province. It also ascertained whether the economic benefit in terms of production is influenced by the level of knowledge of tilapia farmers on the recommended tilapia pond farming practices. Data were obtained from a sample population of tilapia pond farmers in Ifugao using the chain referral sampling technique. Frequency, percentages, and mean were used to categorize and analyse the data using the Statistical Package for Social Sciences (SPSS). Correlation analysis was also utilized to test the level of association between the dependent and independent variables. The respondents' production (gross sales) from tilapia pond farming was categorized as "low tilapia pond farm productivity", notwithstanding their level of knowledge categorized as "knowledgeable". The level of knowledge in tilapia pond farming had a significant influence on the economic benefit particularly on cash income of the tilapia farmers. This significant relationship between the tilapia pond farmers' level of knowledge and the economic benefits derived from tilapia farming signified positive production potential.*

Keywords: Tilapia pond farming, economic benefit, Ifugao, production

1. Introduction

Aquaculture has been one of the fastest growing food production systems in the world, with the bulk of output currently produced in developing countries and with expectation for aquaculture to continue its contribution to food security and poverty reduction. The Food and Agriculture Organization (FAO) of the United Nations recognizes, in its Code of Conduct for Responsible Fisheries and accompanying guidelines, the current importance and future potential of aquaculture for rural communities and for food security. An increasing recognition of the importance of small-scale aquaculture is taking place, and that much hope is placed on aquaculture, to help not only fill the gap of insufficient fish production but also to provide alternative income sources for traditional farmers (Gaite, *et al.*, 1985). Accordingly, rural aquaculture generates employment and cash income, and provides animal protein and essential nutrients to consumers. It contributes to rural livelihoods, improves food supply, and makes low-cost fish available in domestic markets. And as aptly stated by Edwards (1999), rural aquaculture contributes to the alleviation of poverty directly through small-scale household farming of aquatic organism for domestic consumption and/or income; or indirectly through employment of the poor as service providers to aquaculture or as workers on aquatic farms of wealthier farmers; or indirectly by providing low-cost fish for poor rural and urban consumers.

In the Philippines, tilapia aquaculture has had success. Resource poor rural communities and large commercial producers alike have gained from the inland culture of tilapia (Guerrero, 1994). It was noted by previous studies that tilapia production in the country has proven to be very beneficial to the communities as an inexpensive source of protein, as well as an economic boon to the government and

the producers. Guerrero (1994) claimed that other provinces with appropriate water sources could also learn from the Philippine (Region III) experience and promote tilapia production. Central Luzon leads the production of tilapia, having produced a total of 101,233.74 metric tons and sold some 73,900.63 metric tons or 73% of the total production to other regions in the country with tilapia supply shortage (BFAR, 2008).

In the province of Ifugao, tilapia farming is in a dynamic stage today. In fact, the province of Ifugao now ranks first in terms of tilapia production in the Cordillera Administrative Region. Thus, tilapia is recognized as its one-town-one-product (OTOP). Undoubtedly, the potential of tilapia pond farming to attain food security and help spur economic growth in the developing province is enormous given the large land viable and suitable for tilapia pond production, as well as, the awareness and knowledge of the tilapia farmers on the package of technology in tilapia farming through pond.

Given this, it is very significant to look also into the economic benefits of tilapia pond farming as a driver of Ifugao economy. This is essential inasmuch as the province of Ifugao is one of the provinces with highest number of poorest families with 47.5% poverty incidence in 2012, according to the National Statistical Coordination Board (NSCB). This condition of the province indicates the need to identify livelihood programs as alternative sources of income and nutrition to help alleviate its impoverished populace.

2. Background of the Study

This study is part of the study titled, "Information Network Output of Tilapia Pond Farmers in Ifugao, Philippines", which assessed the level of knowledge of tilapia farmers on

the package of technology (POT) in tilapia pond farming. In said study of Dugyon, *et al.* (2015), it found out that the level of knowledge of farmers on the recommended practices in tilapia pond farming in the province of Ifugao was categorized as “knowledgeable” as shown below:

Score in tilapia pond farming practices test	F	%	Description
0	0	0.00	No knowledge
1-7	16	3.60	Somewhat knowledgeable
8-14	325	73.40	Knowledgeable
15-21	102	23.00	Highly knowledgeable

Average score: 13

From that result, this study presupposed that when the farmers’ knowledge is utilized, more economic benefits can be generated. The economic benefits are manifested in terms of production (kg/ha), net income per unit area (sales/ha). Hence, this second part of the study that focuses on tilapia pond farming as a driver of blue economy in the developing province of Ifugao.

Purpose of the Study

The study sought to assess the production in kg/ha and income from tilapia farming and analyse the relationship between the economic benefits of tilapia pond farming and the knowledge of tilapia pond farmers.

3. Methodology

3.1 Conceptual Framework

The framework of the study presupposed that the dependent variable, which is the economic benefit of tilapia pond farming is influenced by the independent variable. The knowledge in tilapia pond farming is the independent variable.

The findings of Dugyon, *et al.* (2015) as regards the level of knowledge of the tilapia pond farmers was used as the independent variable in this study, which is a follow-up of the former’s study. According to that study, knowledge in tilapia pond farming refers to the know-how of tilapia farmers on the recommended practices in tilapia pond farming composed of: site selection, pond preparation and management, stocking and stocking density, feeds and feeding practices, and pest and diseases control.

Meanwhile, tilapia pond farm production in this study was based on the gross sales from tilapia pond farming per hectare per culture period in pesos. Farm productivity was categorized as follows:

<210,000	Very low tilapia pond farm productivity
210,000-420,000	Low tilapia pond farm productivity
421,000-630,000	Moderate tilapia pond farm productivity
631,000-840,000	High tilapia pond farm productivity
841,000 & above	Very high tilapia pond farm productivity

3.2 Sampling Procedure

The municipalities which are the top tilapia producers in the province were purposely selected as the locale of the study. Respondents, determined from among the tilapia pond farmers through the chain referral sampling technique, were the same set of respondents in the first part of this study.

3.3 Research design

The study is a survey research using the quantitative approach to gather information on the tilapia pond farm production of the tilapia farmers in the province of Ifugao.

3.4 Method of data collection

Data was collected through survey questionnaire. Also, interviews with key informants were conducted to fill the gaps during the quantitative data collection process.

3.5 Method of data analysis

Descriptive statistical tool was used to analyse the quantitative data. Means, percentages and frequencies were utilized to summarize and categorize the data. Correlational analysis was also used to analyse the influence of the independent variable to the economic benefit of tilapia pond farming in terms of production (kg/ha) and net income per unit area (sales/ha).

4. Results and Discussion

4.1 Tilapia pond farm production

Table 1: Tilapia pond farm productivity per hectare per cropping of the tilapia pond farmers

Gross Sales (Php)	Category	Percent Distribution N=443
<210,000	Very low tilapia pond farm productivity	20.09
210,000-420,000	Low tilapia pond farm productivity	35.44
421,000-630,000	Moderate tilapia pond farm productivity	16.48
631,000-840,000	High tilapia pond farm productivity	15.83
841,000 & above	Very high tilapia pond farm productivity	12.16

Table 1 shows the tilapia pond farmers’ production per cycle. More than one-thirds (35.44%) of the respondents had gross sales per hectare between Php210,000.00-Php420,000.00, 16.48% had gross sales of Php421,000.00-Php630,000.00, 15.83% had gross sales of Php631,000.00-Php840,000.00, and 20.09% of them had gross sales less than Php210,000.00 per hectare. Only 12.16% had gross sales of Php841,000.00 and above. Mostly, those who obtained high production were more or less the well-off tilapia pond farmers who are able to support the input requirements in tilapia production. The tilapia pond farmers obtained a mean gross sales of Php284,842.21 per hectare that fell under the mean category of “low tilapia pond farm productivity”.

According to the study of Delos Trinos (2003), one test of profitability is income or profit which is obtained by deducting fixed and imputed costs from operating profit, or gross revenues minus total costs including imputed family labor cost. Hence, below is one of the key informant's (KI) net income in the last four cropping period.

Case study

Table 2: KI's net income in the last four cropping

Culture Period	Gross Sales (PhP)	Expenses (PhP)	Net Income (PhP)
Sept. 2012 – March 2013	495,134.00	371,300.00	123,834.00
March 2013 – Sept. 2013	644,054.00	387,150.00	256,150.00
October 2013 – March 2014	576,256.00	299,620.00	276,636.00
May 2014 – October 2014	635,641.00	332,110.00	303,531.00
Total	2,351,085.00	1,390,180.00	960,151.00
Mean	587,771.25	347,545.00	240,037.75

The key informant, who considered tilapia pond farming as a secondary source of income said that he maintained a stocking density of 3-4 fingerlings per square meter. To show his tilapia productivity during his last four cropping, he shared the computation of his production vis-à-vis input expenses as summarized in table 2.

Based on the four production cycles, KI's average gross sales amounted to PhP587,771.25 with an average net income of PhP240,037.75. This positive net profit is indicative of prospects of tilapia pond farming to operate in the long run. The study of Delos Trinos (2003) pointed out that this amount can be consumed or saved without affecting the ability to operate the tilapia production system in the future.

3.2 Relationship between the economic benefits and level of knowledge in tilapia pond farming (based on the study of Dugyon, et al. (2015))

Table 4: Correlation coefficients on the level of knowledge in tilapia pond farming and economic benefits from tilapia pond farming

Economic benefits from tilapia farming	Coefficient (r value)	p-value
Gross income	0.189**	0.000

**Highly significant
 *Significant

Results of this study showed a significant correlation ($r=0.189$, $p<0.05$) between knowledge in tilapia pond farming and economic benefits of tilapia pond farming in terms of income which was based on the tilapia pond production. This signifies that production was influenced by the knowledge on the recommended practices in tilapia pond farming. Thus, more economic benefits will be realized if tilapia pond farmers have higher the level of knowledge in tilapia farming. The results imply that respondents with more knowledge have more chances to increase production. To conclude, it can be said that farmers having high knowledge

level had better produce. To achieve this, a farmer must have sufficient knowledge about the various aspects of the production system.

5. Conclusion and Recommendations

The tilapia pond farm productivity of the tilapia farmers was categorized as “low”, notwithstanding their level of knowledge categorized as “knowledgeable”. This implied the need for an intervention. The disparity should be addressed such that their knowledge should be put to use in their tilapia pond farming. Their knowledge should translate into improved tilapia pond farm productivity. It is therefore recommended that an intensive information drive or campaign on the utilization and adoption of the recommended practices of tilapia pond farming be conducted by the government like the local government units, Bureau of Fisheries and Aquatic Resources (BFAR), and academic institutions.

In the light of the above, it is recommended that further research delving on the extent of utilization and adoption of recommended practices in tilapia pond farming, as well as the factors influencing their utilization and adoption be conducted to be able to properly address the gap between the tilapia farmers' knowledge and production capacity. This can facilitate the development of a communication strategy to help intensify the utilization and adoption of the package of technology (POT) in tilapia pond farming.

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