DEVELOPING FRESHWATER FISH FARMING TO SUPPORT FOOD SECURITY AND ALLEVIATE STUNTING

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ABSTRACT

The large number of stunting cases in the TTS area is caused by a lack of food security. Therefore, the development of freshwater fish farming is very important to support food security and prevent fainting in the region. This is because the fishing industry plays an important role in increasing food security; it also reduces stunting in the region. This study used a cross-sectional research design that observed and measured all variables simultaneously. The research results show that Indonesia has an urgent need to explore the untapped potential of fresh water fish food. This is because increasing their food security and improving their nutrition will help them cope with the country's current situation. One way that can be done is to encourage the use of fish farming foods that are well known to the public, especially foods that are popular among TTS residents.

INTRODUCTION

Due to the increasing prevalence of malnutrition in the public health system in East Nusa Tenggara Province, Indonesia, more than 40% of the population is diagnosed with stunted growth. A 2006 TTS County nutritional hazard map that marked it as one of four "red" provinces identified as concerning. From the data collected, 3,006 toddlers 7.25% of all children under the age of 5 suffered from malnutrition in 2007 in South Central Timor Regency (TTS). In 2008, 1,685 children under five suffered from malnutrition; 3,78%. And in 2009, only 552 children under five suffered from malnutrition; 1,2%. Thus, TTS has the highest number of malnourished children from all districts in NTT (Dinas Kesehatan Kabupaten TTS, 2009).

Food insecurity is one of the causes of nutritional problems and stunting (Motbainor et al., 2015; Walrod et al., 2018; Yang et al., 2019). This happens when food availability is low or unavailable. In times of food scarcity, toddlers are easier to suffer from malnutrition (Doocy et al., 2019; Hendriks, 2015; Sisha, 2020). Having a low food supply will reduce food availability (Deconinck et al., 2020; Thow et al., 2014). This will cause families to have less overall food and will cause them to have to provide extra food for young children.

The key to children's overall growth and development is the availability of food at home (Mahmood et al., 2021; Santiago-Torres et al., 2014). Family food security is influenced by culture and eating habits as well as the distribution of resources to buy food (Alonso et al., 2018; Van Der Velde et al., 2019). Most of the residents of TTS District work in agriculture. Some residents in the TTS area grow vegetables and horticulture. They also cultivate cassava and corn as food
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sources. This shows how important these two plants are to provide food in the area (Martianto, 2008).

Land and sea resources in South Central Timor Regency provide options for fisheries and agriculture. Both activities take place on land and at sea. The land area bordering the sea on both sides is 157.3 square kilometers or about 0.058% of the area of coastal waters/sea. This figure includes only coastal villages; The length of an ordinary coastline is 101.86 kilometers. The number of coastal villages exceeds 22 in the Southern Waters, which is divided into 6 subdistricts. Along the coastline, beaches and coral reefs are very common in Kualin District, Kolbano District, Boking District, Kotolín District, and Nunkolo District. In addition, coastal areas with sandy beaches are abundant in the South Amanuban and Kualin Districts. Coastal businesses are in Kualin and South Amanuban districts. Among them are the cultivation of shrimp, milkfish and mangrove crabs, as well as salt ponds.

Fish is an important source of protein, essential vitamins and energy. They also provide more than 20% of a person's overall protein needs. Fish is a very important source of protein during pregnancy and for children between the ages of two and four. It is also useful for pregnant women who do not have enough protein in their diet. If not properly fed, overfishing can lead to numerous deaths from heart complications. By increasing the availability of freshwater fish farming, food security is achieved as well as alleviating stunting in the TTS area. This is because fishing plays an important role in the TTS fisheries sector.

Based on the explanation, the researchers decided to study how to develop freshwater fish farming to support food security and alleviate stunting. The research is expected to contribute to more insight on how freshwater fish farming can give a positive influence on food security and efforts to demolish stunting.

METHOD

This study used a cross-sectional research design and collected data at the same time on all variables (Notoatmodjo, 2005). This research was conducted in four villages in TTS Regency, namely Fatumnasi, Nenas, Biloto and Binaus Villages. This research involved farming communities living in each of these villages. The villages are located in Fatumnasi, Central Mollo and South Mollo districts respectively. The results of this study were presented in 4 public conferences held throughout the region. The researchers chose the number of RTs they wanted to sample from each village. These were 10 for each village, for a total of 40 samples. They decided on this purposive method after considering certain factors about the population (Notoatmodjo, 2005). The sample criteria require subjects to meet the following requirements: they must have freshwater fish farming in Fatumnasi, Nenas, Biloto or Binaus Villages, as well as live in TTS District.

This study used two types of data: primary and secondary. The research used observation, interviews, literature reviews, data analysis and cultivation profiles based on secondary data such as the number of fish farmers, land area and production level. They also used data collection
techniques such as data analysis and interviews to collect secondary data on cultivation techniques over the past 5 years.

RESULT AND DISCUSSION
Overview of Freshwater Fish Farming in South Central Timor Regency (TTS)

South Central Timor Regency has enormous potential for both marine and fisheries. These resources have not been fully utilized because fish resources are economic resources that can be used for development capital. The GEMALA program encourages the creation of new fishing programs on the south coast of the Timor Sea. Kolbano Beach, the gemala development center, serves as an ideal starting point for this process. The site gives participants the opportunity to plan future marine programs from both the central and provincial levels. Many North Coast fishermen are depleting fish resources due to overfishing. Taking advantage of this opportunity will help many programs succeed. In South Central Timor Regency, it is a very appropriate location to build a fish farm because the area is located in the Noelmina and Benanain watersheds. Year-round access to clean water makes the region ideal for freshwater cultivation. In addition, there is still a lot of potential land covering an area of 1000 hectares that has been used for making ponds. In addition, there are 166 villages in 31 sub-districts that have a potential pond area of 311.7 hectares.

In 1990, a mapping team led by Lapan discovered a potential brackish water agricultural farm in Tanjung Ela, about 10,529 hectares. They also found 101.86 kilometers of coastline between Bena Village and Baus Village; Bena Village is located in South Amanuban District and Baus Village is located in Boking District. The goal is to build a capture fishery along the coast. To harness this potential, the government, the private sector, and communities must come together and make effective and sustainable planning. It will also help farmers cultivate freshwater fish as well as milkfish on their land which will benefit fishermen who work on the coast and cultivate fish farmers.

Development of Freshwater Fish Farming in TTS

Freshwater Fisheries Potential

With freshwater fish farming, production of 271,350,000 per year is obtained. This is the potential of TTS fisheries; is even larger than catfish farming. This shows that freshwater fish farming is a superior alternative to traditional agriculture. Compared to catfish farming, it has a higher production value of 10.1 and 17.1 tons per year.

Freshwater Fish Marketing Activities

Currently, the marketing of freshwater fish in TTS still meets urban needs. This process can be developed optimally so that the fish produced can be more to meet the needs of other regions and cities. Freshwater fish farming is a market focused on the retailer market, which is a term that refers to companies and consumers who buy and sell products and services for profit. This is one of the intended markets for marketing mix strategies focused on marketing activities. The marketing mix consists of several methods for disseminating information about a product.
A proper understanding of the physical location and necessary infrastructure is important for distributing goods and services. This is because it ensures that customers have easy access to every location where the product is sold. In addition, it is necessary because it supports distribution methods for freshwater and saltwater fish farming. These farms sell fish to distributors, who in turn sell to agents and restaurants. This last consumer then markets catfish locally.

**Financial Aspects**

With any type of business, you need to consider finances. This includes considering funds, financing, financial statements and receipts. To open a freshwater fish farming business, an average initial capital of Rp 10,500,000 is needed which includes soil ponds, water pumps, dippers and nets. Calculate the financier's annual costs with operating costs to get working capital/total costs. The cost of running a freshwater fish farm averages around Rp48,400. Typical operational costs per catfish production cycle cost around Rp 44.25 million. Long-term and short-term financial analysis can be carried out at any time in the life cycle of a business project.

**Short-Term Analysis**

Calculating a short-term analysis of a business involves consideration of production in 1 year along with revenue, profit, and Return to Equity Capital (REC). Considering these three components for a limited period of time, such as one year, produces short-term analysis results in business.

Based on the survey results, the average income of respondents per year is Rp. 189.25 million from the calculation of freshwater fish sample receipts. The calculation of income is based on catfish samples. The calculation generates income from the time of production; This calculation results in an average weight of 7,570 kg at a price of Rp. 194,950 per kilogram. After deducting costs for fixed costs and variable costs, the net result of the business is its income. The net result of the business is the amount of money that the company makes after all costs are taken into account. A catfish farming business can generate a gross profit of $108,000,000, also known as EBZ. However, the net profit was only $59,600,000; this is because EBZ only applies to catfish farming. When taking into account other freshwater fish, the EBZ drops to $59,600,000.

In addition to calculating the Return to Equity Capital, or REC, for net profit after tithing is also carried out. This is referred to as REC for net income after tithing calculation (RECEAZ). The results of this calculation are used to determine the value of RECEBZ per year in freshwater fish farming.

**Long-Term Analysis**

To analyze the viability of a business, it is necessary to conduct a long-term analysis which includes IRR (Internal Rate of Return), NPV (Net B/C), Payback Period, and Business/Cash C. It is also necessary to conduct a sensitivity analysis.
**Net Present Value (NPV)**

The NPV value is calculated from the total PVGB total purchase benefit price minus the total PVGC. This results in a percentage value called Net Benefit (B–C). Discounting this percentage to 16% gives us a Net Benefit (B–C) value for freshwater fish farming. The value of B is $51,375,200, and C is $48,604,900.

**Net Benefit Cost Ratio (Net B/C)**

Calculations carried out under normal circumstances resulted in a Net Benefit value of 2.91 for freshwater fish. This means that running the business is feasible as long as the Net B/C value exceeds 1.

**Internal Rate of Return (IRR)**

Whenever calculating the IRR for a freshwater fish business, it is calculated that their current loan interest is greater than the value of their IRR. This calculation found that 120.71% of the IRR value was positive, which proves that running a fish business is worth the time and effort.

**Payback Period (PP)**

In order to generate a decent return on investment, fish farming using freshwater fish can be carried out for more than 6.41 years. The reason is, the payback period or PP of the fish chosen is 2.51 years. When using larger fish, the PP value is smaller than 6.41 years and less than 2.51 years.

**Analysis of Freshwater Fish Farming Development in TTS**

For a business, determining and implementing a marketing strategy is the most important task. It involves determining plans for how different marketing campaigns or programs impact product demand. It is also a way to increase revenue so that the company can achieve the highest possible profit and stay in business. This is because revenue is very important for any company; Without it, many businesses will not survive. The owner of this freshwater fish farming business markets his fish directly to consumers or sells it to the market. This helps them earn extra income and keep the business running smoothly. Without income, their survival will be threatened. By marketing directly to consumers or to the general public, fish farmers earn income from their marketing process. This technique is used in this business involving freshwater farming.

Business development is a strategy deliberately implemented by companies to improve the knowledge, skills and abilities of their employees. This is usually part of the overall marketing plan. The main thing to focus on when developing a territory is to increase the understanding of how to work in the future. This is done through an integrated approach that changes current work behavior. A more intensive development strategy needs to be carefully planned and implemented to spur regional economic development. This then led to an increase in employment in the fishing industry and higher incomes for the residents of the area.

To prepare a long-term fish growth strategy, an understanding of the analysis of these goals is necessary. This allows for an immediate decision on the objectives to be made. The development
of fish in a particular area is best when its potential is known. Creating new ponds can help improve fish farming by creating additional jobs. It helps people earn income through freshwater fish production. Creating a new pond requires access to soil and freshwater sources. Creating a new pond also requires a lot of existing financial resources thanks to freshwater fish farming.

Freshwater fish farming faces significant challenges due to marketing and development plans. Fish farmers face significant problems. These include diseases and floods, which can be reduced so as not to cause income losses.

The results showed that improving the community's economy through food security and alleviating ignorance can be done by implementing marketing strategies and building freshwater fish farming businesses. Fish farming businesses can improve the community's economy by marketing to buyers or sellers or buyers can buy directly from business owners. As part of its marketing process, the company generates revenue from freshwater fish farming to provide food security and reduce stunting. In addition, the company is expanding freshwater fish farming by creating new ponds when it feels that their current business can develop. The income and production of their fish farming increased thanks to more ponds created.

Future freshwater fish farmers are likely to face a number of obstacles beyond their marketing strategies and business development processes. This could include outbreaks of disease and flood damage on their farms. Remedies for disease attacks include natural medicines and chemicals. It can be supplemented by traditional methods such as flooding and fish farmers can also use embankments to manage floods. This reduces possible losses while minimizing setbacks affecting their business.

The Important Role of Freshwater Fish Farming in Creating Food Security and Alleviating Stunting

Contribution of Freshwater Fish as a Source of Protein and Other Nutrients

Indonesia is home to a large number of fish both freshwater and marine. This led to the formation of a popular industry for fishery products, especially for the sale of freshwater fish. Their importance in the diet of the country can be seen from the fact that they account for 50% of all animal protein intake. Despite this, the country's protein intake is still much lower than recommended according to their nutritional guidelines. This is due to several things: people are still malnourished despite their high protein intake; They are also stunted and obese due to overnutrition.

Sustainable Livelihoods

Many traditional fishing communities and individuals depend on the freshwater fisheries sector. More than 80% of Indonesia's fish catches come from small-scale fisheries. There are approximately 2.7 million Indonesian fishermen who are considered part of the lowest socioeconomic class in the country. In addition to being one of the poorest occupations, fishermen are also included in the "last livelihood choice" in the national fisheries development plan. Because the government does not care about small-scale fishermen, many do not receive financial
assistance while working for national fish purposes. This is compounded by the COVID-19 crisis. The important thing to ensure the stability and accessibility of food security for a large group of people is to provide livelihoods for fishermen. In addition, there is an urgent need to pay attention to women and fishermen in the freshwater fishing industry.

**Diversity of Food Sources with Lower Environmental Impact Compared to Other Foods**

Through freshwater fisheries, Indonesia has the potential to develop more varied diets and livelihoods. Improving food security and nutrition is very important for Indonesia. One way to improve both is to explore the power of the country’s untapped freshwater fish resources. This will allow the creation of climate-friendly food sources and new jobs thanks to the sustainable production of fish. It will also help reduce brilliance in the TTS region by encouraging the use of freshwater fish food that is well known in the local community.

**CONCLUSION**

Currently, extracting the feed potential of untapped freshwater fish species is a must to improve food security and nutrition in Indonesia. The main way to explore this potential is to encourage the use of fish farming to produce food from freshwater fish. This is especially important for locally known types of food such as those from TTS as it can help reduce unfamiliarity in the region and contribute to the overall security of the food system through the creation of sources of livelihood.

The researchers realize that there are still gaps to fill from this study. Therefore, future research are expected to fulfill the gap by studying how freshwater fish farming gives positive influences on the environment and how stunting can be decreased significantly.

**REFERENCE**


Developing Freshwater Fish Farming to Support Food Security and Alleviate Stunting