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## DEVELOPING A SMALL ENTERPRISE BUSINESS MODEL WITH ZERO WASTE MANAGEMENT SYSTEMS APPROACH: A CASE STUDY IN FISH PROCESSING AT DONGIN VILLAGE, CENTRAL SULAWESI, INDONESIA

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**Abstract:** Zero Waste is a goal that is ethical, economical, efficient and visionary, to guide people in changing their lifestyles and practices to emulate sustainable natural cycles, where all discarded materials are designed to become resources for others to use. In coastal area of Banggai, economic activities in fisheries with zero waste approach is implemented also to increase the added value of fish. Fish processing activities into food products cannot be separated from the waste generated. Waste generated from fish processing is in the form of bone, head, and entrails of fish. The amount and intensity of waste that appears can be reduced by applying the concept of zero waste through optimizing the use of waste generated during the fish processing process. The application of the zero waste concept provides benefits and reduces waste handling activities. From processing activities, there was an increase in the added value of Rp. 34,079,315.00. If calculated as an increase in income for members, this activity increases income by Rp. 236,661.91 per member per month or 10.10% of the UMR of Banggai Regency (Rp.2,343,970,-), and the ability to prevent waste generation by 75.61 kg per year.

*Keywords: Community empowerment, Zero-waste, Malalgis fish*

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### INTRODUCTION

Dongin Village is one of the villages in West Toili District. This village is located along the Dongin coast. Dongin Village has a unique graphic contour, namely coastal areas, rice fields and hills. According to the source of income data, most of the Dongin villagers are in the marine sector (Badan Pusat Statistik, 2020). Fishermen are the livelihood of most of the residents of this village. However, most of the Dongin villagers are still below the welfare threshold. This is influenced by several factors, namely the lack of managerial ability, a culture of saving that is still low, the low quality of human resources and difficulties in accessing. In addition to these factors, there are also natural factors that are difficult to

control. When the season is not good (bad weather), fishermen cannot go to sea at all, as a result, they have no income. If the sea season is good, the catches of fishermen are abundant and they have difficulty selling their catch. Therefore, most fishermen sell their caught fish to collectors at a lower price (PT. PERTAMINA EP, 2020a)

One way to improve the economy of people engaged in fisheries is to increase the added value of fish. Fish processing activities are one way to increase the added value. However, fish processing activities into food products cannot be separated from the waste generated. Waste generated from fish processing is in the form of bone, head, and entrails of fish. Handling this waste safely requires a large amount of money. The amount and intensity of waste that appears can be reduced by applying the concept of zero waste through optimizing the use of waste generated during the fish processing process (Haryati & Munandar, 2012). The application of the zero waste concept will provide benefits and reduce waste handling activities (Sulaeman, 2008). The purpose of this activity is to determine the social impact of program implementation, determine the economic impact caused by program implementation, and find out how much the program contributes to saving the environment (PT. PERTAMINA EP, 2021).

## METHOD

The research was carried out on August 13-21, 2020. The research location was in Dongin Village, West Toili District, Banggai Regency, Central Sulawesi Province. The object of this research is a member of the Baronang Food group as the executor of fish processing based on the zero waste concept and the Dongin Village community. Data and information were obtained through various ways of taking information, including In-depth Interviews, Observation of Measured Data, Literature Studies (Lembaga Penelitian dan Pemberdayaan Masyarakat "OMAH CIPTA," 2017).

In-depth interviews were conducted to obtain information related to the socio-economic conditions of the community before and after the program, the physical condition of the environment, the impact of program implementation. The informants in this interview are key informants who come from the fish processing implementing group, the local government, and related stakeholders. Observation of the measured data is carried out at the fish processing location based on the zero waste concept and the environment around the processing site. The parameters observed include parameters related to processing activities, waste facilities, community sanitation habits, social conditions, economic conditions, and the impact of program implementation. Literature study was conducted to support justification and conclusion based on primary and secondary data obtained. The literature used is in the form of research journals, books and other scientific manuscripts (Lembaga Penelitian dan Pemberdayaan Masyarakat "OMAH CIPTA," 2017).

Observation variables include social aspects, economic aspects, and environmental aspects. The social aspect is seen from the culture of togetherness, relationships between individuals, and Stakeholder support. Observations on social aspects are carried out by conducting in-depth interviews with community leaders, government leaders, and local community members. The economic aspects observed are the main livelihood, the role of women in the effort to fulfill the economy, the economic analysis of processing activities. Information on this aspect was obtained through in-depth interviews with the community, community leaders, and village government as well as secondary data from the village government, and members of the Baronang Food group. As for the environmental aspect, the things observed were the sanitation of community settlements, the habit of managing waste by the community, and the pile of garbage. Data related to the potential for waste generation and reduction from processing activities were obtained through in-depth interviews with community members, community leaders, and village government as well as observation of measured data (PT. PERTAMINA EP, 2020b).

## **RESULT AND DISCUSSION**

### ***Social Aspect***

One of the supporting factors and even determinants of success in community empowerment activities are social capital. Social capital is a concept with various interrelated definitions, which are based on the value of social networks. Social capital will be able to work well if a set of social systems support it. One of the important aspects of social capital is the relationship between individuals in society (Bebbington, 2006). The Dongin Village community has experienced various social, cultural, and economic dynamics. More or less this dynamic has an impact on the social character of the community. If in general, the character of rural communities has a very high mutual trust between individuals, some of these rural communities do not show this. Various conflicts, both small scale, and even larger scale arise from this mutual distrust. Cohesiveness between residents is not easy to build. This possibility is related to the condition of welfare which is still relatively low. Realizing this, one of the first steps that need to be the main focus of the non-technical aspect is to take various emotional approaches, the goal is to make it easier to strengthen the community. As a result, there is an increase in community cohesiveness and a sense of community. This phenomenon shows that in community empowerment activities, it takes a companion who can approach the emotion to the community. Through this empowerment program, a stronger social structure is formed that can be used as social capital (PT. PERTAMINA EP, 2020b).

### ***Economic Aspect***

Community independence is a condition experienced by the community which is characterized by the ability to think, decide and do something that is deemed appropriate to achieve solving problems faced by using the power/ability possessed. When referring to the data and conditions

in the field, most of the Dongin Village community are still below the threshold of economic independence. The existence of this program has not completely overcome this problem, but it has been able to increase the income of the fostered partners. If viewed from a simple economic analysis, the business run by the fostered partners is a business that is very feasible to be appointed to the MSME business realm. The concept brought from this program is the concept of an environmentally friendly small business through minimizing the waste generated. Even further, waste by-products from the fish sauce production process can be processed into products that have economic value that is not inferior to the main product (Lembaga Penelitian dan Pemberdayaan Masyarakat "OMAH CIPTA," 2020).

### Main Product Economic Analysis (Sambal Fish)

#### - Production cost

##### Fixed Cost (FC)

Fixed costs are calculated based on the estimation accumulated depreciation of equipment and supporting facilities used in the production process. In the fish processing process, the fixed cost is Rp. 25,000.00.

##### Variable Cost (VC)

Variable costs are costs incurred for the purchase of all consumables used in each production process. The following is a breakdown of consumables used in the production process of fish sauce (main product):

Table 1. Raw materials and costs incurred for the production of fish sauce.

Ingredients	Total Weight	Cost (Rp)
Fish	7000 gr	140.000
Small chilli	1500 gr	45.000
Curly chilli	500 gr	30.000
Coconut oil	4 liter	60.000
Shallot	500 gr	25.000
Garlic	250 gr	10.000
Sugar	500 gr	9.000
Packaging and Labels	40 gr	140.000
BBM		35.000
<b>Subtotal</b>		<b>494,000</b>

The total cost of products used in each fish sauce production process is Rp. 25,000.00 + Rp.494,000.00 = Rp. 519.000, 00. Number of Products produced each time of production: 39 packs, Product price per pack: IDR 25,000.00. Sales proceeds: 39 x Rp. 25,000.00 = Rp. 975,000.00 Gross profit: Rp. 975,000.00 – Rp. 519.000,00 = Rp. 456,000.00, R/C Ratio: Rp. 975,000.00/Rp.519. 0000.00 = 1.88. Revenue Cost Ratio (R/C ratio) is a feasibility analysis test with a comparison between total income and total costs incurred. The criteria used in this analysis are if the R/C value > 1 then the business is said to be profitable and feasible to run because the amount of income is greater than the costs incurred, and vice versa. (Asnidar & Asrida, 2017). When viewed from the variable R/C ratio, the business of processing malalagis fish into fish sauce is very feasible to be appointed as an MSME business. Every Rp1,000.00 of capital issued will result in Rp.1,000.00 (Baronang, 2021).

When talking about the business of processing raw materials, it is closely related to how much the process can increase the added value of the product. The greater the increase in added value, the better the process. From this understanding, the definition of added value is the excess difference between the value of the product and the value of the input costs, excluding labor costs (Tim Kajian Nilai Tambah, 2012). Based on this statement, the added value of processing malalagis fish into fish sauce products is Rp. 65,142.86/kg of fish (PT. PERTAMINA EP, 2021) .

### **Economic Analysis of Sticks By-products from Fishbone Waste**

#### **Production cost Fixed Cost (FC)**

The estimated accumulated depreciation of the equipment and supporting facilities used in the production process of fishbone sticks is Rp. 10,000.00

#### **Variable Cost (VC)**

Table 2. Materials and costs for the production of fish sticks

<b>Ingredients</b>	<b>Total Weight</b>	<b>Cost (Rp)</b>
Fishbone	700 gr	0
Butter	350 gr	14.000
Coconut cream	7 pcs	15.000
Starch	2800 gr	21.000
Wheat	7000 gr	70.000
Shallot	600 gr	14.000
Garlic	1000 gr	21.000
Egg	5 butir	10.000
Cooking oil	3500 ml	42.000
Flavoring	4 bks	2.000
BBM		10.000

Packaging and Labels	84 pcs	63.000
<b>Subtotal</b>		<b>282.000</b>

Total Production Cost(VC+FC): IDR 282,000 + IDR 10,000 = IDR 292,000.00. Number of Products produced each time of production: 84 packs (@125 grams). Product price per pack: IDR 5,000.00. Sales proceeds: 84 x IDR 5,000.00 = IDR 420,000.00. Gross profit: IDR 420,000.00 – IDR 292,000.00 = IDR 128,000.00. R/C Ratio: IDR 420,000.00 / IDR 292,000.00 = 1.44. Similar to the results of the main product R/C ratio analysis, processed by-products also produce a fairly high R/C ratio, namely 1.44. Each capital spent on product processing in the amount of Rp. 1,000.00 will bring in an income of Rp. 1,440.00(Baronang, 2021) .

Thus, the business of processing fish bone waste into fish stick products can be said to be very feasible to be developed into an MSME business. In addition, when viewed in terms of increasing added value, the processing of fishbone waste can increase the added value of Rp. 18,285.71/bone waste produced from 1 kg of fish raw materials.

### Liquid Organic Fertilizer Fill Fish Stomach

#### Production cost

##### Fixed Cost

The estimated accumulated depreciation of the equipment and supporting facilities used in the production process of fishbone sticks is Rp. 10,000.00

##### Variable Cost Cost (VC)

Table 3. Materials and costs required for the production of liquid organic fertilizer

Ingredients	Total Weight	Cost (Rp)
Entrails		
Fish	600 gr	0
Sugar	380 gr	17.500
Kitchen		
Waste	750 gr	0
	6400	
Water	ml	700
Package	7 pcs	3.500
Sticker	7 lbr	7.000
<b>Subtotal</b>		<b>28.700</b>

Total Production Cost(VC+FC): IDR 28,700.00 + IDR 5,000.00 = IDR 33,700.00. Number of Products produced each time of production: 7.5 packs (@ 1000 ml). Product price per pack: Rp15.000,00. Sales proceeds: 7.5 x Rp. 15,000.00 = Rp. 112,500.00. Gross profit: Rp.112.500.00 – Rp.33.700.00 = Rp.78.800.00, R/C Ratio: Rp.112.500.00/Rp.33.700.00 = 3.34. Far above the value of the R/C ratio of the main product and processed fish stick products, the processing of by-products in the form of fish stomach contents into liquid organic fertilizer produces a very high R/C ratio of 3.34. This figure shows that the processing of fish stomach contents into liquid organic fertilizer is very feasible to cultivate. The increase in added value resulting from this waste treatment is Rp11,257.14/waste entrails produced from 1 kg of fish (Baronang, 2021) .

Table 4. Records of Baronang Food production during the program

Month	Production Quantity (packaging)			Income Group	Frequency Production
	Fish Sambal	Fish stick	Organic Fertilizer		
March	Institutional Formation and Strengthening				
April	Production Preparation, Trial and Formulation				
May*	76	157	15	Rp2.910.000,00	2 times
June	152	333	30	Rp5.915.000,00	4 times
July	196	397	22	Rp7.215.000,00	5 times
August	201	409	23	Rp7.415.000,00	5 times
<b>Total</b>	<b>625</b>	<b>1.296</b>	<b>90</b>	<b>Rp23.455.000,00</b>	<b>16 kali</b>

\* starting at the beginning of the third week.

Source: Baronang Food Group Data, 2021

At this stage, within three months it can produce 625 packages of fish sauce (75 kg), 1,296 packages of fishbone sticks (162 kg), and 90 bottles of liquid organic fertilizer (90 liters). If you look at the trend of the data, in a year the Baronang Food group is able to produce around 2,142 bottles of fish chili sauce (257.04 kg), 4,443 packages of fish bone sticks (555.38 kg) and 309 packages of liquid organic fertilizer (309 liters). From these processing activities, by applying the concept of zero waste, there is an increase in the added value of Rp. 34,079,315.00. If calculated as an increase in income for members, this activity increases income by Rp. 236,661.91 per member per month or 10.10% of the UMR of Banggai Regency (Rp.2,343,970,-).

### Environmental Aspect

Through this program, it is possible to reduce waste generation which is usually generated from each fish processing process. The following is a form of waste that can be reduced:

Table 5 . Fish Waste Generation Reduction

Bahan Ikan	Sampel (gr)					Rerata (gr)	Presentase (%)
	I	II	III	IV	V		
<b>Total Fish Weight</b>	<b>983,8</b>	<b>966,7</b>	<b>945,5</b>	<b>969,1</b>	<b>1.010,4</b>	<b>975,1</b>	<b>100</b>
<b>Bones and Head</b>	<b>108,3</b>	<b>98,7</b>	<b>121,9</b>	<b>100,8</b>	<b>99,3</b>	<b>105,8</b>	<b>10,85</b>
<b>Stomach Contents</b>	<b>86,8</b>	<b>76,4</b>	<b>90,1</b>	<b>88,3</b>	<b>89,4</b>	<b>86,2</b>	<b>8,84</b>

*\*\* weighing with 1 kg of fresh Malanggis fish*

Based on the data above, the consumption index (edible part ratio) of the average malalgis fish is 80.31%. Generally, the largest part of the part that is not consumed is the bones and heads of fish. However, through fish processing based on this zero waste concept, the bones and heads of fish are processed into products that can be consumed. In other words, this program can increase the edible part ratio by 10.85%. Even though it is not the main raw material, in the process of processing fish sticks, this waste of fish bones and heads has an important role in providing flavor to the resulting product. Processing of liquid organic fertilizer made from fish entrails waste can eliminate the waste generation of 8.84% of the fresh weight of malalgis fish used in each processing process (Program PPM DMF Olahan Ikan, 2021).

Table 6. Reduction of Fish Waste Generation per Time Period

	Bone (gr)	Entrails (gr)	Total (gr)
<b>Every time production</b>	<b>759,50</b>	<b>618,8</b>	<b>1.378,3</b>
<b>Production Per Month</b>	<b>3.472</b>	<b>2.828,8</b>	<b>6.300,8</b>
<b>Production Per year</b>	<b>41.664</b>	<b>33.945,6</b>	<b>75.609,6</b>

*\* Each production uses 7 kg of fish; production 16 times/3.5 months*

If accumulated, the fish processing based on the zero waste concept carried out by the Baronang Food Group is able to eliminate the generation of large amounts of waste. Every year, the group's activities are able to eliminate 41.64 kg of bone and fish head waste and 33.95 kg of fish gut waste so that if accumulated, the ability to prevent waste generation from the activities carried out is 75.61 kg per year (Baronang, 2021).

## CONCLUSION

The positive impact of empowerment can increase a sense of community and strengthen relationships between members (socially). The increase in added value in the production of main products, by-products, liquid organic fertilizer from fish intestines shows the added value and is very feasible to become a household-scale fish processing group (MSME). It can

be seen from the analysis of Revenue Cost Ratio (R/C ratio) if the R/C value  $> 1$  then the business is said to be profitable and feasible to run because the amount of income is greater than the number of costs incurred, and vice versa. The positive impact from the environmental aspect is indicated by the ability to eliminate 41.64 kg of bone and fish head waste and 33.95 kg of fish gut waste so that if accumulated, the ability to prevent waste generation is 75.61 kg per year. This figure is big enough for the group, but not big enough for the wider community. The hope is that fish processing activities based on the zero waste concept can inspire the general public so that the environmental impact that can be overcome can be even greater.

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