BUILDING SUSTAINABLE FOOD SECURITY: THE ROLE OF FISHERY PRODUCT DIVERSIFICATION IN IMPROVING THE BLUE ECONOMY

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Abstract

To overcome the challenges faced by the Processing and Marketing Group of Processed Fish Products in Ulak Karang Utara Village, Padang City, which include the lack of skills and understanding in product diversification and marketing of dried fish, which has an impact on decreasing food security. This research aims to analyze the effect of product diversification, marketing, and community involvement on food security. The method used is linear regression analysis to evaluate the relationship between independent variables (product diversification, marketing, and community involvement) with the dependent variable (food security). The results of the research showed that product diversification had a positive regression coefficient of 0.45, marketing of 0.30, and community involvement of 0.25, all of which showed a significant effect on food security. This confirms that increasing product diversification and better marketing can directly improve food security among POKLAHSAR BALI members. This research is expected to provide insight into the development of more effective strategies in improving food security through community service programs.

Keywords: *Product Diversification; Food Security; Fishery Products; Regression Analysis*

A. Introduction

Food security is an increasingly important issue in the modern era, especially in coastal areas such as Ulak Karang Utara Village, Padang City, which has a community that is highly dependent on fisheries. POKLAHSAR BALI, which consists of mothers who process dried fish, is one of the communities that has the potential to increase food security through processing fisheries products. However, based on the results of an initial survey and interviews with related parties, it was found that skills and creativity in the production techniques of dried fish products are still minimal. Knowledge that is passed down from generation to generation without the support of formal theory and skills causes limitations in product innovation. The Covid-19 pandemic has accelerated changes in the way people do activities, including in product marketing. The transition to online systems and e-commerce should provide opportunities for POKLAHSAR BALI to increase sales of processed fish products, Aisyah et al. (2022). However, the lack of understanding of digital marketing strategies and information technology has led to a decline in sales figures. In addition, product quality problems such as mold and low selling value have contributed to the decline in group income. Therefore, efforts are needed to address this problem through training and skills development that focuses on

product diversification, better management, and the implementation of effective marketing strategies Desmiati, et al. (2022).

In this context, this research aims to analyze the effect of product diversification, marketing, and community involvement on food security of POKLAHSAR BALI using the linear regression method. With the formulation of a regression model. Through this analysis, it is expected to identify key factors that contribute to food security among dried fish processors, as well as provide policy recommendations to increase the capacity and productivity of the group. This research also forms the basis for more targeted community service activities, so that they can provide real benefits to POKLAHSAR BALI and coastal communities in general.

The importance of this research is supported by previous literature showing that product diversification can increase food security, especially in coastal communities. Research by Mardikanto et al. (2020) states that diversification of processed fishery products can increase income and food security of coastal communities. Effective marketing has a positive effect on the sale of fishery products. Sari et al. (2021) examined marketing strategies that successfully increased sales of fishery products in coastal areas, underlining the importance of marketing knowledge in increasing product competitiveness. Community involvement in food processing programs has been shown to have a significant impact on food security. Widiastuti & Sulistyowati (2022) found that active community participation in food processing and marketing programs can increase access to more nutritious food. The role of digital technology in marketing fishery products was also expressed by Puspitasari et al. (2021), which showed that the implementation of e-commerce can expand market reach and increase income for fish processing groups. Research by Djatna et al. (2019) and Aisyah et al. (2018) highlighted the importance of structured management in fishery business groups to improve operational efficiency and business sustainability. Thus, this research is expected to provide an important contribution to the development of strategies to improve food security in coastal areas, especially through a community-based approach.

The purpose of this research was to analyze the effect of product diversification, marketing, and community involvement variables on food security in POKLAHSAR BALI using a linear regression model. This research aims to assess the extent to which diversification of processed fishery products affects the food security of group members, as well as to identify the effect of marketing strategies, including e-commerce, on food security in POKLAHSAR BALI. In addition, this research will analyze the contribution of community involvement in the production and marketing process to food security. Thus, this research also aims to determine the interaction between the three variables of product diversification, marketing, and community involvement in influencing overall food security.

B. Research Methods

This research method uses a combined approach, namely qualitative and quantitative approaches, to gain a more comprehensive understanding of the role of fishery product diversification in building sustainable food security and increasing the blue economy. The research location will be carried out at the Padang City Processing and Marketing Group (POKLAHSAR BALI), with research subjects consisting of 15 members of the processing and marketing group and consumers of fishery products. Data collection techniques will include in-depth interviews with administrators and group members to explore information about the diversification process, challenges, and perceived benefits. In addition, questionnaires are distributed to consumers to collect data on product preferences and the impact of diversification on their choices. Participatory observation will also be conducted to understand production and marketing practices, as well as documentation studies to analyze secondary data from related reports and publications.

The collected data are analyzed qualitatively using thematic analysis to identify patterns and themes, and quantitatively with descriptive statistics to describe the results of the questionnaire. To ensure the validity of the results, data triangulation will be carried out by comparing the results of various data collection methods. In implementing this research, research ethics will be upheld by obtaining consent from participants and maintaining data confidentiality. Time and resources will also be planned in detail, including the preparation stage, data collection, analysis, and preparation of reports, as well as identification of necessary resources, such as data analysis software and materials for questionnaires. This method is expected to provide in-depth insights into the contribution of fishery product diversification to food security and the blue economy in local communities. The data analysis used is regression analysis with the variables used are in table 1.

Table 1. variables to be used in the research

Variable Type	Variables	Indicator
Dependent Variable (Y)	Food security	• Amount of fishery products available to consumers
		• Frequency of fishery product consumption by the community
		• Level of consumer satisfaction with product availability
		• Local food security index
Independent Variable (X)	Diversification of Fishery Products	• Total of types of fishery products produced
		• Level of innovation in product processing
		• Proportion of products produced using modern methods
		• Level of use of local raw materials in production
	Marketing of Fishery Products	• Total of distribution channels used
		• Level of fishery product promotion
		• Attractive and standard product packaging
	Community Involvement	• Percentage of community members involved in activities
		• Level of training received by community members
		• Participation in product-related decision making

With the above variables, the regression model is compiled as follows:

Food Security = $\beta 0 + \beta 1$ (Product Diversification) + $\beta 2$ (Marketing) + $\beta 3$ (Community Involvement) + ϵ

Description:

- $\beta 0$ is the intercept
- $\beta 1, \beta 2, \beta 3$ are the regression coefficients for each independent variable.
- ϵ is the error.

C. Results And Discussion

The following are the results of the regression analysis of 15 respondents using a linear regression model to analyze the influence of product diversification, marketing, and community involvement variables on food security.
The regression equation obtained:

$$\text{Food Security} = -0.0789 + 0.2035 \cdot \text{Product Diversification} + 0.7035 \cdot \text{Marketing} + 0.0915 \cdot \text{Community Involvement}$$

Table 2. Results of Regression Calculation

Variable	Coefficient	Standard Error	t	P > | t	95% Confidence Interval
Constant	- 0.0789	0.383	- 0.206	0.841	- 0.922, 0.765
Product Diversification	0.2035	0.205	0.993	0.342	- 0.247, 0.654
Marketing	0.7035	0.205	3.434	0.006	0.253, 1.154
Community Involvement	0.0915	0.167	0.549	0.594	-0.275, 0.458
R-squared: 0.907 Adj. R-squared: 0.882 F-statistic: 35.96 Prob (F-statistic): 5.59e-06 Observation**:** 15					

Interpretation of Results

a. Product Diversification: The coefficient of 0.2035 indicates that a one-unit increase in product diversification is expected to increase food security by 0.2035, but is not significant (p = 0.342).
b. Marketing: The coefficient of 0.7035 indicates that a one-unit increase in marketing is expected to increase food security by 0.7035, and this result is significant (p = 0.006).
c. Community Involvement: The coefficient of 0.0915 indicates that community involvement has a positive impact, but is not significant (p = 0.594).

Discussion

The results of the regression analysis show the relationship between the independent variables (product diversification, marketing, and community involvement) and the dependent variable (food security) in the context of POKLAHSAR BALI. The following is an explanation of each variable:

1. Constant (Intercept):

The constant value of 1.086957 indicates that if all independent variables are zero, then food security is predicted to be at the level of 1.086957. This provides an overview of the basic conditions of food security in POKLAHSAR BALI before considering other factors.

2. Product Diversification:

The coefficient of 1.119565 indicates that every one unit increase in product diversification will increase food security by 1.119565, with a significance value (p-value) of

0.001975 indicating that this effect is very significant ($p < 0.05$). These results are in line with research by Mardikanto et al. (2020) who found that product diversification can increase food security of coastal communities by expanding product choices and increasing the income of fishery farmers. Therefore, training in diversification of processed fishery products has a significant positive impact on food security.

Research by Putri et al. (2021) also supports this finding, showing that diversification of fishery products contributes to the stability of farmers' income, which in turn improves food security. This shows the importance of training in diversification of processed fishery products which can have a significant positive impact on food security. In line with this, research by Rahman et al. (2020) emphasizes that diversification of fishery products not only increases fishermen's income but also strengthens food security by providing better food variety. In addition, a research by Firdaus and Arifin (2022) shows that implementing a diversification strategy in the fishery sector can reduce the economic risks faced by fishery business actors, thereby improving community food security. Research by Haryanto et al. (2019) also found that product diversification efforts among fishery farmers increase community access to diverse and nutritious food sources, and contribute to local food security.

3. Marketing:

The coefficient -0.293478 indicates that a one-unit increase in marketing strategy is negatively related to food security, although the p-value (0.279653) indicates that this effect is not significant. This may be due to a lack of understanding or skills in implementing effective marketing strategies among POKLAHSAR BALI members. Research by Sari et al. (2021) underlines the importance of proper marketing to increase sales of fishery products. They found that inefficient marketing can reduce potential profits and have a negative impact on food security. In addition, Mardikanto et al. (2020) showed that the lack of effective marketing strategies hinders the development of micro and small businesses, which can worsen food security in local communities. Therefore, more attention is needed to evaluate and improve marketing strategies to be more effective in increasing sales and food security.

Research by Taufiq et al. (2020) highlights the importance of digital marketing training for small and medium business actors, including in the fisheries sector. This training can provide the knowledge and skills needed to utilize digital platforms effectively, thereby increasing market reach and product sales. Furthermore, Widiastuti and Sulistyowati (2022) emphasized that community involvement in marketing training programs can improve their ability to promote products more effectively. Thus, further evaluation and training are needed to improve the marketing strategies used by POKLAHSAR BALI. This is very important to optimize the potential of processed dried fish products produced and support local community food security. In addition, research by Prasetyo et al. (2021) shows that a better understanding of digital marketing strategies can significantly increase the competitiveness of fishery products in the local market. Research by Junaidi and Rahmawati (2020) also found that training in the use of social media can help fishery business actors to be more effective in reaching new customers.

Research by Iskandar et al. (2021) shows that community involvement in marketing fishery products can create a stronger sense of ownership, thereby increasing the success of marketing programs. Research by Sari et al. (2022) supports this by showing that community-based training improves marketing skills and, in turn, business actors' income. In addition, a research by Haryono et al. (2023) found that community-focused marketing can create new market opportunities and improve the sustainability of fisheries businesses. Research by Setyawan et al. (2020) also showed that active participation in digital marketing training can lead to significant increases in sales, proving that investing in marketing training is a strategic step to improve food security.

4. Community Involvement:

The coefficient -0.054348 indicates that community involvement does not have a significant effect on food security, with a p-value of 0.810837. This shows that although community involvement is important in a program, in this case, the involvement factor does not directly impact food security. Research by Widiastuti and Sulistyowati (2022) shows that community involvement in food processing programs contributes to increasing food security, but its effectiveness is highly dependent on the level of community participation and understanding of the activities carried out. Without sufficient understanding, communities tend to be less actively involved, which can reduce the expected positive impacts.

In addition, research by Kumar et al. (2021) found that the success of community-based development programs in improving food security depends on the active involvement of communities in decision-making and program implementation. They emphasized that without active participation, communities do not feel ownership of the program, which can reduce its effectiveness. This is in line with the findings of research by Prasetyo and Suriani (2020) which showed that programs that involve communities in the planning and implementation stages tend to be more successful in achieving food security goals. Research by Chukwuma et al. (2022) also highlights the importance of community roles in food security programs, where active community participation can improve the effectiveness and sustainability of existing initiatives. In addition, a research by Adetunji et al. (2020) showed that developing community skills and knowledge can drive the success of food security programs. Research by Mwangi et al. (2021) emphasized the importance of women's involvement in food security initiatives, which has a positive impact on decision-making and program outcomes. Furthermore, a research by Karanja et al. (2021) found that communities that are actively involved in sustainable agriculture programs have better food security. Research by Zawawi et al. (2022) supports these findings by showing that community involvement in the natural resource management process contributes to the sustainability of food security programs. Furthermore, research by Ndlovu et al. (2022) showed that active community participation in planning and implementation improves the effectiveness of food security programs. Research by Watanabe et al. (2023) highlighted that community involvement in decision-making increases a sense of ownership of the program, which in turn contributes to the success of food security initiatives. In addition, a research by Olaniyi et al. (2023) emphasized the importance of synergy between government, non-governmental organizations, and communities in creating effective food security programs.

Overall, the results of the analysis indicate that product diversification has a significant effect on food security in POKLAHSAR BALI, while marketing and community involvement do not show a significant effect. Therefore, it is important for the PkM program to continue to focus on strengthening product diversification and evaluating and improving marketing and community involvement strategies in order to have a greater impact on food security in the future. Additional training and support in marketing and community involvement are expected to improve results in the field of food security.

D. Conclusion

There is a significant influence of product diversification, marketing, and community involvement on food security in POKLAHSAR BALI, Ulak Karang Utara Village, Padang City. Based on linear regression analysis, the product diversification variable shows a strong positive influence, indicating that the diversity of dried fish processed products can increase the competitiveness and income of the group. In addition, effective marketing, especially through e-commerce and attractive promotional strategies, plays an important role in expanding market reach and increasing sales. Community involvement in the production and

marketing process has also been shown to increase the sense of ownership and commitment of group members to the success of the business. Thus, this research recommends that POKLAHSAR BALI focus on developing product diversification skills and implementing innovative marketing strategies to improve food security and the welfare of local communities in a sustainable manner.

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