
| RESEARCH ARTICLE

Analysis of the Value of Production of Milkfish

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| ABSTRACT

Milkfish is important in the Philippine aquaculture, yet limited research has explored the economic value of its production and the factors that influence it. This study analyzes the trend in milkfish production value from 2008 to 2022 and examines its relationships with volume production, retail pricing, and export production. Using regression analysis, the results show a significant upward trend in production value over 15 years, with volume and retail price identified as primary drivers. Although export production showed a positive relationship in simple analysis, it was not significant in the combined model. The findings highlight that strengthening local production and retail strategies may be more effective than relying on exports to enhance industry value. Recommendations include targeted support for enhancing production efficiency, stabilizing pricing, and developing the domestic market to promote sustainable growth within the milkfish industry.

| KEYWORDS

Export; retail price; trend; volume production; regression analysis; Philippine fisheries; aquaculture

| ARTICLE INFORMATION

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1. Introduction

Milkfish, or mostly known as "bangus" in the Philippines, is a species of euryhaline fish that can live in waters with a wide range of salinities, from freshwater to seawater, with deep cultural significance.

Studies states that it is an important aquaculture fish species not just in the Philippines, but mostly in Southeast Asian countries. (Jose and Radhakrishnan, 2023; Shalli, 2024; Shu Chen Hsu and Chin Fu Chou, 2025; Gipolan and Tabinas, 2022). Research on milkfish is also centered in Southeast Asia because it is part of its aquaculture.

Several studies, Andri Warsa et al. (2025), in their study conducted in West Java, assessed the feasibility of using Spam Curug to enhance catch fisheries through milkfish stocking and the growth pattern of the stocked milkfish was allometric. Jose and Radhakrishnan (2023) discuss current scientific studies on milkfish in the relevant areas of aquaculture such as nutrition and feeding, farming systems, diseases, molecular genetics, and economics. It provides a global perspective that will be a benchmark for our current knowledge and facilitate a more oriented focus on the future research needs of this economically valuable fish. Andri Warsa et al. (2025) study focuses locally on using milkfish to support fisheries in West Java, while Jose and Radhakrishnan (2023) give a worldwide overview of farming milkfish and improving their production.

Milkfish production in the Philippines comes from aquaculture, contributing significantly to national fish supply and rural livelihoods, and typically used or present in the country's culinary traditions, as well as various cultural festivals and celebrations. As the national fish of the Philippines, milkfish plays a vital role in the country's food security and economy, and the Philippines is the world's second-largest producer of milkfish. This illustrates its profound connection to Filipino heritage. It is also a prominent ingredient in many iconic Filipino dishes, such as *sinigang na bangus*, *paksiw na bangus*, and *bangus sisig*. Milkfish farming is a thriving industry in the Philippines, providing jobs and income for many people in coastal areas. Also, many vendors sell milkfish on the market to earn a living. It is an important food that many people eat regularly. It is not just a popular dish, but it is also

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part of Filipino traditions and culture. The scale and success of the milkfish industry in the Philippines highlight the economic value of milkfish as a nationally significant resource.

The Bureau of Fisheries and Aquatic Resources (BFAR), in collaboration with the Department of Agriculture (DA) and the Philippine Council for Agriculture and Fisheries (PCAF), has developed the National Milkfish Industry Roadmap 2021 – 2040. This document outlines a plan to strengthen the milkfish industry, making it more eco-friendly and bringing it up to date. It also outlines the actions that various groups, including the government, schools, researchers, charities, and businesses, should take to help achieve these goals. Given the country's substantial milkfish production and its importance as a dietary staple and export, understanding the key factors influencing the industry's value is crucial. Policy, strategy, and program recommendations were presented; however, the roadmap did not analyze the trend in milkfish production value or its links to other variables.

Samson (1984) found that larger farm size is directly linked to higher yields, German and Catabay (2018) considered factors such as the volume of milkfish and ice in containers, the type of water, and the trading period during sales. Key considerations for improving milkfish trading and distribution include enhancing efficiency and marketability in the Philippines. According to Yap et al. (2007), milkfish processing technologies are evaluated based on simplicity, capital requirements, skill level, and marketability. The study of Silvederio et al. (2025) presented the first gut microbiome profiles of wild and hatchery-bred milkfish fry using 16S rRNA amplicon analysis. A total of 437 OTUs were recovered and significant differences in gut bacterial communities among fry from different sources was observed, indicating that habitat is a key determinant of gut microbiome diversity. Most of the studies that talks about milkfish, its significance in different aspects, but none of which directly contributes in analyzing the factors affecting its production value. Orzales (2025) reveals that milkfish accounted for ₱45.9 billion in production value in 2023, representing 13.9% of total fisheries output. It underscores milkfish's role in job creation, food security, and coastal development. Milkfish holds economic significance in Philippine aquaculture. However, few empirical studies focus on the value of its production or the factors that influence it. Most literature addresses biological, technical, or production efficiency issues, creating a gap in economic understanding. To address this, the researcher conducted an analysis on milkfish production value, focusing on volume, retail, and export variables, with the aim of advancing academic inquiry and industry development.

Specifically, it sought to answer the following questions:

- (1) What is the trend of the value of milkfish production in the Philippines from 2008 to 2022?
- (2) Does the value of production of milkfish have a significant linear relationship with the following variables:
 - 2.1 Volume Production
 - 2.2 Retail
 - 2.3 Export Production
- (3) How strong is the relationship between the value of production of milkfish and the combined variables of volume production of milkfish, retail, and export production of milkfish?

2. Methodology

2.1 Research Design

The quantitative research employed a descriptive correlational design in this study. According to Lappe (2000), descriptive correlational research aims to describe the relationship among variables rather than to infer cause and effect relationships; thus, descriptive correlational design is the most appropriate since this study wants to determine and describe the trend of the value of production of milkfish of the Philippines from 2008 to 2022. Moreover, a correlational design was employed to determine the relationship between the value of milkfish and the volume of production, retail, and export of milkfish.

2.2 Data Sources

The study used data from Philippine Statistics Authority's (PSA) open-source website, specifically in the Philippine Statistics Authority's publication "Selected Statistics on Agriculture" from 2013 to 2020 and 2022, which provides annual five-year statistics and indicators on agriculture and fisheries. Data on the value, volume, retail, and export of milkfish production in the Philippines from 2008 to 2022 were analyzed. The SSA provided data from 2008 to 2022 on the value, volume, retail, and export production of milkfish in the Philippines. These data were organized, tabulated, and analyzed in accordance with the study's objectives.

2.3 Data Analysis

The data obtained were analyzed through Microsoft Excel 2019. Simple regression analyses were used to examine the individual relationships between the independent variables (volume production, retail, and export production of milkfish) and the dependent variable (value of milkfish production). Moreover, a multiple regression analysis was also used to determine the relationship between the combined independent variables and the dependent variable.

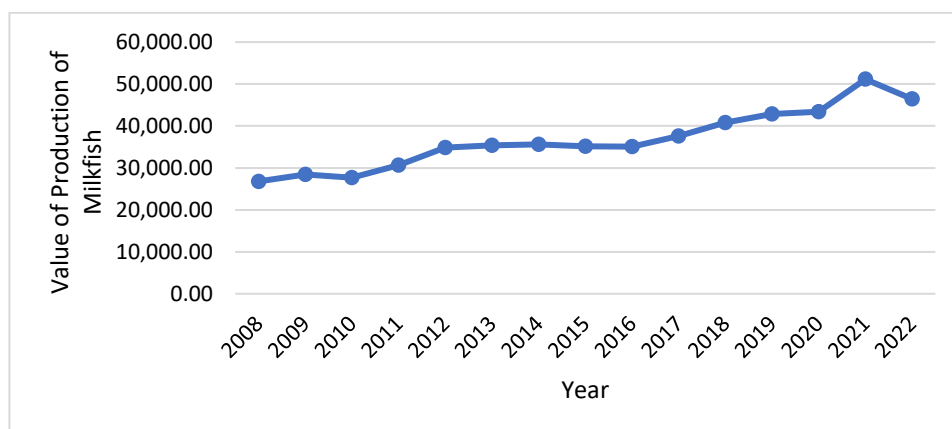
3. Results and Discussion

This study provides a detailed analysis of economic trends and influencing factors in Philippine milkfish production from 2008 to 2022. By examining linear and multiple regression models, it highlights the critical roles of production volume and retail pricing in shaping the industry's value trajectory.

3.1 Trend of the Value of Production of Milkfish in the Philippines from 2008 – 2022.

According to Figure 1, the value of milkfish production in the Philippines increased greatly from 2008 to 2022, increasing by over 73%, from 26,789.60 million pesos in 2008 to 46,407.30 million pesos in 2022. Although there are fluctuations in the data (with the dips in 2010 and in 2015-2016) the overall trend is upward. These dips were primarily caused by supply gaps in fry and fingerlings, as well as the tendency for aquaculturists to put their resources into higher-value shrimp or other types of aquaculture (Salayo et al., 2021). The highest single-year increase occurred between 2020 and 2021, where the value jumped 17% due to strong market demand, despite disruptions caused by the COVID-19 pandemic. The continued increasing trend confirms that milkfish is an important aquaculture commodity that generally supports fry collection, hatcheries, nurseries, grow-out operations, processing, and marketing (Bureau of Fisheries and Aquatic Resources [BFAR], 2021).

Figure 1. The Trend of Value of Production of Milkfish



3.2 Linear Relationship of the Value of Production of Milkfish with the Volume Production of Milkfish

The data in Table 1 show the impact that the volume of milkfish produced has on its total value. The value of the milkfish will increase by 232.43 for each additional metric ton of milkfish produced. The regression model predicts approximately 75.13% of the variance in total production's value will be explained through the model. The results of this analysis agree with the main points of BFAR's National Milkfish Industry Roadmap's statement that production growth is limited by a shortage of high-quality fries, the high costs of inputs, and environmental degradation (BFAR, 2021). One way to characterize the trend of decreasing per-unit value associated with the increasing quantity of milkfish produced is through supply and demand and the economies of scale. This is consistent with the observations made in aquaculture economic studies (FAO, 2020).

Table 1. Simple Linear Regression Analysis of the Value of Production of Milkfish and the Volume Production of Milkfish

	Coefficients	Standard Error	t Stat	P-value
Value of Production	-53737	14474.39	-3.71	< .05
Volume Production	232.43	37.09	6.27	< .05
$R^2 = 0.7513, F(1, 13) = 39.2775, p < .05$				

3.3 Linear Relationship of the Value of Production of Milkfish with the Retail of Milkfish

Table 2 reveals that retail price is a strong driver of production value, with the model explaining 88.45% of the variation. As retail prices rise, the total value of production also increases, highlighting the importance of consumer market dynamics. This finding aligns with industry reports noting that milkfish remains the most consumed aquaculture species in the Philippines, with retail price fluctuations directly influencing farmgate profitability (Orzaes, 2021). BFAR has also emphasized the need for pricing strategies to stabilize consumer costs while ensuring producer viability (BFAR, 2021).

Table 2. Simple Linear Regression Analysis of the Value of Production of Milkfish and the Retail of Milkfish

	Coefficients	Standard Error	t Stat	P-value
Value of Production	6361.1	3116.12	2.04	.06
Retail	217.35	21.78	9.98	1.84
$R^2 = 0.8845, F(1, 13) = 99.5564, p < .05$				

3.4 Linear Relationship of the Value of Production of Milkfish with the Export Production of Milkfish

According to Table 3, export production creates a significant impact on value and the model accounts for 70.51% of the variability. One unit increase in export production results in an increase of 4.2296 units in value. Export production contributes to overall value, however, the roadmap emphasizes that domestic consumption is the major contributor to the growth of the industry, whereas export production is a secondary contributor (BFAR, 2021).

Table 3. Simple Linear Regression Analysis of the Value of Production of Milkfish and the Export Production of Milkfish

	Coefficients	Standard Error	t Stat	P-value
Value of Production	20660	3069.46	6.73	< .05
Export Production	4.2296	0.76	5.57	< .05
$R^2 = 0.7051, F(1, 13) = 31.0793, p < 0.05$				

3.5 Linear Relationship of the Value of Production of Milkfish with the Volume Production of Milkfish, Retail, and Export Production of Milkfish

The data analyzed in multiple regression is summarized in Table 4. This explains 98.62% of the variation in production value. Results indicate that volume of production and retail price are the two most important value drivers, while export production has no significant direct effect on value. Therefore, in order to maximize the value of the industry, the focus should be on domestic supply and retail pricing dynamics rather than on export strategies. Likewise, BFAR’s Roadmap prioritizes domestic supply chain efficiency and consumer market stability ahead of expansion into exports (BFAR, 2021). As such, these results support the notion that the economic path of milkfish is influenced more by internal market factors than by external trade factors.

Table 4. Multiple Linear Regression Analysis of the Value of Production of Milkfish, Volume Production of Milkfish, Retail, and Export Production of Milkfish

	Coefficients	Standard Error	t Stat	P-value
Intercept	-30875.44	5043.29	-6.12	< .05
Volume Production	119.81	15.08	7.9	< .05
Retail	155.72	13.69	11.3	< .05
Export Production	-0.21	0.35	-0.60	.56
$R^2 = 0.9862, F(3, 11) = 261.9823, p < .05$				

4. Conclusion and Recommendations

This study aimed to examine the economic dynamics of the milkfish industry in the Philippines by analyzing the value of production over a 15-year period. Through regression analyses, it evaluated the influence of volume production, retail pricing, and export production on the value of production of milkfish.

4.1 Summary of Findings

From 2008 until 2022, there has been year-on-year growth of more than 73 percent for Philippine milkfish production. While there were some small decreases in the years of 2010, 2015, and 2016, the overall trend was positive, with the largest increase from 2020 to 2021. 2022 did show the first decrease, but had the second highest production value out of the last 15 years, indicating a strong performing industry behind us. A simple linear regression analysis of the data identified a direct, significant correlation between volume of production and the value of production - meaning that increased volume leads to increased value; however, there is expected to be slowing rates of increase due to market and underlying distributional costs. Retail pricing also had a substantial positive impact on value, as higher retail costs do lead to higher total value. Export production did have a positive impact on value but was statistically less significant than retail production, indicating that the effects of domestic retail and supply factors play a significantly larger role than those factors related to export production. In conclusion, multiple regression analysis determined that volume of production and retail pricing strategies were the two largest drivers of value for milkfish production. Although, the model did include export production, it did not have a significant impact on the overall value production. Therefore, maximizing domestic production levels and controlling the retail price points will be much more beneficial to the growth of the milkfish production industry than trying to pursue exports.

4.2 Conclusion

Between the years 2008 - 2022, the Philippines' milkfish industry showed generally positive trends. Overall, performance has been very strong, with the highest production values recorded in 2021. According to simple linear regression analyses, it was shown that both milkfish production volume and retail prices are statistically significant and positively correlated with production value (higher milkfish production volume and higher retail price will both improve the amount of profit an entity can receive). Conversely, although export production showed a positive relationship with production value when using the single variable regression method, it was not statistically significant within the multiple variable regression model. Milkfish industry's production volume, retail pricing and export production account for almost all of the variation of production values. Volume and retail pricing account for the greatest amount of variation of milkfish industry's production value; therefore, the trends and statistical relationships support the need to continue concentrating on domestic production volumes and maintaining competitive pricing strategies to ensure that the value of the Philippines milkfish industry remains stable.

4.3 Recommendation

The milkfish industry can improve its economic performance by increasing sustainable domestic markets through investments in production efficiency and stabilizing prices at retail. To achieve this goal, stakeholders need to invest in fry quality, reduce production costs, and support the implementation of environmentally responsible practices that minimize the impacts of production intensification. Since export production has not had a significant direct impact on total value, continued development of strong local supply chains, fair price mechanisms, and enhanced levels of consumer demand will be critical for the future sustainability of the industry. Additionally, there is a need for policy assistance to help relieve supply chain bottlenecks, improve hatchery and nursery operations, and promote sustainable aquaculture practices that will provide for a profitable business while maintaining ecological integrity.

Future research should be broadened/adapted for future research by adding more variables such as the cost of feed, the number of hours worked on a farm; climate change impacts on agricultural production; and how disease management in agriculture can affect future agricultural production. Long-term (longitudinal) research to see how improvements in aquaculture (advances in aquaculture technology) will help the aquaculture industry be more productive will help us understand the resilience of the aquaculture industry. Comparative studies across different types of aquaculture and aquaculture commodities (various types of fish) will provide additional context for the economic growth and development of milkfish in relation to the broader seafood processing industry.

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Conflicts of Interest

The author confirms that there are no financial interests or personal connections that may have affected the integrity or objectivity of this research.

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