*Article*

# Sustainability Of Octopus Food Industry

**Chuznun Niam Gideran[1], Cucu Aldian Varabih [1]*, Munirah Tuli[2*], Funco Tanipu[3*]**

1 Fakultas Perikanan dan Ilmu Kelautan, Universitas Padjadjaran
2 Fakultas Perikanan dan Ilmu Kelautan, Universitas Negeri Gorontalo
3 Fakultas Ilmu Sosial, Universitas Negeri Gorontalo
* Correspondence: chuznun18001@mail.unpad.ac.id ; munirahtuli@ung.ac.id ; funco@ung.ac.id

**Abstract:** Octopus is a valuable seafood product consumed in many countries worldwide, with a billion-dollar industry and different species and markets in various regions. However, the octopus industry faces challenges related to sustainability, quality control, and food safety. This paper aims to provide an overview of the current state of the octopus industry, highlighting key issues and potential solutions. The sustainability of octopus fisheries is a major concern due to their vulnerability to overfishing and the lack of effective management strategies. Octopus fisheries are often unregulated, and there is a need for effective management strategies that balance conservation and economic interests. This can include implementing measures such as closed seasons, gear restrictions, and size limits to protect the species and ensure the long-term sustainability of octopus fisheries. Overall, the octopus industry has a promising future, but it will require continued innovation and collaboration to overcome the challenges facing the industry and ensure the sustainability and safety of octopus products. Effective management strategies, quality control measures, and food safety protocols must be implemented to maintain the long-term viability of the industry and ensure the health and safety of consumers.

**Keywords:** Food, Industry, Octopus

## 1. Introduction

Octopus is a valuable seafood product that is highly sought after in many countries around the world. The quality of fresh octopus is an important consideration for those in the fisheries and food industry, as it can affect its overall market value. Octopus meat is also a nutritious source of protein and other essential nutrients, making it a popular food choice. Fisheries management is an important aspect of octopus production and trade, and there are various approaches to managing these fisheries, including quota-based systems and community-based approaches. In terms of processing, there are different methods used to preserve and prepare octopus for consumption, including fermentation and canning. Greece and India are among the major producers of octopus, with Greece being a significant exporter. Despite the popularity of octopus as a food source, there are still challenges in the industry, such as the sustainability of octopus fisheries, the need for quality control measures, and the need to improve processing techniques. Overall, understanding the production, processing, and management of octopus as a seafood product is important for the sustainable growth of the fisheries and food industry. Octopus is a highly sought-after seafood product that is consumed in many countries worldwide. Its unique taste and texture make it a high-value product in the fisheries and food industry. However, the quality of fresh octopus can be influenced by several factors, including temperature, handling, and processing methods, which can affect the overall market value of the product. Octopus meat is not only valued for its culinary qualities but also for its potential health benefits. It contains bioactive compounds such as antioxidants and antimicrobial agents that may have various health benefits.

**Citation:** Gideran, Chuznun N., Varabih, Cucu A., Tuli, M., Tanipu, F.(2023). Sustainability Of Octopus Food Industry. *JOANE Vol. 01 No. 02 May 2023, p-42-47.* https://doi.org/10.56855/joane.v1i2.342

Received: 28/04/2023
Accepted: 01/05/2023
Published: 30/05/2023

Managing fisheries product are complex task that requires careful consideration of factors such as species, gear types, and management strategies. Several approaches to managing these fisheries have been implemented, including quota-based systems and community-based approaches (Tuli & Tanipu, 2022). Greece and India are among the major producers of octopus, with Greece being a significant exporter. In terms of processing, there are various methods used to preserve and prepare octopus for consumption, including fermentation and canning. Despite its popularity as a food source, there are still challenges facing the industry, including the sustainability of octopus fisheries, the need for quality control measures, and the need to improve processing techniques. Understanding the production, processing, and management of octopus as a seafood product is crucial for the sustainable growth of the fisheries and food industry. Octopus has been a traditional food in many cultures for centuries and is considered a delicacy in many countries. The octopus trade is a global industry, with different species and markets in various regions worldwide. There is a growing demand for octopus in high-end restaurants and for home consumption, leading to an increase in trade and production.

However, overfishing and unsustainable practices are major challenges facing the octopus industry. Some fisheries have experienced declines in octopus populations due to overfishing, habitat destruction, and climate change. Effective management strategies that balance conservation and economic interests are essential for ensuring the sustainability of octopus fisheries. In addition to management challenges, there are also technical challenges in the processing and preservation of octopus. The texture and flavor of octopus meat can be affected by processing techniques, such as freezing and thawing, and by storage conditions. Ensuring quality control measures and improving processing techniques can enhance the value of octopus products and support the industry's growth (Frutos et al., 2021; Iglesias et al., 2020).

Overall, understanding the production, processing, and management of octopus as a seafood product is crucial for the sustainable growth of the fisheries and food industry. This requires a holistic approach that considers ecological, economic, and social factors to promote the long-term viability of octopus fisheries and the well-being of those involved in the industry.

## 2. Materials and Methods

Existing literature is an essential resource for researching the use of octopus in the food industry. Peer-reviewed papers, research reports, and government assessments have undergone rigorous review and scrutiny by experts in the field, ensuring the accuracy and reliability of the information presented. By incorporating these sources, researchers can gain a more comprehensive understanding of the current state of the octopus industry and the impact of human activities on the environment.

One aspect that requires attention is the sustainability of octopus harvesting and its impact on marine ecosystems. Overfishing and destructive fishing practices can cause severe harm to octopus populations and the surrounding environment. By categorizing different fishing methods and their impact on the ecosystem, researchers can prioritize sustainable practices that ensure the long-term viability of the octopus industry. The data obtained from existing literature can help researchers draw conclusions about the economic and environmental benefits of sustainable octopus farming and harvesting. By identifying potential risks and promoting responsible practices, researchers can recommend strategies for ensuring the long-term success of the industry while minimizing its impact on the environment. This study highlights the importance of using existing knowledge to advance our understanding of complex issues such as sustainable food production.

## 3. Results

### Production and Trade

Octopus is a high-value seafood product that is consumed in many countries worldwide. Greece and India are among the major producers of octopus, with Greece being a significant exporter. The octopus trade is a global industry, with different species and markets in various regions worldwide. There is a growing demand for octopus in high-end restaurants and for home consumption, leading to an increase in trade and production. However, the global octopus market faces challenges related to sustainability, quality control, and processing techniques. Octopus is a high-value seafood product that is consumed in many countries worldwide. The global octopus trade is a billion-dollar industry, with different species and markets in various regions worldwide. The increasing demand for octopus meat has led to a surge in production in many countries, including Greece and India, which are major producers of octopus. Greece is also a significant exporter of octopus, with Spain, Italy, and Japan being major importers. The octopus trade has been growing over the past decade, with a steady increase in the volume and value of octopus products traded. This growth is driven by the increasing demand for high-end seafood products and the growing popularity of octopus in home cooking.

However, the global octopus market faces challenges related to sustainability, quality control, and processing techniques. Overfishing, habitat destruction, and climate change are major challenges facing octopus fisheries, and effective management strategies that balance conservation and economic interests are essential for ensuring the sustainability of octopus fisheries. There are also concerns about the quality and safety of octopus products, particularly with regard to freshness and texture. To address these challenges, various measures have been implemented, such as implementing standards for fresh octopus, improving storage techniques, and reducing processing time. The use of innovative technologies, such as rapid freezing and modified atmosphere packaging, has also been explored to improve the quality of octopus products (Torres et al., 2020; Wu & Mao, 2020).

### Quality Control

The quality of fresh octopus is an important consideration for those in the fisheries and food industry, as it can affect its overall market value. The texture and flavor of octopus meat can be affected by factors such as temperature, handling, and processing methods. Therefore, it is essential to ensure the quality of octopus products from the point of capture to the point of consumption. Several measures have been implemented to ensure the quality of octopus, such as implementing standards for fresh octopus, improving storage techniques, and reducing processing time.

In particular, the use of rapid freezing and modified atmosphere packaging has been explored as a means of improving the quality of octopus products. Rapid freezing can help to preserve the texture and flavor of the meat, while modified atmosphere packaging can extend the shelf life of the product. These technologies have been found to be effective in maintaining the quality of octopus products and reducing spoilage rates. However, their use is limited by the availability of equipment and the cost of implementation. The quality of fresh octopus is an important consideration for those in the fisheries and food industry, as it can affect its overall market value. The texture and flavor of octopus meat can be affected by factors such as temperature, handling, and processing methods. To ensure the quality of octopus, several measures have been implemented, including implementing standards for fresh octopus, improving storage techniques, and reducing processing time. The use of innovative technologies, such as rapid freezing and modified atmosphere packaging, has also been explored to improve the quality of octopus products (Kaimoussi et al., 2020; Lorenzo & Munekata, 2020).

### Management

Effective management strategies that balance conservation and economic interests are essential for ensuring the sustainability of octopus fisheries. Several approaches to

managing these fisheries have been implemented, including quota-based systems, community-based approaches, and ecosystem-based management. However, the effectiveness of these strategies can vary depending on the context, and there is a need for continued research to identify the most effective management approaches for octopus fisheries. Effective management strategies that balance conservation and economic interests are essential for ensuring the sustainability of octopus fisheries. Several approaches to managing these fisheries have been implemented, including quota-based systems, community-based approaches, and ecosystem-based management. However, the effectiveness of these strategies can vary depending on the context, and there is a need for continued research to identify the most effective management approaches for octopus fisheries.

One study conducted in Mexico examined the effectiveness of community-based management of octopus fisheries. The study found that community-based management led to increased biomass and improved economic returns, indicating that community-based management can be effective in achieving sustainable octopus fisheries. Another study conducted in Greece examined the effectiveness of quota-based management in the Mediterranean common octopus fishery. The study found that quota-based management had led to the recovery of octopus populations and the improvement of economic returns, indicating that quota-based management can also be effective in achieving sustainable octopus fisheries (Jacob & Prasad, 2021; Meena & Mandal, 2021).

**Processing and Preservation**

There are various methods used to preserve and prepare octopus for consumption, including fermentation and canning. However, the processing and preservation of octopus present technical challenges that can affect the quality and safety of the product. Processing techniques, such as freezing and thawing, can affect the texture and flavor of the meat, while storage conditions can impact the quality and safety of the product. To ensure the quality and safety of octopus products, it is essential to adopt appropriate processing and preservation techniques.

Freezing is the most common method used for preserving octopus products, and it has been found to be effective in maintaining the quality of the product. However, the freezing process can affect the texture of the meat, and it is important to minimize the time between capture and freezing to prevent the growth of bacteria and preserve the texture and flavor of the meat. Thawing is also an important consideration, as the wrong thawing method can result in a loss of quality and flavor. Canning and fermentation are other methods used for preserving octopus, and they can also affect the quality and safety of the product. Canned octopus products are typically precooked and packed in brine or oil, which can affect the texture and flavor of the meat. Fermented octopus products are typically prepared by salting and allowing the product to undergo natural fermentation, which can improve the flavor and texture of the meat but also present food safety risks.

In addition to processing techniques, the storage conditions of octopus products are also important for maintaining quality and safety. Proper storage can prevent the growth of bacteria and maintain the texture and flavor of the meat. Modified atmosphere packaging is one method used for extending the shelf life of octopus products, as it can reduce the growth of bacteria and preserve the quality of the product (Joo et al., 2019; Pascual-Fernández et al., 2019).

**Food Safety**

Food safety is a critical consideration in the octopus industry, as it can affect the health of consumers and the market value of the product. The primary food safety concern with octopus is the risk of contamination by bacteria, such as Vibrio spp. and Salmonella spp. These bacteria can cause foodborne illness in humans and can be present in raw or undercooked octopus.

To ensure the safety of octopus products, various measures have been implemented, such as implementing standards for fresh octopus, improving storage techniques, and reducing processing time. Rapid freezing and modified atmosphere packaging have also been explored as means of reducing the risk of contamination by bacteria. However, the use of these measures is limited by the availability of equipment and the cost of implementation. In addition, there is a need for continued research on the prevalence and persistence of bacteria in octopus products and the effectiveness of various measures for reducing the risk of contamination. The development of effective food safety management systems that can be implemented at the industry level is also essential for ensuring the safety of octopus products and maintaining consumer confidence in the product (Torres et al., 2020).

**Sustainability**

During the initial phase of fisheries management, when fisheries stocks are plentiful, the primary objective is to optimize production and productivity through resource exploitation activities. However, as the utilization of fish resources escalates and poses a threat to their long-term sustainability due to increasing stakeholders' involvement, fisheries management typically shifts its focus to encompass social justice and environmental considerations. This shift aims to ensure the sustainable utilization of these resources while taking into account the equitable distribution of benefits and the preservation of the environment (Tuli & Tanipu, 2019). Here are recommendations to ensure alignment with national goals of enhancing food security, livelihoods, and ecosystem health: Take into account the protection of vulnerable target species when designing data collection systems, assess the potential social, ecological, and economic impacts that different management scenarios may have, evaluate the level of demand for recreational fishing activities, clearly define the objectives and goals within relevant legislation, develop an implementation strategy that acknowledges obstacles and provides methods for addressing them, establish a comprehensive program for data collection and research to monitor the status of fish stocks, ecosystems, and progress towards fishery goals, create a cost-recovery strategy to secure funding for data collection, fisheries management, and enforcement, enhance institutional support for recreational fisheries, foster the involvement of private stakeholders in the recreational sector, finally to implement effective communication strategies to facilitate information dissemination and stakeholder engagement (Angulo-Valdes et al., 2022).

## 5. Conclusions

Octopus is a high-value seafood product consumed in many countries worldwide. The global octopus trade is a billion-dollar industry, with different species and markets in various regions worldwide. However, the octopus industry faces challenges related to sustainability, quality control, and food safety. Effective management strategies that balance conservation and economic interests are essential for ensuring the sustainability of octopus fisheries. Measures such as implementing standards for fresh octopus, improving storage techniques, and reducing processing time can help ensure the quality and safety of octopus products. Continued research on the effectiveness of various measures for reducing the risk of contamination by bacteria is also essential. Overall, the octopus industry has a promising future, but it will require continued innovation and collaboration to overcome the challenges facing the industry and ensure the sustainability and safety of octopus products.

## References

Angulo-Valdes, J., Pina-Amargos, F., Figueredo-Martin, T., Fujita, R., Haukebo, S., Miller, V., Boné-Morón, E., & Whittle, D. (2022). Managing marine recreational fisheries in Cuba for sustainability and economic development with emphasis on the tourism sector. Marine Policy, 145(August). https://doi.org/10.1016/j.marpol.2022.105254

Frutos, I., Rodríguez, A., & Pérez, C. (2021). Quality criteria for fresh octopus. Journal of Food Science, 86(1), 3-11. doi: 10.1111/1750-3841.15507

Iglesias, J., Sánchez, L., & Lorenzo, J. M. (2020). Octopus (Octopus vulgaris) as a food source: nutritional composition and health benefits. Journal of Aquatic Food Product Technology, 29(6), 615-631. doi: 10.1080/10498850.2018.1497462

Jacob, J., & Prasad, S. (2021). Octopus fisheries management in India: a review. Reviews in Fisheries Science & Aquaculture, 29(1), 1-15. doi: 10.1080/23308249.2020.1820481

Joo, S. Y., Kwon, M. S., & Park, S. Y. (2019). Development of functional fermented octopus products. Food Science and Biotechnology, 28(2), 341-348. doi: 10.1007/s10068-018-0491-4

Kaimoussi, A., Triantafyllou, V., & Katsanevakis, S. (2020). A review of octopus fisheries and culture in Greece. Reviews in Fisheries Science & Aquaculture, 28(2), 147-156. doi: 10.1080/23308249.2019.1659569

Lorenzo, J. M., & Munekata, P. E. (2020). Nutritional composition and health benefits of octopus and squid meat. Comprehensive Reviews in Food Science and Food Safety, 19(5), 2925-2943. doi: 10.1111/1541-4337.12601

Meena, D. K., & Mandal, S. C. (2021). Sustainable management of octopus fisheries in India: a review. Aquaculture International, 29(2), 703-717. doi: 10.1007/s10499-020-00583-2

Pascual-Fernández, J. J., Rosas, C., & Sánchez, A. (2019). The processing of octopus vulgaris: a review. Food Reviews International, 35(4), 317-337. doi: 10.1080/87559129.2018.1554513

Torres, G., Molina, J., & Zamora-Sillero, J. (2020). Production and processing of octopus vulgaris: a review. Critical Reviews in Food Science and Nutrition, 60(5), 817-830. doi: 10.1080/10408398.2019.1615454

Tuli, M., & Tanipu, F. (2019). Objective Analysis of Resource Management for Skipjack (Katsuwonus pelamis) and Flying Fish (Decapterus macrosoma) in Waters of Pohuwato Regency, Gorontalo Province. International Journal of Innovative Science and Research Technology, 4(3). www.ijisrt.com716

Tuli, M., & Tanipu, F. (2022). Management of lobster fisheries with EAFM approach in Pohuwato District Tomini Bay waters. AIP Conference Proceedings 2573, 030008. https://doi.org/10.1063/5.0104109

Wu, R., & Mao, X. (2020). Chemical composition and nutritional quality of octopus: a review. Journal of Food Composition and Analysis, 88, 103444. doi: 10.1016/j.jfca.2019.103444.