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Opportunities, Challenges, and Solutions in Expanding The Blue Economy in Sri Lanka: Special Reference to The Fisheries Sector

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ABSTRACT

Purpose: *The blue economy emphasizes the sustainable utilization of marine resources to promote economic growth, create job opportunities, and enhance livelihoods while ensuring the protection of the ocean ecosystem. The blue economy comprises a variety of activities such as fisheries, aquaculture and Mari culture, marine and coastal tourism, boat and shipbuilding, seaports and shipping, marine transportation, renewable energy, offshore hydrocarbons and minerals, and marine biotechnology. The primary objective of this research is to identify the opportunities and challenges in expanding the blue economy in Sri Lanka, with a focus on the fisheries sector.*

Design/methodology/approach: *The qualitative research method was employed for data collection, using key person interviews with 20 Sri Lankan blue economy stakeholders. Thematic analysis was used to analyze data.*

Findings: *The study identified several opportunities, including the introduction of a sound VMS and forecasting system, technology improvement, properly trained human resources, reducing post-harvest loss, value addition to the fish, and diversification towards aquaculture and Mari culture. The study also identified challenges such as limited access to finance, lack of infrastructure, and weak governance. With the right policies and management practices in place, the fisheries sector in Sri Lanka can achieve sustainable development, contribute to the country's economic growth, and provide livelihoods for fishers and their communities.*

Originality: *Though Sri Lanka is an Island, ideal for practicing the blue economy, the attention given by the scholars and practitioners to develop the sector is not sufficient. This study stands out for its thorough examination of opportunities and challenges in expanding Sri Lanka's blue economy, with a specific emphasis on the fisheries sector.*

Implications: *The theoretical contribution lies in the identification of opportunities and challenges in expanding the blue economy, particularly within the fisheries sector. This research significantly contributes to guiding policymakers and stakeholders to develop strategies for the sustainable growth and management of the fisheries sector in Sri Lanka*

Keywords: *Blue Economy, Fisheries, value addition, Post-harvest loss*

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INTRODUCTION

The concept of the Blue Economy has a global meaning that pertains to the utilization of ocean resources sustainably for economic progress, enhanced livelihoods, and job creation without compromising the health of the ocean ecosystem. Sri Lanka's coastal location and abundant marine resources make the blue economy a crucial sector for the country's economic growth and development (Ranasignhe, 2017). The blue economy's potential impact on Sri Lanka's economic and social progress is significant, particularly in coastal communities where employment and livelihood opportunities are limited (World Bank, 2022). The blue economy offers various opportunities for sustainable development, including the expansion of the fisheries sector, the promotion of marine tourism, and the generation of renewable energy from the ocean (SLEDB, Fishery Products-Industry Capability Report, 2019).

The concept of the Blue Economy was introduced at the United Nations Conference on Sustainable Development, Rio +20. The conference's central theme was advancing and developing institutional frameworks for sustainable development under the "Green Economy." Before the conference, concerns raised by coastal countries prompted the introduction of the Blue Economy concept (Ranasignhe, 2017). Thus, Rio+20 was the first international platform where the idea of the Blue Economy was raised. The Blue Economy concept revolves around the oceans, representing the human population's common heritage and its role in sustainable development. The Blue Economy holds immense potential for growth and development, considering that only an estimated 5-7% of the ocean has been explored (UNESCO, 2022; Ranasignhe, 2017). However, a critical knowledge gap exists regarding how developing nations, such as Sri Lanka, can effectively harness the opportunities presented by the Blue Economy while navigating the inherent challenges. This paper addresses this gap by focusing on the Sri Lankan fisheries sector, exploring the opportunities, challenges, and potential solutions for its sustainable development within the Blue Economy framework.

Sustainable use of ocean resources has been a global objective since 2015, and strict penalties exist for exploiting these resources or polluting the oceans with waste. To ensure a sustainable future, it is essential for each state, institution, and individual to take initiatives toward responsible resource use. The oceans remain a primary natural resource with vast untapped potential for sustainable development, but only if they are maintained and restored to a healthy state. As oceans become a focal point of economic growth, the challenge is to balance economic priorities with the long-term health of ocean ecosystems.

The Blue Economy encompasses a diverse array of sectors, incorporating fisheries, shipping and port infrastructure, minerals, renewable energy, marine biotechnology, ocean governance, marine tourism, and education. Fundamentally, the Blue Economy integrates the expansion of the Ocean Economy with a commitment to environmental sustainability, social inclusivity, and the cultivation of innovative business models.

This holistic approach seeks to harmonize economic development with the preservation of marine ecosystems, social equity, and the exploration of novel and sustainable business strategies within an academic context.

Within the Blue Economy framework, the fisheries sector assumes particular significance due to its inherent economic, social, and ecological implications. The selection of the fisheries sector for focused analysis stems from its pivotal role in global economic systems and its vulnerability to overexploitation. Understanding the challenges and opportunities within this sector is essential for formulating sustainable policies and practices. Consequently, this study strategically delves into the fisheries domain, aiming to contribute valuable insights to the broader discourse on responsible and sustainable Blue Economy development.

Exclusive Economic Zone (EEZ) of Sri Lanka, which extends up to 200 nautical miles from the coastline, is a vital area for the country's blue economy. This zone, covering approximately 5 million square kilometers, offers exclusive rights to Sri Lanka to explore and exploit its marine resources, including fisheries and minerals. The fisheries sector plays a significant role in Sri Lanka's blue economy, contributing to the country's economic growth and providing employment opportunities for coastal communities. Despite the immense potential of the fisheries sector, there are challenges that hinder its growth and development. Due to these challenges is crucial to ensure sustainable development in the fisheries sector and the overall blue economy in Sri Lanka. With the right policies and management practices in place, the fisheries sector in Sri Lanka can achieve sustainable development, contribute to the country's economic growth, and provide livelihoods for fishers and their communities.

For coastal nations like Sri Lanka, with abundant marine resources, the Blue Economy presents a crucial pathway for economic growth and development (Ranasignhe, 2017). Its potential impact on Sri Lanka's economic and social progress is significant, particularly in coastal communities where alternative employment and livelihood opportunities are often limited. The Blue Economy offers diverse opportunities for sustainable development, including the expansion of the fisheries sector, the promotion of marine tourism, and the generation of renewable energy from the ocean. While the potential of the Blue Economy is undeniable, its development faces numerous challenges. These include the lack of comprehensive policies, limited access to finance, inadequate infrastructure, and weak governance. Addressing these challenges is crucial to ensure the sustainable development of the Blue Economy in Sri Lanka and other coastal nations. This research article focuses on the fisheries sector within the Blue Economy framework, recognizing its economic, social, and ecological significance. The fisheries sector is particularly vulnerable to overexploitation, highlighting the need for sustainable policies and practices (Maheepala, 2016). By exploring the specific challenges and opportunities within Sri Lanka's fisheries sector, this study aims to contribute valuable insights to the broader discourse on responsible and sustainable Blue Economy development, with potential implications for other coastal nations facing similar challenges. This research

addresses the knowledge gap regarding the specific challenges and opportunities faced by Sri Lanka's fisheries sector within the Blue Economy framework. By analyzing these factors, the study aims to inform the development of effective policies and management practices that can ensure the sustainable development of the sector, contributing to economic growth, improved livelihoods, and the preservation of marine ecosystems.

Research Problem

Despite the recognized potential of the fisheries sector within Sri Lanka's blue economy to catalyze economic growth, employment generation, and livelihood enhancement while ensuring marine conservation (Azmi, 2021), there exists a critical knowledge gap in understanding the broader theoretical and conceptual frameworks underpinning sustainable development in similar contexts beyond Sri Lanka. While empirical evidence from other regions may provide insights, the application of such findings to Sri Lanka's specific socio-economic and environmental landscape requires more exploration (European Commision, AFD, & GIZ, 2017). Thus, the research problem lies in delineating the theoretical and conceptual underpinnings of sustainable growth within the fisheries sector, with a focus on Sri Lanka as a case study. By examining the applicability of existing theories and conceptual frameworks to the Sri Lankan context, this study aims to bridge the gap between global understanding and local realities, offering insights into tailored solutions for sustainable development in Sri Lanka's fisheries sector.

Research Objectives

This research aims to explore the opportunities and challenges faced in expanding the blue economy with special reference to the fisheries sector in Sri Lanka. Thus, the research objectives of this study are three-fold.

- To identify the Opportunities to enhance the blue economy in Sri Lanka with regard to the Fisheries Sector.
- To Explore the Challenges faced when implementing a blue economy in Sri Lanka with regard to the Fisheries Sector.
- To identify potential solutions to overcome the challenges in implementing the blue economy in Sri Lanka with regard to the Fisheries Sector.

LITERATURE REVIEW

Major catalysts of the blue economy

The concept of the Blue Economy has a global meaning that pertains to the utilization of ocean resources sustainably for economic progress, enhanced livelihoods, and job creation without compromising the health of the ocean ecosystem (Youssef, 2023). The Blue Economy encompasses various sectors, including fisheries, shipping and port infrastructure, minerals, renewable energy, marine biotechnology, ocean governance, marine tourism, and education. Essentially, the

Blue Economy aligns the development of the Ocean Economy with environmental sustainability, social inclusivity, and innovative business models (UNDP, Sri Lanka's Blue Economy, 2023).

In order to achieve "blue growth", renewable and organic inputs are fed into sustainably designed systems. As a result of such "blue growth," resource scarcity and waste disposal problems are addressed, and human welfare is improved holistically by sustainable development (Bennett, Blythe, White, & Campero, 2021). Focus on marine resources and their economic potential has led to the emergence of the Blue Economy, offering a new pathway for coastal countries to develop their economies by exploiting sea and marine resources domestically and internationally (UNDP, Diving Deep into the Blue, A case for a Marine Spatial Plan for Sustainable Blue Economy in Sri Lanka, 2023).

The Blue Economy relies solely on marine resources. Therefore, it is the responsibility of every country to safeguard its seas, which constitute 64% of the Earth's surface and over 90% of the total living space (United Nations, 2014). The concept serves as a call to action for promoting sustainable development, particularly in fisheries, aquaculture, pollution reduction, and habitat protection. As such, there is a pressing need to demonstrate measurable progress in these areas. Given the increasing importance of the coastal and marine environment to a country's social, economic, and strategic objectives, it is crucial to prioritize their conservation and sustainable use (Blaufelder, Levy, Mannion, & Pinner, 2021).

Coastal regions, home to a substantial and increasing proportion of the global population, face environmental degradation (Creel, 2003). Creel (2003) further evaluated that environmental decline is exacerbated by demographic factors, especially in developing nations. This study found that by 2025, it is likely that about 3 billion people will live within 200 kilometers of a coastal region or about half of the world's population. Many economic benefits have accrued to coastal regions due to their high population concentration, such as improved transportation connections, industrial and urban growth, tourism revenue, and food production.

The concept of the blue economy

The blue economy has become a crucial sector for many coastal countries, including Sri Lanka, due to the increasing demand for seafood, sustainable energy, and tourism growth (Ranasignhe, 2017). The concept of the blue economy involves a holistic approach to utilizing marine resources that involve economic, social, and environmental considerations (United Nations, 2014). In Sri Lanka, the blue economy has the potential to contribute to economic development and job creation, particularly in coastal communities. Sri Lanka is a geographically blessed country by the Bay of Bengal, and Blue Economy is very much related to Sri Lanka when considering the maritime area and maritime area's connection with the people of Sri Lanka and Sri Lanka's economy (Senaratne & Melegoda, 2022).

The world's oceans face a critical juncture. Climate change, global warming, melting glaciers, and a growing global population are placing immense pressure on marine

ecosystems (IPCC, 2019). These challenges, coupled with issues like poverty, food security, and healthcare, necessitate a global shift towards sustainable ocean economic practices (OECD, 2020). Protecting resource scarcity and ensuring sustainable resource and energy use for future generations is crucial as global circumstances change (IREA, 2023). The 20th century, known as 'The Great Acceleration,' witnessed significant economic and industrial activities that have negatively impacted ocean health (Nakicenovic, Rockström, Gaffney, & Zimm, 2016). This decline, coupled with a rapidly growing population and associated resource scarcity, highlights the urgency of addressing global ocean health challenges (FAO, 2020). Moving away from harmful oceanic practices such as waste dumping, unauthorized fishing, and non-eco-friendly tourism is essential to mitigate climate change and protect marine ecosystems (UNESCO, 2022). Embracing Blue Economy initiatives, regardless of scale, is crucial for ensuring human security as oceans are increasingly recognized as vital to the planet's future (World Bank, 2022).

Sustainable Livelihoods Framework (SLF)

To comprehensively assess the opportunities and challenges faced by Sri Lanka's fisheries sector within the blue economy, we can utilize the Sustainable Livelihoods Framework (SLF) as a theoretical lens. The SLF, developed by Chambers and Conway (1992), emphasizes the interaction between five key capitals – human, social, natural, physical, and financial – in shaping livelihood strategies and outcomes (Natarajan, Newsham, Rigg, & Suhardiman, 2022; Majale, 2022). By integrating the SLF into the analysis, this research explored how the various dimensions of sustainable livelihoods intersect with the dynamics of the fisheries sector, shedding light on pathways for enhancing economic resilience, social well-being, and environmental sustainability within Sri Lanka's blue economy context.

METHODOLOGY

While the expansion of the blue economy and its implications for the fisheries sector in Sri Lanka involve factual elements, understanding the diverse perspectives, experiences, and interpretations of stakeholders is crucial. This research adopts interpretivism as its paradigm, acknowledging the importance of social constructs, power dynamics, and contextual factors in shaping this complex issue (Saunders, Lewis, & Thornhill, 2007). By employing an inductive research logic (Saunders, Lewis, & Thornhill, 2007), the study aims to draw conclusions grounded in the data collected through qualitative methods, allowing for a nuanced and in-depth understanding of the challenges, opportunities, and potential solutions. This study employs a qualitative research approach, utilizing semi-structured interviews as the primary data collection method (Interview Guide- Appendix I) . The research aims to understand the lived experiences, perspectives, and interpretations of individuals involved in Sri Lanka's fisheries sector. The study population comprises individuals from government agencies, industry associations, research institutions, and private sector companies. Ensuring a diverse and representative sample is crucial to capturing the varied viewpoints within the sector., to ensure that findings are applicable to the broader population. The study employed a purposive sampling technique to select

key informants within the Sri Lankan fisheries sector. This included officials from various government agencies responsible for policy formulation, regulation, and research: Department of Fisheries and Aquatic Resources (DFAR): 06 officers were interviewed, including (Director General and Directors). Their insights were crucial in understanding current regulations, challenges faced in implementation, and potential solutions. Ministry of Fisheries (MoF): 07 officers, including (additional Secretaries, Assistant Secretaries and Sectorial Officers), were interviewed to gain insights into policy priorities, development plans, and challenges faced by the Ministry. National Aquatic Resources Research and Development Agency (NARA): 04 researchers with expertise in (Aquaculture and Breeding) were interviewed to understand the scientific perspective on resource management, sustainability concerns, and potential for innovation. Ministry of Industries (MoI): 03 officers focusing on the fisheries sector were interviewed to understand the Ministry's role in promoting value addition, diversification, and industrial development within the sector. While this research primarily focused on the perspectives of policymakers and researchers, the valuable role of industry participants, including fishermen and business representatives, is acknowledged. Future research could incorporate their experiences and perspectives to provide a more comprehensive understanding of the challenges and opportunities within the blue economy. The rationale for focusing on government officials in this study was to gain insights into the existing policy framework, regulatory environment, and institutional capacity for driving the expansion of the blue economy.

The study employed purposive sampling to select key stakeholders with relevant knowledge and experience in the Sri Lankan blue economy, particularly in the fisheries sector. The selection criteria included relevant experience, diverse perspectives, and willingness to participate. Efforts are made to ensure diversity and representativeness by including participants from different organizations and sectors of the Fisheries sector. The final sample size is determined by data saturation, ensuring comprehensive and meaningful findings. Accordingly, the interviews were limited to twenty interviews.

An interview protocol was used to collect data which includes inviting them to participate, briefing, obtaining informed consent, interview questions and closing the interview. Field notes are taken using a standard template that includes the following components: Date, time, and location of the interview; participant’s name, role, and organization, summary of the key points discussed during the interview, noteworthy observations or reflections; and follow-up questions (if applicable). Voice recordings were used to capture interviews with key stakeholders involved in the fisheries sector of the blue economy in Sri Lanka. The recordings were transcribed verbatim by a researcher to ensure accurate and comprehensive data collection, capturing nuances such as tone, emphasis, and pauses. The interviews conducted in the study use either Sinhala or English, depending on the language preference of the participant.

The collected data was analyzed using thematic analysis, identifying key themes and patterns related to the opportunities and challenges in expanding the blue economy,

specifically in the fisheries sector. This analysis involves coding, categorizing, and interpreting the data to gain a comprehensive understanding of the current state of the sector and potential ways to enhance its growth (Maguire & Delahunt, 2017). The findings are presented in a clear and concise manner to provide valuable insights for policymakers and industry stakeholders. The findings were triangulated by comparing and contrasting the data from different sources to ensure the validity and reliability of the research. This research employed several strategies to ensure the credibility, transferability, dependability, and confirmability of its findings. Data analysis involved an iterative process of coding and thematic analysis (Thematic Maps – Appendix II). To enhance credibility, we engaged in member checking by sharing preliminary findings with key informants for feedback and validation. Additionally, the research team conducted regular peer reviews of the coding and analysis process, ensuring dependability through ongoing discussion and consensus-building. Recognizing the potential limitations of inter-coder reliability in interpretive research, we focused on ensuring confirmability by providing detailed descriptions of the research context, data collection procedures, and analytical steps. This allows for an audit trail and facilitates the assessment of the findings' trustworthiness by other researchers. Finally, to enhance transferability, we have provided rich descriptions of the Sri Lankan fisheries sector and the specific challenges and opportunities identified. This contextualization allows readers to assess the applicability of the findings to other contexts (Maguire & Delahunt, 2017; Dawadi, 2020).

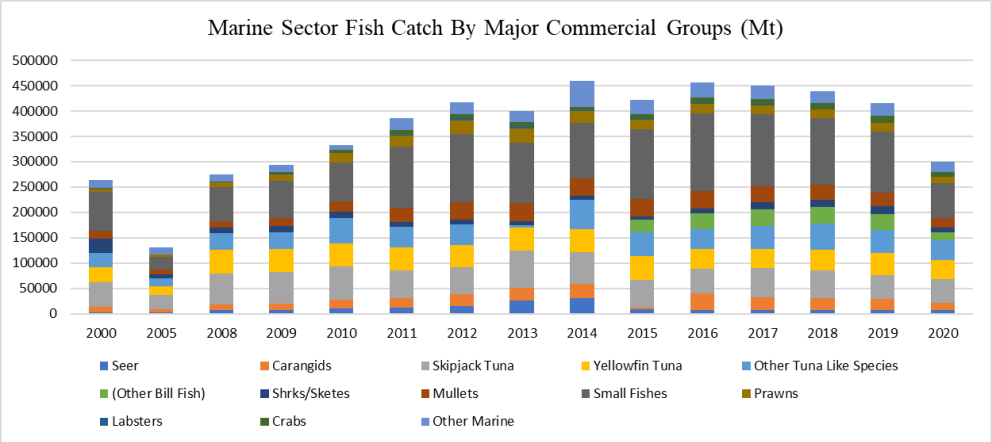
DATA ANALYSIS AND PRESENTATION

Fisheries Sector in Sri Lanka, as a major component of Blue Economy

Fisheries is a crucial component of Sri Lanka's blue economy, providing employment and income for many people, particularly in coastal areas (SLEDB, SLEDB, 2023). The country has a long history of fishing and a diverse range of fish species that are highly valued both locally and internationally (SLEDB, Sri Lanka Business, 2023). As such, exploring the opportunities and challenges of fisheries in the context of the blue economy is crucial.

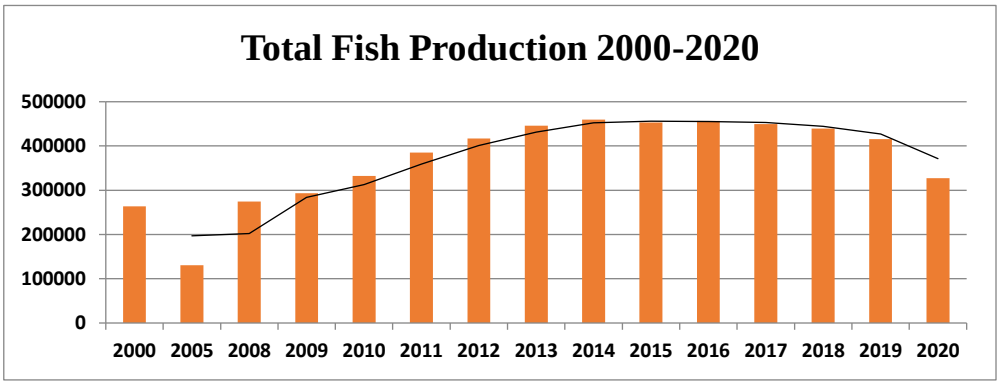
The waters surrounding Sri Lanka have diverse marine biological resources, with 620 species from 137 families. Most of these resources comprise teleost fish, with fewer elasmobranchs, cephalopods, crustaceans, decapods, echinoderms, gastropods, and reptiles (Athukoorala, Bhujel, Krakstad , & Fri, 2021). One could observe a steady growth in marine fish production over the past few decades. But the reduction in the last 2-3 years reached approximately 300,000 Mt in 2020 (Figure 01 and Figure 02)

Figure 01 - Marine Sector Fish Catch by Major Commercial Groups (Mt)



Source: MoF, Annual Report 2020

Figure 02 -Total Sri Lankan Marine Fish Production 2000-2020

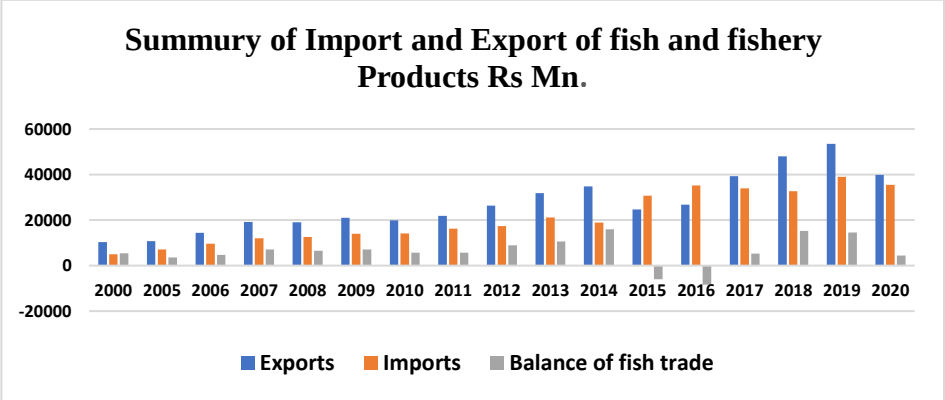


Source: MoF, Annual Report 2020

When examining the fisheries sector, a significant portion of fish production consists of 33% of tuna species and 29% of small pelagic species such as sardines, herrings, and sprats. Additionally, Sri Lankan coastal waters are abundant in non-fish living resources (Prasada, 2020). For example, Sri Lankan coastal waters are home to 24 different species of sea cucumbers, including the highly valued *Holuthuria scraba*, which can cost up to $7.00 (Seven United States Dollars) per fresh animal (Prasada, 2020).

The abundance of marine living resources in Sri Lanka plays a vital role in the country's export market. Except for 2012 and 2016, there has been a steady increase in foreign exchange earnings from these resources over the past two decades (Figure 03).

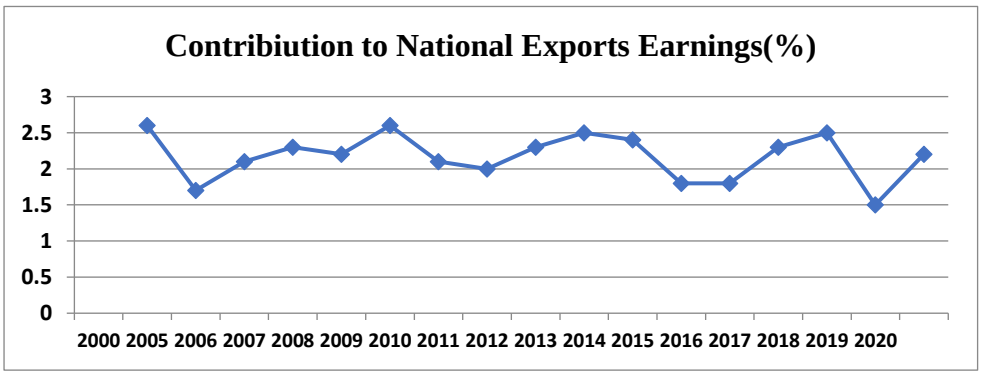
Figure 03 - Import and Export of fish and fishery Products



Source: MoF, Annual Report 2020

Also, fish production is playing a significant role in National Export earnings and around 1.5% to 2% of National Exports consist from fish (Figure 04).

Figure 04- Contribution to National Exports Earnings (%)



Source: MoF, Annual Report 2020

The fisheries industry in Sri Lanka has seen positive growth in terms of industrial infrastructure, with 15 022 small traditional craft, 8334 fiberglass speedboats with kerosene outboard motors, 1550-day boats, and 1700 larger multi-day boats currently in operation. Additionally, the country boasts 22 major fishery harbors, 104 ice plants, 42 anchorages, 72 boat manufacturing yards, 883 minor fish landing centers, and ten fishing gear factories (SLEDB, Fishery Products-Industry Cpability Report, 2019). These developments have enabled the country to serve the local and international markets effectively.

The marine fisheries sector contributes to the overall economy very significantly. Fish and other seafood products are crucial in providing animal protein to the population, contributing to 50% of the protein intake, 34.5% of the calorie intake, and 22.2% of the fat intake in 2019 (Ministry of Fisheries, 2020).

In 2020, the marine fishing sector in Sri Lanka provided the livelihood for 185,570 fishing households and direct employment to 225,020 fishers, including both men and women. This represents a 3.6% annual growth rate since 2001. The fishing household population is 804,980 (Ministry of Fisheries, 2020).

The Analysis focuses on key themes identified through the interviews, including opportunities in the sector, challenges facing the sector, and potential strategies for addressing these challenges.

Opportunities in the Fisheries Sector

This study identified three themes as opportunities in the fisheries sector as the high demand in domestic and export market, sound technological processing factories, and lots of untapped resources.

Demand in domestic and export markets

The key theme that emerged from the statements from the respondents from DFAR and MoF was a high demand for Sri Lankan fish products.

> *"Since our fish have flavor advantage, we have more demand for fresh fish than Frozen fish. Wild Shrimp, Blue Swimming Crab, and Mud Crab (Lagoons) have more demand in the Singapore market. If we have more production of sea cucumber, Chank (Hak bellan), and color fish, we can export more. No barriers from the demand side." (Director General/DFAR)*

Especially Wild Shrimp, Blue Swimming Crab, Mud Crab, Chank, Color Fish, Yellow Fin Tuna, beche-de-mer, Lobster, and Crabs have high demand.

> *"Yellowfin tuna (Kaha Waral Kelawalla) has high demand, beche-de-mer, Chank (ramous meat) lobster, crabs have high demand trend" (Director/Research/DFAR)*

> *"We are one of the major tuna exporters. We export more to Europe. (Director/Research/ MoF)*

> *"We can gain huge income from beach-de-mer (sea cucumber). Since we are not consuming them, we can export whole production to the countries like China" (Director 2 /DFAR)*

Beche-de-mer (sea cucumber) was highlighted as a product with the potential to generate significant income.

> *"Best quality fish are exported to Japan as sesame, next to EU. Likewise, we export. They have high recognition for our products" (Director General/DFAR)*

Additionally, a significant export market for these products exists, with Europe and Japan being the primary destinations.

> *"In Sri Lanka, Per capita fish consumption is 17 kg per person per year. It should increase up to 21kg. Fish produce more than 60% of human protein as animal protein. So, we need to increase 17 kg to 21 kg as the natural protein requirement of a human. Our annual fish production is around 574000. Since we cannot fulfill the protein need from that amount, we need to go to alternative sources to fulfill our protein requirement." (Principal Scientist 1/Ocean Resource/NARA)*

Finally, there is also an opportunity to increase per capita fish consumption in Sri Lanka from 17 kg to 21 kg to fulfill the protein needs of the population.

Sound Technological Processing Factories

DG/DFAR and D/R.DFAR both mention that we have sound processing factories and using some of the factories, we are re-exporting the fish after a small amount of value addition.

> *"We have good processing factories, so we are re-exporting after a small amount of value addition." (Director/Research/DFAR)*

> *"Now we have more than 80 processing factories. More than 40 are EU standard." (Director General/DFAR)*

According to that, we have processing factories with sound technical capacity, and more than half of our processing factories are compliant with EU standards.

Lots of Untapped resources

Untapped resources in the fisheries sector reveal a need for better access to deeper waters and larger fishing vessels. The NARA has identified the areas of potential fish harvest, but the current small boats are inadequate for the job.

> *"Maru wel Panna (Fishing gear/Line gear/Longline method), 40KM long rope with hooks with boyas, drowns up to 200-300M deep. Thermo climbed depth is the ideal place for tuna. We are targeting the fish in 200-300m depth. However, big eye tuna, Thalapath, koppara, and sappara are more deep sea." (Director 2/DFAR)*

Specifically, it is necessary to tap the potential of deep-sea fishing to harvest big-eye tuna, thalapath, koppara, and sappara. Larger vessels reaching 200-300km depths are required to access this untapped resource.

> *"Our boats are small to catch that harvest. If we have big boats, we can touch this untapped resource. Thalapath, koppara, and sappara are*

bycatch. Now NARA identified the places where the fish harvest is located. Time, cost of production is reduced." (Assistant Director/Fisheries/ MoF)

Furthermore, the production cost must be reduced to make deep-sea fishing a viable option for fishermen.

Challenges of the Fisheries Sector

As challenges 09 themes emerged, and that are Wild Catch/Fish harvest decreasing, Fish Handling, Lack of Technology, Lack of Proper Refrigeration and other facilities for the Boats, Increased cost of Production, Lack of Skilled Labour, International barriers, Degradation of Coastal Habitats and Biodiversity and Over-Capacity of the Fishing Fleet.

Decrease of fish harvest

Thematic Analysis suggests that the fish harvest is declining, and there is a need to manage the current fisheries resource. This indicates a growing concern for managing fisheries resources on a regional level.

"Fisheries resource has become decreasing. We need to manage the current resource. No new license issues, the only license holder can do the fishing." (Director/Research/DFAR)

"Yellowfin tuna (Kaha Waral Kelawalla) has high demand, beche-de-mer, Chank (ramosus meat) lobster, crabs have high demand trend, nowadays we have barriers as low wild catch" (Director/Research 2/DFAR)

The main concerns raised by the Officials of the DFAR and MoF are related to the decreasing wild catch and the high demand for specific fish species such as yellowfin tuna, beche-de-mer, Chank, lobster, and crabs.

"Now we have barriers to wild catch, and it is declining. Southern Bluefin is now no more. There are Regional fisheries management Bodies (RFMB), and our body is the Indian Ocean Tuna Commotion (IOTC). Now IOTC informed us that our fleet is declining, and a quota system will be introduced. As an example, 30000MT for us, 20000MT for Bangladesh." (Director/Research/DFAR)

Moreover, the text highlights that the Southern bluefin fish species is no longer available due to declining wild catch. The IOTC has informed the concerned authorities about the declining fleet and the introduction of a quota system.

"Only the Indian Ocean has seen some kind of increase in fish production. All four other oceans are over-exploited. Even though Indian Ocean fish production has increased when we consider that Sri Lankan coastal

fishery production is somewhat over-exploited. Coastal fishery produces 60% of the fish production of Sri Lanka, while offshore fishery contributes 40%. So, this 60% is over-exploited. (Principal Scientist 2/Ocean Resource/NARA)

"Cage culture should be developed while saving the wild catch." (Director/Research/ MoF)

The Sri Lankan coastal fishery production, which contributes to 60% of fish production, is also overexploited. There is a need for sustainable management practices to ensure the long-term viability of the fisheries sector.

Poor practices in fish handling

This bad practice of not handling the fish hygienically and not using clean water for cleaning and making ice has a significant negative impact on the quality of fish and leads to post-harvest losses.

"We are not handling the fish hygienically. Not using clean water for clean the fish and for making Ice." (Director General/DFAR)

Practicing the proper and hygienic fish handling is essential to reduce post-harvest losses and ensure quality.

"Our fisherman are not using clean water for their fisheries activities such as making ice and clean the fish and other instruments." (Director 3/DFAR)

This means that clean water should be used for cleaning and making ice, and the fish should be handled carefully and hygienically. This will ensure that the quality of the fish is maintained, and post-harvest losses are minimized.

Lack of Technology

The lack of technology and training in the Sri Lankan fishing industry significantly contributes to the decline in overall production. The DFAR and the NARA research center have identified these issues but have been unable to address them due to a lack of capital.

"No fish finders – Other counties reach exactly where fish locate, and we spend too much time on fish finding. No Stock assessment is done. We do not know about our resources, our beche-de-mer, and Chank has high demand in the EU region. However, we do not know the exact recourse since no stock assessment is done." (Director/Research/DFAR)

Without modern fish finders, stock assessments, and deep-line trolling, fishermen cannot maximize the potential of their resources.

> *"Long line method – Our trollers cannot go beyond the level. Researchers identify that if we can put a ling line deeper than what we are doing, we can catch more harvest (Amount and other tuna species than YFT). Big tollers are needed. But No capital. We cannot change the fleet. Gradual change should be imposed" (Director/Research 2/DFAR)*

This lack of technology and training has had a significant influence on the overall productivity of the Sri Lankan fishing industry.

> *"Fisherman are traditional ones. Do not have training centers. No proper institute to transfer knowledge, NARA has a research center, but it is not sufficient." (Director General/DFAR)*

Additionally, the lack of knowledge transfer and training centers leaves fishermen operating on outdated and inefficient practices, further reducing their production ability.

Lack of Proper refrigeration and other facilities for the boats

Thematic Analysis suggests that the lack of proper refrigeration on fishing boats is causing a high rate of post-harvest quality loss.

> *"Now we have more than 80 Processing factories. More than 40 are EU standards. Our boats are traditionally developed fiberglass (20,28,30,35,40,45 60 ft). Now they impose a regulation as boat length should be at least 55-60ft since they need to include toilet facilities, Cooling facility and another sanitization facility into that boat." (Director General/DFAR)*

The regulations imposed by other countries require boats to have facilities such as toilets, cooling systems, and sanitization systems. However, Sri Lankan boats are usually made of fiberglass and cannot meet these requirements.

> *"Other countries are using steel boats (Vessel). We have only 30 of them. Our boat has few facilities, so the cooling system is not up to standard. We Use 50 kg ice cubes. Some are carrying 500-600 cubes with them. When ice gets old, it starts to become water. Other counties are using cooling systems like huge refrigerators. (-2 +2 level temperature should be kept). Post-harvest quality loss is high. Some boats occurred 70% PHQL." (Assistant Director 2/Fisheries/ MoF)*

As a result, they are forced to use ice for cooling, which can become water and lead to a high rate of post-harvest quality loss.

"Toilet, bath, sleeping facility should be in the boat. Other countries are using Reverse Osmosis (RO) plants (Purify sea water), but we are taking tanks and bottles." (Director General/DFAR)

"yellowfin tuna has the high market, but when we wild catch quality decrease, due to lack of cooling facility – Post-harvest losses occurs" (Director/Research/DFAR)

It is clear that the need for proper refrigeration is hindering the fishing industry in Sri Lanka and that better regulations and facilities need to be put in place in order to ensure that the quality of tuna landing meets export-quality standards.

Increased cost of Productions

As per the Director of the MoF, increased cost of production due to rising fuel prices has had a significant impact on production costs, and it drives an overall increase in the prices for the Fisheries products

*"Fuel Price Increase has been affected badly. Cost is improved from 10000*405 to 10000*137 or 15000 liters needed—1.3 million to 4 million. The total cost is around 3 million earlier, but today we need 4 million for fuel. kerosene oil increased to 355 from 77. Transport cost increased." (Director/Research 3/ MoF)*

"Another issue is fuel price fluctuation including petrol and kerosene oil" (Director/Research/DFAR)

Recent fuel price fluctuation has impacted to the Fisheries Sector in an adverse manner.

Lack of Skilled Labor

The lack of skilled labor in the fisheries sector is an issue that must be addressed in order to improve the industry. Furthermore, there are no proper institutes to transfer knowledge, and the available research center is insufficient.

"fishermen are low educated, so we need to transfer new technology and good practices of the sector to them. Ex- Egg lobster is prohibited to catch, but fishermen are catching them." (Assistant Director 3/Fisheries/ MoF)

"fisheries training colleges are not yet implemented." (Assistant Director 4/Fisheries/ MoF)

"On-board fish handling is a separate technique. If we do not properly handle the fish, it is wasted. (Blood removal, Nerves should not be damaged)." (Director General/DFAR)

Fishermen are low educated and need to be taught new technologies and good practices in order to increase their efficiency. Fisheries training colleges must be implemented to provide fishermen with the skills they need. On-board fish handling is a different technique that must be taught for fish to be handled properly and not wasted.

> *"Fisherman are traditional ones. Do not have training centers." (Director/ResearCH/DFAR)*

> *"No proper institute to transfer knowledge. NARA has a research center, but it is not sufficient." (Director/Research/DFAR)*

This lack of skilled labor is a significant problem that must be addressed to improve the industry and ensure that the fish are handled correctly.

International barriers

Another theme that emerged is International Barriers. The Indian Oceans Tuna Commission (IOTC) has imposed a quota system on Yellow Fin Tuna (YFT) due to its decreasing population. At the same time, it is a necessary step towards ensuring sustainable fishing practices and the conservation of marine life, which is critical for the long-term health of the planet.

> *"Yellowfin tuna is now decreasing. And IOTC imposed quota system to YFT." (Director/Research/ MoF)*

This policy has international implications as it affects cross-border fishing activities and is likely to adversely impact fisherfolk's livelihoods and the local economy.

> *"Now we have barriers to wild catch, and it is declining. Southern Bluefin is now no more. There are Regional fisheries management Bodies (RFMB), and our body is Indian Ocean Tuna Commission. Now IOTC informed us that our fleet is declining, and a quota system will be introduced. As an example, 30000MT for us, 20000MT for Bangladesh." (Director General/DFAR)*

The implications of this policy highlight the importance of international cooperation in addressing environmental issues, particularly those related to the ocean and marine life. Furthermore, it also serves as a reminder of the need for effective monitoring and enforcement of global fishing regulations in order to ensure that future generations will be able to enjoy a healthy Marine ecosystem.

Degradation of Coastal Habitats and Biodiversity

> *"Eutrophication should be reduced. Marine protected areas, (Prohibited all activities), EZZ – 2030 should be 10%-20% from the EZZ as marine protected areas." (Assistant Director 3/Fisheries/ MoF)*

> *"Microplastic level increased, Fish eat that, and we eat the fish. So, we are effect with that microplastic." (D/Fisheries/ MoF)*

Various actions can be taken to reduce the adverse effects of pollution, such as establishing Marine protected areas, reducing eutrophication, and reducing the number of microplastics in the environment.

> *"Conflicts with major companies. Hotels in harvesting areas. Access problems. Transport problems occur. Dry fish manufacturing process. Express Pearl incident – Livelihood stopped. Compensation is given. Port City – Sand mining is the problem for the fisheries sector." (D/Fisheries/ MoF)*

> *"Our fisherman use trolling method it harms to the biodiversity." (Assistant Director/Fisheries/ MoF)*

Strategies should implement with the intention of protecting the environment and preserve biodiversity.

Over-Capacity of the Fishing Fleet

The statements of the Assistant Director of the MoF are focused on the issue of the over-capacity of the fishing fleet. The speaker highlights the need to manage the number of boats used in fishing and suggests using methods to calculate the catch per unit effort (CPU) to reduce the number of boats.

> *"Not the increase in the quantity of the boats. We can estimate the nonmoving fish."*

> *"If we put more boats catch per unit (CPU), an effort is reduced. We need to manage that quantity by using minimum boats. We must introduce methods to increase CPU. "Sunken Billion" book mentions that 1/3 of the boat is enough to catch the amount of fish they are catching now. So much energy, oil, and Human resources are wasted. We need to manage that quantity." (Assistant Director /Fisheries/ MoF)*

The speaker also mentions the need to implement strategies to reduce the quantity of energy, oil, and human resources wasted through over-capacity fishing practices. The importance of managing the fishing fleet to ensure sustainable fishing practices and reduce the environmental impact of fishing.

Solutions to overcome the Challenges

Solutions that emerged from the discussions are Introducing a Sound VMS and forecasting System and Technology Improvement, Collaboration with other sectors, Proper Trained Human Resources, Technology Transfer from other countries, Reducing Post Harvest Lost, Value Addition to the Fish and Diversification, and Moving towards the Aquaculture and Mari Culture.

Introduce a Sound VMS and forecasting System and boat modernization

The Director and Sectorial Officer of MoF have identified two main areas of focus to improve the handling of fish and reduce the time spent at sea: the introduction of a forecasting system and vessel monitoring system and boat modernization. The forecasting system and vessel monitoring system will help to ensure that fishing activities are conducted in a safe, responsible, and sustainable manner.

> *"Can introduce a Forecasting System and Vessel Monitoring System" (Director/Research/ MoF)*

> *"Boat modernization to improve the handling of fish, and enhanced logistical arrangements to reduce time spent at sea, without increasing the overall catch. Maintaining Database and participatory fishery management plans to maintain the health of coastal fish stocks." (Sectorial Officer 1, MoF)*

The boat modernization will improve the efficiency of fishing activities and reduce the time spent at sea. In addition, the MoF is also maintaining a database and participatory fishery management plans to maintain the health of coastal fishery stocks.

> *"Vessel monitoring system – cruise track, Unregulated, Unreported Illegal (IUU) fishing cannot be exported. Department of Fisheries have vessel monitoring system" (Assistant Director/Fisheries, MoF)*

These efforts will safeguard that fishing activities will conduct responsibly and sustainably while also helping to protect the marine environment.

Collaboration with other sectors

The thematic Analysis explores the collaboration with regard to developing a national policy. Both the Assistant Director and Director of the MoF have proposed adopting more technological solutions in the marine fisheries sector and developing a national Fisheries and Aquaculture Policy.

> *"No research on pharmaceutical, recreation and other things." (Assistant Director/Fisheries/ MoF)*

"More technological Solutions should be there as marine fisheries. National Fisheries and Aquaculture Policy development should be done with collaboration with other sectors" (Director 2/Research/ MoF)

This policy could include guidelines and regulations on research into pharmaceuticals, recreation, and other related topics. This thematic Analysis highlights the importance of inter-sectoral collaboration in order to develop effective policies that promote the health and welfare of the environment, as well as the economic well-being of the marine fisheries sector.

Properly train human resources

The DFAR is aware of the need for human resources to be well trained but recognizes that fishermen are traditional, without access to training centers. The department is, therefore, likely to be focused on developing ways to provide training and support to fishermen in order to ensure they remain up-to-date with the latest industry trends, regulations, and best practices.

"Since the farmers do not have proper skills, Human resources should be well trained" (Director General/DFAR)

"Fisherman are traditional ones. Do not have training centers." (Director/Research/DFAR)

This could include offering online courses, developing mobile apps, or partnering with local universities and other organizations to provide training programs in coastal areas.

Technology Transfer from other countries

Thematic Analysis identifies the technology transfer from other countries as a suggestion to overcome the above problems as suggested by the Director General and Director (Research) of the DFAR.

"*Develop boat building industry, fishing gears, Human Resource exchange with other counties should be done" (Assistant Director 2/Fisheries/ MoF)*
"Korean fisherman and boat engine technology should come here" (Director General/DFAR)

"Technology transfer, dry fish (Maldives fish – technology should be transferred)." (Director General/DFAR)

That includes Developing the boat-building industry, fishing gears, and human resource exchange with other countries, Transferring Korean fishermen and boat engine technology, and transferring technology related to dry fish (Maldives fish).

> *"Technology transfer from developed countries, Regulations implementation, impose regulations" (Director/Research/DFAR)*

Furthermore, implementing regulations and imposing regulations from developed countries should be done.

Reduce Post Harvest Lost

It is proposed intervention to reduce post-harvest loss suggests an increased focus on the development of infrastructure and storage facilities.

> *"Storage facility improvement of the boats, Harbor Storage facility (Infrastructure improvement)," (Director/Research/DFAR)*

This would provide the necessary resources to ensure the preservation of fish and other aquatic resources for a longer period, thus reducing post-harvest loss.

> *"Post-harvest Quantity lost and Post-harvest Quality loss both should be reduced," (DG/DFAR)*

According to the DG- DFAR both post-harvest quality and quantity loss should be minimized since now it occurred from the most of the fisherman.

Value Addition to the Fish and Diversification

The fish industry provides a variety of products and services.

> *"Value Addition Product we are just exporting raw fish. Bust some counties are making tablets, and so many products from fish. Sri Lankan Catering have Ready to heat fish" (Director General/DFAR)*

> *"Diversify harvest beyond yellowfin tuna to healthy fish stocks and increase value addition along the value chain such as Farm oysters, mussels, and seaweed" (Sectorial Officer 2, MoF)*

The DG of the DFAR has identified a range of value-added products and services that can be derived from fish, including tablets, ready-to-heat fish, and catering services, and suggests that there is a need for increased investment in the development and promotion of value-added products and services in order to increase the economic benefits to be derived from the fish industry.

Move towards the Aquaculture and Mari Culture

DFAR has identified aquaculture and Mari culture as potential areas for growth.

> *"Manage resource and should go to aquaculture and Mari culture" (Director/Research/DFAR)*

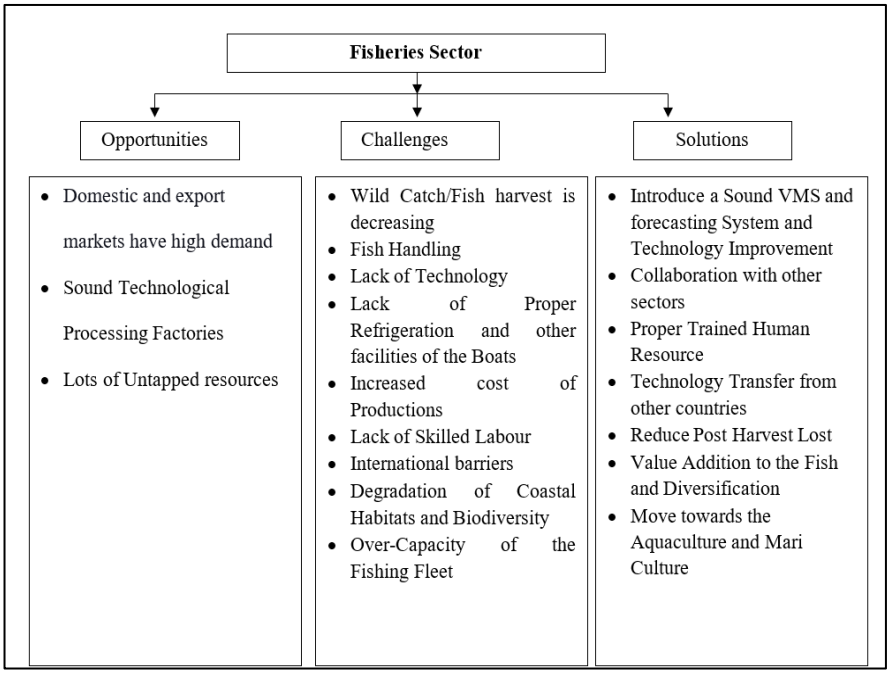
> *"We need to go to aquaculture and matriculate for growing fish." (Director General/DFAR)*

> *"We have big potential to develop Mari culture. NAQDA has Zonal Plan. But we are not expanding to that areas. Seaweed sea cucumber growing potential is there." (Assistant Director/Fisheries/ MoF)*

NAQDA has established a Zonal Plan to develop Mari culture further. However, expansion in this area has been limited.

> *"Aquaculture – Marine 50% Aquaculture 50% in developed countries. our around 15% to 20% we must expand it to 40% at least." (Director/Research/DFAR)*

It is suggested that aquaculture and Mari culture should be expanded to at least 40% of total fisheries activity, up from the current 15-20%. This could be achieved through the development of new resources and techniques, as well as better education and training in these areas. The DFAR will continue to work with other stakeholders to ensure that aquaculture and Mari culture are developed to their fullest potential.



The analysis identifies key themes related to opportunities, challenges, and solutions for expanding the blue economy in Sri Lanka, with a specific focus on the fisheries sector. A significant opportunity lies in the high demand for Sri Lankan fish products. However, this opportunity is challenged by the declining fish harvest, with concerns about overexploitation and even extinction of certain species. Several solutions can address this challenge and ensure long-term sustainability such as Introduce a sound VMS and forecasting system, improve technology and boat modernization, implement sustainable fishing practices, invest in resource management and stock assessments and Collaborate with other sectors to develop a national fisheries policy Sri Lanka possesses sound technological processing factories, offering an opportunity for value addition and diversification which increase profits and boost the industry's economic contribution. However, several challenges hinder efficiency and lead to losses such as Poor fish handling practices, Lack of technology and training, Lack of proper refrigeration and other facilities on boats, Increased cost of production. To address these challenges and improve efficiency we can Properly train human resources, Transfer technology from other countries, reduce post-harvest losses by improving storage facilities and Invest in value-added products and diversification.

Sri Lanka has significant potential for Mari culture and aquaculture development. However, challenges exist in this area such as Degradation of coastal habitats and biodiversity, Lack of skilled labor in aquaculture. To overcome these challenges, we should Collaborate with other sectors to develop a national aquaculture policy, invest in research and development of new resources and techniques, Provide education and training in aquaculture. By addressing these interconnected challenges and strategically leveraging the identified opportunities, Sri Lanka can develop a thriving and sustainable blue economy centered around its fisheries sector. The proposed solutions highlight the need for collaboration, innovation, and responsible resource management to ensure the long-term health and prosperity of the industry and the marine environment.

DISCUSSION OF THE FINDINGS

The findings highlight several challenges and opportunities in the fisheries sector in Sri Lanka. Some of these challenges are not unique to Sri Lanka and have been identified globally. For instance, overfishing, over-capacity of the fishing fleet, degradation of coastal habitats, and biodiversity loss are significant global challenges the fisheries sector faces (FAO, 2020). Similarly, eutrophication and microplastic pollution are significant environmental issues affecting the fisheries sector worldwide (UNEP, et al., 2012).

In addition to non-compliance with fisheries law and management protocols, additional issues related to fisheries, such as Indian fishermen poaching, a lack of accurate data and information, post-harvest losses, inadequate marketing and transportation, poor management, and maintenance of fishery infrastructure, destructive fishing gear practices, insufficient investment in the fishery sector, inadequate application of fisheries development plans, a lack of expertise in the

fishery sector and high operational costs of fishing, are of particular concern for the sustainability of marine resources (Maheepala, 2016).

When Small-Scale Fisheries (SSFs) are hindered by limited access to resources, lack the ability to discuss terms with entities that mediate their access to resources, and do not have any influence in decision-making, their susceptibility to harm increases because they lack skills and access to the modern technology. Consequently, it is essential for the government and policymakers to recognize the various susceptibilities, such as training experienced by SSFs, as small-scale fisheries provide sustenance for countless fishers and are a fundamental source of food security (Ibrahim, 2020). The unhealthy practice of bottom trawling by Indian fishermen causes severe harm to the marine ecosystem (Goonetilleke & Colombage, 2017).

The sector was facing several difficulties, such as overfishing, decreased fish populations, destruction of coastal habitats and pollution, and the influences of climate change. Sustainable fisheries control is essential for ensuring Sri Lanka's food safety and meeting the sizeable domestic requirement for fish (World Bank, 2022).

On the other hand, the opportunities identified in the interviews also align with the available literature. The potential for aquaculture and Mari culture has been recognized as viable solutions to address the challenges facing the fisheries sector in Sri Lanka (Gunawardene, 2018). Value addition to fish products and diversification have also been identified as opportunities for the fisheries sector to increase its profitability and competitiveness (Gunawardene, 2018). The importance of proper training and the need for technology transfer from other countries have also been highlighted in previous studies on Sri Lanka's fisheries sector (Ibrahim,2020). Furthermore, collaboration with other sectors has been recognized as a critical factor for the sustainable development of the fisheries sector (Gunawardene, 2018).

To support effective policy decisions, accurate and cost-effective data collection methods must be employed, such as activating weight measures at harbors and using log books and electronic monitoring systems. Additionally, infrastructure development in the northern districts could raise fish production, improve the quality and reduce post-harvest losses (Maheepala, 2016). Aquaculture development is a policy priority, as it is necessary to meet the local market requirements and remain competitive in the international arena. To reduce the economic and ecological damage caused by Indian poaching, short-term and long-term solutions must be found. Poor living standards for fishers can be attributed to low average annual fish production, particularly in the northern and eastern districts, as well as poverty resulting from non-compliance with fishery law and illegal fishing practices, such as dynamite, caused by a lack of alternative income sources. Thus, it is essential to maintain a balance between socioeconomic sustainability and ecological resilience (Maheepala, 2016).

Theoretical Contributions

This study provides valuable theoretical contributions by elucidating the intricate dynamics of the fisheries sector within the broader context of the blue

economy. The identification of high demand in both domestic and export markets highlights the sector's potential as a key player in the global fisheries market. The recognition of decreasing wild catch, technology gaps, and international barriers adds theoretical depth to discussions on sustainable fisheries management. The conceptualization of solutions, such as the introduction of a Sound VMS and collaboration strategies, contributes to the theoretical foundation by offering insights into fostering resilience and responsibility in fisheries practices. This study thus enriches theoretical frameworks surrounding sustainable resource utilization, market dynamics, and the interplay of environmental and economic considerations in the context of the blue economy.

Practical Contributions

Practically, this research offers actionable insights for policymakers and stakeholders involved in the fisheries sector. The identification of challenges, such as insufficient technology, lack of skilled labor, and overcapacity, serves as a practical starting point for targeted interventions. Concrete solutions, including technology transfer, collaboration initiatives, and value addition, provide practical approaches to address these challenges. Recommendations for modern technology adoption, improved enforcement, and enhanced training contribute directly to the implementation of sustainable fisheries management practices. The emphasis on spatial planning and a comprehensive national policy offers practical guidance for responsible sector management. These practical contributions equip policymakers and industry players with real-world strategies, fostering the actualization of sustainable fisheries practices, economic growth, and community well-being within Sri Lanka's blue economy.

Limitations

Despite its contributions, this study has limitations. Its context-specific nature may limit universal applicability, and external factors such as global economic shifts could impact the effectiveness of proposed solutions. Additionally, the dynamic nature of the blue economy introduces uncertainties, and unforeseen policy changes might affect practical implementation. These limitations underscore the need for ongoing research and adaptive management strategies in the evolving field of blue economy development, emphasizing the importance of continual reassessment and adaptation to changing circumstances.

Future Research Directions

Future research endeavors to expand the Blue Economy in Sri Lanka must prioritize the development of sustainable and profitable fisheries, considering the sector's significant contribution to the national economy. Ongoing threats posed by overfishing, illegal fishing practices, and climate change necessitate focused investigation. Specifically, researchers can assess the impact of climate change on fish stocks and explore alternative livelihood options for fishermen, addressing the challenges posed by environmental shifts. Additionally, a crucial avenue for future

research involves the formulation of sustainable fishing practices, incorporating selective fishing gear to mitigate overfishing and habitat destruction. Fish stock assessment initiatives are imperative for understanding the current status of fish populations in Sri Lankan waters and identifying influential factors. A comprehensive market analysis is equally vital, examining trends and identifying new markets for Sri Lankan fish and fishery products to ensure the long-term viability and prosperity of the fishing industry.

CONFLICT OF INTEREST

The authors declared no conflict of interest.

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APPENDIX I: INTERVIEW GUIDE

1. What is the Current Status of the Fisheries/Aquaculture/ Mari culture Sector in Sri Lanka
2. How Fisheries/Aquaculture/ Mari culture Sector Contribute to the Blue Economy?
3. What are the areas we can develop Fisheries/Aquaculture/ Mari culture within Sri Lanka?
4. Global Trends or Demand of the Fisheries Sector
5. What are the current problems which prevent reaching the global standards in the sector?
    - Technology/Operational/Financial/Skill/Land/Human Resources/Social/Environmental/Government Barriers/International Barriers/Global Competition
6. What are the bad practices we do
7. Proposing solutions to overcome these problems?
8. Institutional Support could be given to develop the sector
9. What are the Direct & Indirect Job Opportunities?

10. Approximately how much foreign exchange can be earn or save by developing Fisheries Sector?
11. How we can attain Blue Economy Sustainability by Developing this Sector?