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Assessing the Value Chain of Small-Scale Fisheries in Egypt: Challenges and Opportunities

Mai S. ElDine[1,*], Sally I. AbdelAziz[2]

[1]Associate Professor @Arab Academy for Science, Technology and Maritime Transport, College of International Transport and Logistics
[2]Maritime Postgraduates Institute, Arab academy for Science Technology and Maritime Transport, AbuQir, Egypt

Abstract The purpose of this study is to conduct a SWOT analysis to uncover the major problems and possibilities in Egypt's small-scale fishing value chain. It was followed by a qualitative data approach using semi-structured interviews with fishers and traders (wholesalers and retailers) to determine the current state of the fisheries sector in Egypt, particularly in the Mediterranean Sea, followed by a road map illustrating the main challenges and solutions to serve as a guide for all sections in Egypt to maximize the benefits of such a sector. It also discovered ASWOT analysis by emphasizing obstacles and problems.

Keywords Value chain, Small-scale fisheries, Fisheries sector

1. Introduction

The fisheries sector is vital for economic activity, export income, and employment in many developing countries; it also provides a significant amount of food to humanity. (Costello et al., 2020). Fisheries sector sustainability is strongly linked to value chains and postharvest activities (Islam and Habib, 2013, Kruijssen et al., 2018, Porras et al., 2017, Rashid and Sarkar, 2020, Tint et al., 2020, Yihang, 2020), but this is frequently hampered by poor postharvest performance and limited value addition to fishery products, particularly in developing countries and small-scale fisheries.

Overcoming these challenges is thus crucial for improving fisheries value chains and fostering the long-term development of the sector.

According to the General Authority for Fish Resources Development's (GAFRD) 2019 statistics yearbook, the Egyptian Mediterranean accounted for 48.5% of total marine output in 2019. Nonetheless, its output has declined in recent decades, going from 77388 tons in 2010 to 48018 tons in 2019. Furthermore, the total share of fisheries production declined from 35% of total aquatic production in 2010 to 20% in 2019. As a result, there is a critical need to study, analyze, and measure every step in the natural fisheries sector, beginning with the fishing process and ending with the final consumers, in order to identify the barriers to developing the marine fisheries sector in Egypt, especially the Mediterranean Sea in two ports (Alexandria and Damietta), as illustrated in fig. 1.

The study of value chains in the fisheries industry is a systematic method for analyzing important components of the production process, particularly in small-scale fisheries, in order to identify ways to enhance quality and product design. Furthermore, data and information required for management alternatives and actions are made available (Rosales et al., 2017).

FAO (2014) states that "sustainable food value chains emphasize the integration of multidisciplinary concepts of added value and sustainability, as well as an understanding of the governance frameworks within which the food system is developed." In this context, fish value chain analysis has been used to investigate fisheries management and co-governance systems (Barclay et al., 2017; Rosales et al., 2017; Wentink et al., 2017). in addition to expanding market access (Jacinto and Pomeroy, 2011; Purcell et al., 2017; Pascual-Fernández et al., 2019).

Furthermore, a sustainable fish value chain analysis must include expanding job and income generation opportunities in rural areas, particularly for women (2014; Manyungwa et al., 2019).

Millions of people rely on small-scale fisheries for a living, particularly in low-income countries (Béné et al., 2010), yet climate change, habitat destruction, and overfishing all threaten productivity (FAO, 2022).

Several studies have been conducted to evaluate the consequences of climate change on the fish value chain and how to increase the resilience capacities of small-scale fishing communities (Kimani et al., 2020; Timmers, 2012; Fleming et al., 2014; Galappaththi, 2014).

* Corresponding author:
maysalah@aast.edu (Mai S. ElDine)
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Small-scale fisheries value chains include many actors and activities such as gear production, fish catch, sorting, cleaning, and processing, fish transportation, marketing, and selling, and fresh fish and fish product consumption (FAO, 2020).

Many activities in the value chains of small-scale fisheries are done by hand, often using low-cost equipment for handling and processing fish. Limited postharvest infrastructure and facilities, a lack of fish product quality control and certification systems, a paucity of processed fish, a lack of training facilities, and poor fisheries: among the obstacles to sustainable management of small-scale fisheries value chains are weak fisheries governance systems (Jacinto and Pomeroy, 2011; Kimani et al., 2020; Rosales et al., 2017; Galappaththi et al., 2021).

Despite the significance of value chain analysis (VCA) in the fisheries sector, little attention has been paid to understanding, investigating, and analyzing the many value chains of the diversative fishing methods and species generated in the Egyptian Mediterranean fisheries sector.

According to the above, this research aims to evaluate the value chain of the small-scale fisheries sector in Egypt through a SWOT analysis to determine the main challenges and opportunities of such a sector in Egypt.

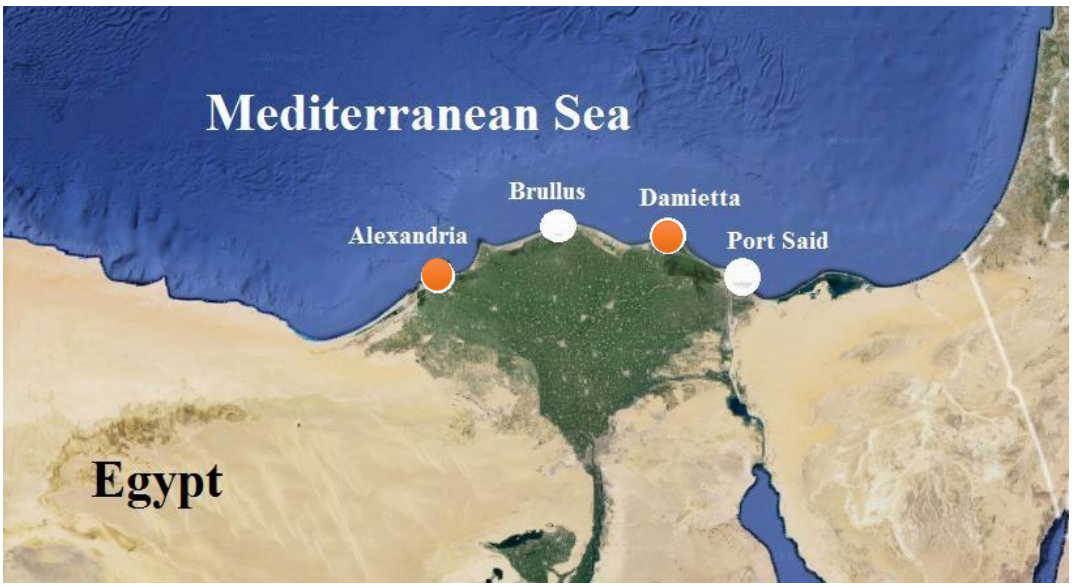

Figure 1. Map of the Mediterranean Sea coast of Egypt showing the main fishing ports (Red circles refers to the ports of sampling). Source: Google Earth (https://earthengine.google.com/)

2. Current Situation in the Fisheries Sector in Egypt

Despite the importance of the fisheries sector in coastal countries in terms of food and employment opportunities, there has been a decline in fisheries production in the Mediterranean and a lack of application of value chains in the fisheries sector in Egypt. The study of value chains in the fisheries sector is a structured approach to analyzing the main components of the production process, specifically in small-scale fisheries, in which ways to improve quality and product design are identified. Furthermore, data and information necessary for management options and measures are provided (Rosales et al., 2017). The proposed study aims to study and analyze the value chains of fish and fishing products in the Egyptian Mediterranean region, with a focus on the small-scale sector, to identify strengths and weaknesses in the field.

2.1. Value Chain Analysis (VCA) in the Fisheries Sector

The study of value chains in fisheries sector is a systematic approach to analyzing the main components of the production process, particularly in small-scale fisheries, where ways of improving quality and product design are identified.

Moreover, data and information needed for management options and measures should be provided (Rosales et al., 2017), focusing on small-scale sectors in order to provide decision-makers with the information needed to help manage and develop that sector.

The whole range of operations required to get a product or service from conception to end consumers is referred to as a value chain. Production, marketing, distribution, and support services are all included in this category in local, regional, and worldwide markets (Kruijssen et al., 2020).

It is also defined as a network of merchants, distributors, transporters, and suppliers involved in the manufacturing, transportation, and sale of a product to the consumer (Harland, 1996).

The value chains of the fisheries and aquaculture sectors comprise several key activities, including production, processing, transportation, and marketing at both wholesale and retail levels. Fig. 2 illustrates the chain from all the stages, from fishing to the consumer

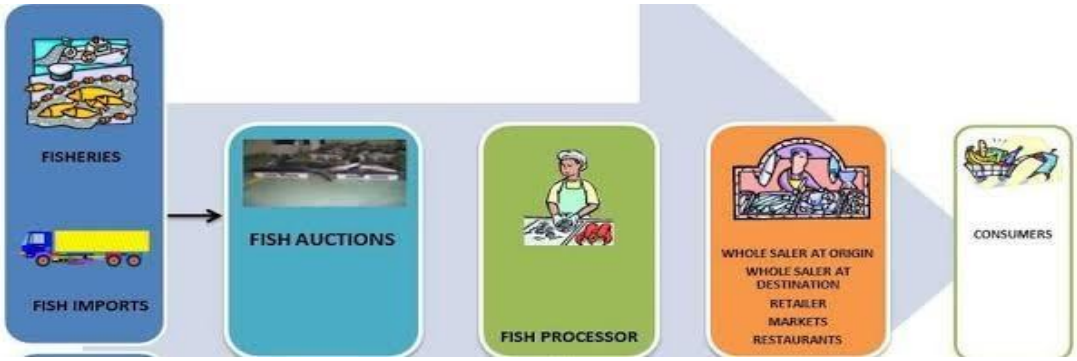

Figure 2. Illustrate the chain from all the stage from fishing to the consumer. Source: MARINE BIOMASSES OF THE ATLANTIC REGION. BIOTECMAR

2.1.1. Physical Disruption in Transport and Logistics of Fisheries Sector

Logistics' primary goal is to protect the products from damage during packaging or transportation so that they can be correctly delivered to the consumer.

The proper product, the appropriate quantity, the appropriate quality, the right place, the right time, the right consumer, the right cost, and the logistics for market transactions are the concepts that countries have developed. Beyond national boundaries, all fishermen who are equipped are likely to have access to improved postharvest methods, lowering losses as a result of improved road infrastructure (De Silva, 2011).

2.1.2. Product, Price, Place and Promotion

Product, Price, Place, and Promotion, which are the 4Ps categories of marketing management decisions that represent the traditional marketing model, are not fully reflected in the growing service-based economy. Instead, present value chains focus more on services, and they are composed of the 7 Ps: product, price, place, promotion, people, process, and physical evidence (De Silva, 2011). In terms of employment, income, and the provision of protein sources to the diet, the fishing industry provides a substantial contribution to the livelihoods of more than 50 million people. Furthermore, the fishing industry has consistently been among the top contributors to the local and regional economies (FAO, 2018). The fishing industry's capacity to generate significant growth prospects and successfully contribute to the developing world's development goal of poverty eradication and wealth creation has been severely hampered because of overexploitation of resource bases, environmental deterioration, climate change, high resource pressures, and poor or restricted value addition, which have all put the industry at threatening levels (FAO, 2020).

The value chain viewpoint is significant because it provides insights that research focusing on individual economic agents or specific fisheries policies or management frameworks would not provide. A value chain analysis (VCA) can also reveal insights into the issues that the sector faces as a result of several drivers of change, such as inadequate governance and market access, as well as the competitiveness of small businesses and fishermen in changing markets.

Therefore, we conducted semi-structured interviews to study the situation of the fisheries sector in Egypt, especially the Mediterranean Sea (Damietta and Alexandria), and the obstacles that prevent the development of the fisheries sector.

3. Research Methodology

This paper started with a generic literature review about applying value chain analysis of fisheries sector to validate research problem which is Misleading information about the sector and interactions between different levels of value chains has a negative impact on fisheries management options and measures. Then, a systematic review of the literature of 15 published papers was conducted over a 24-year period, with the main goal being to report on the most important research studies that correspond to the requirements for research in many databases and to determine what other researchers should take into account when reporting the research. Swat analysis is used to assess the strengths and opportunities for achieving food security for the country, specifically in the Mediterranean Sea. And threats of preserving the source of fish resources in the Mediterranean Sea in Egypt.

The purpose of this study was to conduct a value chain analysis of the fisheries sector in the Egyptian Mediterranean to identify the sector's strengths and weaknesses and potential opportunities to improve its competitiveness and sustainability. The study used a set of qualitative methods to collect and analyze data on the economic and social aspects of the sector, including production volumes, market prices, employment and value added.

The study employed a descriptive research design to describe the different stages involved in the production and distribution of fish and fish products, from harvesting to final consumption. The data was collected from primary and secondary sources, including interviews with key stakeholders, market surveys, and literature reviews.

The analysis focused on identifying the strengths and weaknesses of the value chain and potential opportunities for improving the sector's competitiveness and sustainability. The findings revealed that the sector is an important source of employment and income for many coastal communities, specifically in the small-scale and artisanal sub-sectors.

However, the sector faces a number of challenges, including overfishing, low productivity, and limited access to markets and technology. The analysis also highlighted a number of opportunities for improving the value chain, including the adoption of more sustainable fishing practices, the development of new value-added products, and the integration of small-scale producers into larger, more efficient supply chains.

4. Productivity Problems Explained through Semi-Structured Interview

The issues that fishermen face while working on fishing boats in the Mediterranean Sea are many and varied. 62 fishermen agreed that fish production has decreased significantly compared to the past due to the absence of support and insurance for them and the absence of guidance for fishermen about fishing during the ban period. The increase in the prices of fishing supplies occupied 57 boat owners, the lack of fuel and oil, the high prices of licenses, and maintenance costs.

5. Finding

As a result of the aforementioned semi-structured interviews of fishermen and boat owners, a SWOT analysis was performed to apply value chain analysis in the fish sector in the Mediterranean Sea in Egypt (Table 1). To work on applying the value chain in order to control the obstacles of this research and emphasize the strengths, Egypt can take various forms, including weaknesses, opportunities, and threats, as follows

Table 1. The SWOT Analysis: The fisheries sector in Egypt

• **Strengths**	• **opportunities**
1- The fisheries sectors is important for providing people with a vital animal protein source and reducing the unemployment rate in developing countries. That role is line with the strategic objectives of Food and Agriculture Organization of the United Nations in "eliminating hunger, food insecurity and malnutrition" (FAO, 2019) 2- When examining Egypt's natural water resources, we notice the economic significance of this industry (fisheries and aquaculture), which is primarily responsible for 12% of the country's agricultural income and is related to the natural fisheries that the Egyptian government owns, particularly the northern lakes (Burullus, Mariot, and Manzala, which are coastal lakes; Port Fouad and Bardawil, which are inland lakes; and Al-Murra and Timsah).	1- From a management point of view, fisheries and aquaculture, which are among the most important productive food resources in the world, should be properly managed and sustained in order to secure food supply, since they are representing a safe and reasonable source of animal protein. 2- Ecosystem; If the systems or its components' functions are disrupted, this imbalance triggers the appearance of unfavorable consequences and the deterioration of the environment. - Value chain analysis (VCA), which reveals the visions and issues faced by the sector as a result of many of the changing systems (e.g., governance), was viewed as providing insights into the fisheries industry that are not provided by research that focuses on individual economics or fisheries policy.
• **Weakness** 1- A lack of understanding of the sector's social and economic dimensions is thought to be a barrier to any future development plans.	• **Threats** 1- The first and most significant impact that people have on fisheries is the direct result of fishing activity, which has a negative impact on them. The act of fishing involves removing particular or nonspecific fish species from their natural habitat with the goal of profiting from them. 2- Human activity can sometimes have an indirect negative impact on fishing as a whole. For example, many sources of pollution can harm fisheries as a whole. A decrease in the areas that these organisms can use as nurseries for their young or as breeding grounds for their adults' results from additional activities, like reclamation of coastal areas and the destruction of mangrove areas, both of which have a significant impact on the various fish nursery areas.

(Authors, 2022)

6. The Road Map Shows Barriers and Suggests Solutions for the Fisheries Sector

Barriers	suggest solutions
the low rate of fish production	-This is done by working to reduce the sources of pollution in the Mediterranean Sea, including oil spills from ships, because it destroys the nursery grounds for young fish. - Adherence to the months of stopping fishing during the period of fish reproduction.
Poor quality and traceability of fish products	-Implement stricter quality control measures throughout the value chain, from fishing vessels to processing and distribution. -Establish a comprehensive traceability system to ensure transparency and accountability, enabling consumers to make informed choices about the origin and quality of fish products.
Lack of knowledge on the socio-economic dimension of the sector stands against any future development plans.	-Strengthen human capital and build capacity by providing training programs for fishermen and fish processors to enhance their skills and knowledge in sustainable fishing practices, quality control and value-added processing. - Promoting vocational training initiatives to develop a skilled workforce for the fisheries sector, including

Barriers	suggest solutions
	technicians, quality inspectors and cold chain management specialists. - Promoting awareness campaigns among fishermen and consumers about the importance of sustainable fishing practices and responsible consumption.
Poor infrastructure and logistics services in fish sector	- Invest in upgrading and modernizing fishing ports, landing sites, and storage facilities to ensure efficient handling and preservation of fish products. - Enhance cold chain logistics to maintain product quality and freshness during transportation and export. -Develop infrastructure and facilities for value-added processing, such as filleting, packaging, and freezing, to meet diverse market demands.

(Authors, 2023)

7. Conclusions

Concluding of research proposals on the importance of value chain analysis of the fisheries sector in the Mediterranean Sea in Egypt.

This paper focuses on identifying the strengths and weaknesses facing this sector.

The systematic review highlights the importance of applying the value chain approach to fisheries in the Mediterranean Sea in Egypt. The key findings suggest that a coordinated and multi-faceted approach involving all stakeholders, increased investment in processing and marketing infrastructure, and stronger regulation and enforcement of fisheries laws and regulations are needed to improve the value chain of fisheries in the region. The review also identifies the potential for the private sector to play a key role in improving the value chain, but only if done in collaboration with government agencies and other stakeholders. The implications of the findings for practice include recommendations for policymakers and practitioners to develop and implement a comprehensive and integrated approach, increase investment in processing and marketing infrastructure, strengthen regulation and enforcement, foster greater collaboration, and support and promote research. The identified gaps in the evidence base also suggest areas for future research, including the need for more studies on the social and environmental impacts of the value chain of fisheries, best practices and innovative solutions, specific fish species, gender issues, and climate change impacts.

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