Reimagining Indian Seafood Industry in the VUCA World

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***Abstract*—Seafood exports from India contribute to the country's foreign exchange yearly at US$.6 billion. A more significant proportion of Indian seafood is exported in raw form to China and Southeast Asia for their innovation. Drastic changes, the pandemic has increased freight charges, which curtails Indian seafood exporters' opportunities for a sustainable business model. This research paper shall determine factors influencing Indian seafood firms while adopting sustainable product-process innovation. The study's outcome envisages what regulatory frameworks should help Indian seafood businesses innovate their production processes and sustainably add value to their raw products to reimagine business models.**

***Index Terms*—Product-process innovation, Seafood, Sustainable Business model, Sustainable Innovation.**

I. INTRODUCTION

Oceans cover around 70% of the earth's surface and are home to various life essential for social, environmental, and economic well-being [1]. The seas propel global processes that render the Earth conducive to human habitation [2]. Seafood ranks among the most traded food commodities globally, and its growth trajectory suggests an upward trend. The global fish trade reached USD 153 billion in 2017, increasing by a compounded annual growth rate of 4% since 2012 [3]. The global seafood demand and supply continue to grow, although the trading facet is rapidly changing. The world has become uncertain and instable, with rapid changes. Globally, the press, media, executives, and researchers frequently refer to this dynamic environment using the acronym VUCA, denoting volatility, uncertainty, complexity, and ambiguity.

II. BACKGROUND OF STUDY

Seafood is among the highly valued food items and has many nutritional benefits [4]. Nowadays, seafood is progressively seen as a luxury item, with these consumer demographics prioritising convenience, food quality, and flavour [4]. In developing nations, seafood is a vital component of the food supply [5], with estimates indicating that over one billion individuals rely on fish as their primary protein source.

India is bestowed with a long coastline of 8129 kilometers, and seafood products from India have entered the international kitchens since the very beginning of the evolution of trade from the country. Seafood exports from India contributed to the country's foreign exchange a yearly US$ .6.67 billion. The occurrence of the COVID-19 pandemic during early 2020 led to a number of paradigm shifts ranging from individual to organizational, personal to professional across industries [6]. The year 2020 exemplifies the volatility, uncertainty, complexity, and ambiguity (VUCA) of the globe. Pre pandemic, globalization enabled fast worldwide exchanges.

The pandemic outbreak necessitated adaptation to handle this new world challenge [6]. This new normal necessitated that enterprises exhibit agility in their production and worldwide logistics to survive and prosper during this atypical period. The sudden changes in consumer demand, changes in logistics, and changes relative to certain products like medical aids have made disparity in the trade of consumer goods. The pandemic created uncertainty and ambiguity in the world's market [7].

After a year, while the world ran back to normal, the shipping costs started increasing as freight lines were required to avoid the Suez Canal and take a longer route around Africa to reach the West following conflicts in the Red Sea. Annually, billions of dollars in Indian exports traverse the crucial canal linking the Mediterranean and the Red Sea. The extended transit duration will affect sailing timetables and service reliability, resulting in delays.

Data from the UN Conference on Trade and Development indicates that 70% of global trade by value is conducted by maritime transport. Numerous factors, including port closures resulting from coronavirus outbreaks, labour shortages, port congestion, and insufficient availability of new shipping containers, have rendered the industry complex and unpredictable. Imports from Asia to the United States grew by almost 40 percent in 2021 relative to 2019, resulting in the multifold freight charges increase [8].

III. REASEARCH QUESTIONS

1. Which are the major export destinations of Indian frozen seafood, and what are the causes of increasing freight charges?
2. What are the factors that influence value addition in the Indian seafood industry?
3. What are the innovative production processes and practices adopted by Indian seafood industrialists in rolling out value-added products?
4. How can the regulatory framework force the seafood industry to reimagine its existing business model?

IV. OBECTIVE OF THIS STUDY

This study aims to explore the value gain of Indian seafood from value addition and the measures the Indian seafood industry could adopt to survive and thrive in this VUCA world. The initial research shows that present markets for Indian seafood are more of a reprocessing nature and play the role of a supplier to countries that do value addition.

This paper aims to describe, synthesize, and analyze the main disadvantages of the industry, which remains a supplier for reprocessing, and tries to suggest some solutions for the topic. Eventually, this study provides valuable insights into the industry to help plan VUCA-related strategies by scrutinizing many scholarly articles. This paper will better understand the leaders and business managers' adoption of product innovation as a critical business strategy to handle a highly turbulent and complex environment. The outcomes will lead researchers and add to the knowledge related to sustainable product and process innovation in the seafood industry.

V. RESEARCH GAP

There has been a multifold increase in sea freight charges starting in 2020. The Indian Seafood is mainly supplied to other countries for value addition. The increase in freight charges has a two-fold effect on the existing trade of India and South Asia/China for value addition as the increase of freight charges is loaded twice on a commodity. The Indian seafood industry can quickly move towards value addition and upscale their products directly to the end market. Hence, the research problem is the quest to reimagine and redesign products and process improvements to leverage the market potential for value-added products in the international markets.

VI. RESEARCH METHODOLOGY

The Research design was exploratory and descriptive. The qualitative analysis was conducted with industry experts (seafood exporters) using a free-flow narrative in the research context. A quantitative analysis was carried out using data from secondary sources. A literature review was conducted to provide an understanding of what strategic modus operandi organizations can implement to survive and succeed in a VUCA world. Several databases (as listed below) were chosen to gain access to the extant scholarly literature and narrow down the research questions.

The chosen databases included Scopus, EBSCOhost, Academia and ResearchGate, due to their credibility, reputation, and worldwide recognition. The data was collected from secondary sources like the Marine Products Export Development Authority, Seafood Exporters Association of India, the Statistical Department, and the Global Freight Index. Interviews were conducted with renowned entrepreneurs. Each research question had an intersection of literature explaining the phenomenon backed by real-time data from secondary sources. As it is a real-time scenario post-pandemic, the literature was scantly available. As part of the methodology, we summarized and synthesized the articles and data to prepare the seafood industry to cope with the VUCA environment.

VII. RESULTS & DISCUSSION

Thorough data analysis brought the share of Indian seafood to its major export destinations. The data gave insights into which markets Indian seafood is currently focused on and for what reasons. The data from the industry through the Seafood Exporters Association and Freight Forwarders Association gave the details of the spurt in the freight charges. Critical factors that influence product and process innovation were garnered from the extant literature.

The discussions with industrialists who have already adopted process-product innovation revealed the fact that the markets should be more competitive only if a significant proportion of exporters shift to innovation. The evolutions to be made in the regulatory framework were also identified through a literature review, data available, and interviews.

A. Major export destinations of Indian Frozen Seafood

India exported 1.78 million MT of marine products worth US$ 7.38 billion during FY 2023-24. India is the fifth largest exporter of Frozen seafood in the world.

Table 1. Major export destinations of Indian Frozen Seafood

COUNTRIES EXPORTED	QUANTITY	VALUE	QUANTITY%	VALUE%	Unit value in US$
WORLD	1781602	73800.00			
USA	329192	20892.44	18.48%	28.31%	$6.35
CHINA	451363	11356.72	25.33%	15.39%	$2.52
SOUTHEAST ASIA	378630	7907.27	21.25%	10.71%	$2.09
EU	192505	8451.73	10.81%	11.45%	$4.39
JAPAN	107968	3279.44	6.06%	4.44%	$3.04

Table 1 indicates the quantity and value of the frozen seafood exported from India to various major destinations. The data indicates that India exports mainly raw products to countries like China and Southeast Asia, where it is reprocessed and exported to countries like the USA and the EU. These countries import whole seafood from India, add value to their processing factories, and then re-export to countries like the USA, European countries, and the Russian Federation.

Table 2. Comparison of Price and Quantity of Indian Seafood Exports by Region

Comparison	Price/kg realized	Quantity
USA AND EU	$5.37	39.76%
China and SE ASIA	$2.30	26.10%
Value Gain obtained though value addition	$3.07	

It can be seen from Table 2 that China and Southeast Asia imported 26.10% of Indian seafood, while their per kg contribution was only US$.2,30. The per kg value gain obtained by India is US$.3.07, when value-added products are exported to the USA and the EU.

Table 3. Value Addition in Indian Seafood Exports

Total exports from India (Quantity) in MT	Exported quantity to China and SE Asia in MT	Value Gain obtained through value addition (Table 2) for US$/MT	Earnings India would have made if the exports of 26.10% of raw material be converted to the value added products and exported to USA/EU in US$.
17,81,602	4,65,051	3,066	$1.43 billion

While evaluating the total Indian seafood exports of 1.78 million MT, with the value gain obtained from Table 3, it can be seen that there is a rampant leakage of India's valuable foreign exchange. While India supplies seafood in non-value-added forms, the markets of other countries like SE Asia are growing, and India's foreign reserves are declining.

B. Cause of increase of freight charges

Following the return of the Chinese economy after the COVID-19 epidemic, numerous commodities were sent to Europe and the United States in the latter half of 2020 to meet the increased demand spurred by e-commerce and holiday seasons [9]. The imbalance of imports and exports in global markets perturbed container movements, ultimately resulting in a severe container shortage in Asia [10]. The gradual relocation of empty containers may have stemmed from carriers' reluctance to transport them from European and American ports to Asia.

The transportation of empty containers incurs significant costs, encompassing terminal and port handling fees, warehouse storage and maintenance, as well as hinterland trucking services. Furthermore, severe weather events, such as Typhoon Haishen and Typhoon Maysak, have obstructed the transit of empty containers to Asian nations, since ocean carriers tend to bypass certain port calls. Ongoing threats and assaults on vessels in the Red Sea are driving up maritime freight charges, prompting alerts on inflation and delayed shipments.

C. Identified factors influencing value addition

The adoption of sustainable product innovation in the seafood industry has been primarily explored in developed countries. In the study [11], there has been an increasing claim for the sustainability concept in the seafood industry across European countries, and it is faster for northern countries and varies across species.

Recent research in the seafood industry emphasized the future relevance of developing sustainable products further to the interactions with leaders and innovators during the product development phase [12]. Knowledge-based innovations can enhance the sustainable management of an indigenous resource [13].

According to [14], the practices of process innovation, acting as a mediator, may activate firm-specific characteristics such as absorptive ability, intrapreneurship, and stakeholder integration, which influence sustainable innovation at lower levels.

Sustainable innovation has been relevant in the Indian context for years. Technological Aspects [15], [16], [17], [18], Sustainable human resource management [19], [20], [21], Green Infrastructure Capabilities [22], Financial Capabilities [23], Availability of Sustainable/Green Resources [24], Absorptive Capacity, Intrapreneurship [25], Stakeholder Integration [26], Firm Size and years of operation [27], Environmental Certification (Eco Certification) [28], Regulations – SDG 14 Incentives/Subsidies [29] and Process Innovation [14], [26], [30] are the various factors which influence a sustainable product innovation in seafood industry.

D. Seafood Industrialists who have already adopted value addition.

Some companies have already made investments in machinery to produce value-added seafood. When available in bulk, the catch is purchased by companies that still need to implement value addition and is exported to countries like China, Vietnam, and Thailand. Factories that have not adopted value addition pose a threat to factories willing to present Indian seafood after value addition to world markets. The raw material prices of seafood are governed by auction and demand. A significant quantity of capture fisheries is exported from India at meager prices during the season, and traditional companies linger idle during the non-seasonal period.

Many merchant exporters who do not own factories) also become active during the seasonal catching of and export the available catches in raw form. Therefore, the companies who have invested enormous amounts in technological upgradation need to receive the necessary raw material for their operations for the whole year. The value-added products are to be supplied year along. Fluctuations in international prices, variations in fish production from capture and culture, variations in international prices, and the variable values of export earnings are significant concerns for developing countries, including India. India obtains a significant share of export earnings from a few selected items or commodities, and the trade is concentrated with a few nations.

For the low income exporting countries, managing commodity price risk and stabilizing export earnings are important policy issues. Adopting advanced marketing strategies helps minimize the price risk and ensures assured returns to seafood exports. Such advanced strategies should involve value addition, better packaging etc.

E. Regulatory framework to reimagine the existing business model

Considering the high initial investment involved in setting up of the production line for value-added products and the delay in getting the product established in the overseas market with wide acceptance, various schemes are introduced by the government. The implementation of such schemes is yet to be streamlined. The government and the regulatory bodies should take immediate steps to ensure that India should no longer be a raw material supplier to countries like China and Southeast Asia for value addition. Marketing value-added products is a major

challenge while adopting value addition among the exporters. Given that leading seafood exporters have significantly invested in upgrading facilities to satisfy end market demands, India should also pursue advanced processing and value addition, thereby augmenting opportunities for seafood import and re-export, similar to practices in countries such as China and Thailand. Such job work will also help to effectively utilize processing facilities to realize higher unit values [31].

VIII CONCLUSION

Based on the discussions above, all the results focus on immediate attention to a paradigm shift to product innovation in the seafood industry. We can already see the shift at a low pace, but those who have adopted the change have to survive; only streamlined strategic regulatory intervention from time to time can ensure the sustenance of such firms. VUCA is changing the business environment, not relying on one competence alone. The ability to be agile, multifaceted, and adaptable to change, both as a company and as employees, is more important. Despite global container shipping companies achieving record profits, exporters and merchants have persistently faced delays, container shortages, and significant rises in shipping charges.

The only option for the 8-billion-dollar Indian seafood Industry to survive in this VUCA world is to add value to the raw products by streamlining the merchandise to the final markets. Reimagining their existing model and adopting the critical factors influencing value addition is the need of the time. Sensitizing the industry about the need for value addition, government regulations after differentiating product and market, incentives on value-added products, infrastructural support for value addition, and formulating implementable policies in discussion with the industry are key takeaways for reimagining the existing business model.

REFERENCES

[1] "While Oceans Cover 70 Per Cent of Earth's Surface, Understanding Has Lagged, Speakers in Lisbon Dialogue Stress, Offering Ways to Close Knowledge Gap | Meetings Coverage and Press Releases." Accessed: Oct. 04, 2024. [Online]. Available: https://press.un.org/en/2022/sea2152.doc.htm

[2] "Sustainable Development Goal 14: Life Below Water | United Nations in Iraq." Accessed: Oct. 04, 2024. [Online]. Available: https://iraq.un.org/en/sdgs/14

[3] "DownloadReportByFileName.pdf." Accessed: Oct. 04, 2024. [Online]. Available: https://apps.fas.usda.gov/newgainapi/api/Report/DownloadReportByFileName?fileName=2024%20China%20Fishery%20Products%20Report_Beijing_China%20-%20People%27s%20Republic%20of_CH2024-0044.pdf

[4] T. Trondsen, "Value Chain Policy, Industrial Conventions and Market Performance: A Comparative Analysis of Norwegian and Icelandic Cod Exports to Spain," 2015, pp. 115–135. doi: 10.1007/978-3-319-16405-2_9.

[5] "Sixth World Congress on Seafood Safety, Quality and Trade: 14-16 September ... - Food and Agriculture Organization of the United Nations - Google Books." Accessed: Oct. 04, 2024. [Online]. Available: https://books.google.com.om/books?hl=en&lr=&id=9_ki3yA8XhwC&oi=fnd&pg=PA17&dq=Challenges+for+the+global+seafood+industry.+In+Sixth+World+Congress+on+Seafood+Safety,+Quality+and+Trade:&ots=7OCx5syIFS&sig=JpFsFaEe9CF4rDMPJp6jhoHNRMc&redir_esc=y#v=onepage&q=Challenges%20for%20the%20global%20seafood%20industry.%20In%20Sixth%20World%20Congress%20on%20Seafood%20Safety%2C%20Quality%20and%20Trade%3A&f=false

[6] "Paradigm shifts caused by the COVID-19 pandemic - PMC." Accessed: Oct. 04, 2024. [Online]. Available: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7648497/

[7] S. Winter, "COVID-19: A Salutary Experience of VUCA | ICCPM," International Centre for Complex Project Management (ICCPM). Accessed: Oct. 04, 2024. [Online]. Available: https://iccpm.com/covid19-vuca-article/

[8] "Containerized Freight Index - Price - Chart - Historical Data - News." Accessed: Oct. 04, 2024. [Online]. Available: https://tradingeconomics.com/commodity/containerized-freight-index

[9] R. Henry, "Innovations in Agriculture and Food Supply in Response to the COVID-19 Pandemic," *Mol. Plant*, vol. 13, no. 8, pp. 1095–1097, Aug. 2020, doi: 10.1016/j.molp.2020.07.011.

[10] "Freight Traffic Impacts and Logistics Inefficiencies in India: Policy Interventions and Solution Concepts for Sustainable City Logistics | Transportation in Developing Economies." Accessed: Oct. 04, 2024. [Online]. Available: https://link.springer.com/article/10.1007/s40890-022-00161-8

[11] S. Lucas and L.-G. Soler, "Are Innovations in Seafood Market in Europe More Sustainable?"

[12] I. Minelgaite, B. B. Bjarnadottir, and K. Kristinsson, "Walking the Talk? Sustainability in New Product Development Projects in the Icelandic Seafood Industry," in *Research on Project, Programme and Portfolio Management*, R. Cuevas, C.-N. Bodea, and P. Torres-Lima, Eds., Cham: Springer International Publishing, 2021, pp. 137–149. doi: 10.1007/978-3-030-60139-3_10.

[13] "Innovation, sustainability and regional development: the Nelson/Marlborough seafood cluster, New Zealand - Pavlovich - 2010 - Business Strategy and the Environment - Wiley Online Library." Accessed: Oct. 04, 2024. [Online]. Available: https://onlinelibrary.wiley.com/doi/abs/10.1002/bse.688

[14] A. Widya-Hasuti, A. Mardani, D. Streimikiene, A. Sharifara, and F. Cavallaro, "The Role of Process Innovation between Firm-Specific Capabilities and Sustainable Innovation in SMEs: Empirical Evidence from Indonesia," *Sustainability*, vol. 10, no. 7, Art. no. 7, Jul. 2018, doi: 10.3390/su10072244.

[15] C. J. C. Jabbour, D. Jugend, A. B. L. de S. Jabbour, A. Gunasekaran, and H. Latan, "Green product development and performance of Brazilian firms: measuring the role of human and technical aspects," *J. Clean. Prod.*, vol. 87, pp. 442–451, Jan. 2015, doi: 10.1016/j.jclepro.2014.09.036.

[16] J. L. Crosno and A. P. Cui, "A Multilevel Analysis of the Adoption of Sustainable Technology," *J. Mark. Theory Pract.*, vol. 22, no. 2, pp. 209–224, Apr. 2014, doi: 10.2753/MTP1069-6679220213.

[17] R. Kuehr, "Environmental technologies – from misleading interpretations to an operational categorisation & definition," *J. Clean. Prod.*, vol. 15, no. 13, pp. 1316–1320, Sep. 2007, doi: 10.1016/j.jclepro.2006.07.015.

[18] A. Hernandez-Vivanco, M. Bernardo, and C. Cruz-Cázares, "Sustainable innovation through management systems integration," *J. Clean. Prod.*, vol. 196, pp. 1176–1187, Sep. 2018, doi: 10.1016/j.jclepro.2018.06.052.

[19] N. Jerome, "Impact of Sustainable Human Resource Management and Organizational Performance," *Int. J. Asian Soc. Sci.*, vol. 3, no. 6, pp. 1287–1292, Subtitle 2013.

[20] "Dimensions of environmentally sustainable innovation: the structure of eco-innovation concepts - Hellström - 2007 - Sustainable Development - Wiley Online Library." Accessed: Oct. 04, 2024. [Online]. Available: https://onlinelibrary.wiley.com/doi/abs/10.1002/sd.309

[21] R. S. Schuler and S. E. Jackson, "A Quarter-Century Review of Human Resource Management in the U.S.: The Growth in Importance of the International Perspective," *Manag. Rev.*, vol. 16, no. 1, pp. 11–35, 2005.

[22] F. Carlet, "Understanding attitudes toward adoption of green infrastructure: A case study of US municipal officials," *Environ. Sci. Policy*, vol. 51, pp. 65–76, Aug. 2015, doi: 10.1016/j.envsci.2015.03.007.

[23] P. Ekins and D. Zenghelis, "The costs and benefits of environmental sustainability," *Sustain. Sci.*, vol. 16, no. 3, pp. 949–965, May 2021, doi: 10.1007/s11625-021-00910-5.

[24] H. Gmelin and S. Seuring, "Achieving sustainable new product development by integrating product life-cycle management capabilities," *Int. J. Prod. Econ.*, vol. 154, pp. 166–177, Aug. 2014, doi: 10.1016/j.ijpe.2014.04.023.

[25] N. Bosma, E. Stam, and A. R. M. Wennekers, "Intrepreneurship - An International Study.," Jan. 2010.

[26] C. Garcés-Ayerbe, P. Rivera-Torres, and I. Suárez-Perales, "Stakeholder engagement mechanisms and their contribution to eco-innovation: Differentiated effects of communication and cooperation," *Corp. Soc. Responsib. Environ. Manag.*, vol. 26, no. 6, pp. 1321–1332, 2019, doi: 10.1002/csr.1749.

[27] "Firm Size Matters: An Empirical Investigation of Organizational Size and Ownership on Sustainability-Related Behaviors - Peter Jack Gallo, Lisa Jones Christensen, 2011." Accessed: Oct. 04, 2024. [Online]. Available: https://journals.sagepub.com/doi/abs/10.1177/0007650311398784

[28] I. Schumacher, "Ecolabeling, consumers' preferences and taxation," *Ecol. Econ.*, vol. 69, no. 11, pp. 2202–2212, Sep. 2010, doi: 10.1016/j.ecolecon.2010.06.005.

[29] S. J. Tayouga and S. A. Gagné, "The Socio-Ecological Factors that Influence the Adoption of Green Infrastructure," *Sustainability*, vol. 8, no. 12, Art. no. 12, Dec. 2016, doi: 10.3390/su8121277.

[30] P. Huynh, "Innovation drivers at the firm level. An empirical study of the Norwegian seafood industry.," Master thesis, University of Stavanger, Norway, 2018. Accessed: Oct. 04, 2024. [Online]. Available: https://uis.brage.unit.no/uis-xmlui/handle/11250/2563464

[31] P. . S. . A. and M. . K. Pavithra S ., "Market shares , instability and revealed comparative advantage of seafood exports from India , Indian," *Indian Fish. Educ. J.*, vol. 61, no. August, pp. 90–97, 2014.