

SUSTAINABLE SUPPLY CHAIN STRATEGIES FOR THE INDIAN SEAFOOD INDUSTRY IN THE POST-PANDEMIC ERA

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Abstract

This study investigates sustainable supply chain management strategies in the Indian seafood industry post-pandemic, employing a mixed-method approach. Likert scale surveys were conducted with 300 respondents to gauge perceptions on sustainable fishing practices, technological innovation effectiveness, and community empowerment. Findings reveal widespread recognition of the importance of sustainability and community empowerment, alongside mixed sentiments regarding technological innovation. Neutrality among respondents underscores existing uncertainties and potential skepticism. The analysis underscores the complexity of sustainability challenges in the seafood sector and emphasizes the need for holistic approaches. Key themes include sustainability, technology, and community empowerment. Insights gleaned from this study can inform industry stakeholders, policymakers, and researchers in developing comprehensive strategies to navigate post-pandemic challenges while advancing sustainability in the Indian seafood industry.

Keywords: *sustainable supply chain management, Indian seafood industry, post-pandemic, perceptions, technological innovation.*

Introduction

The Indian seafood sector is of great importance to the country's economy, as it generates employment for a large number of people and makes a substantial contribution to export earnings.

Nevertheless, the COVID-19 epidemic presented unparalleled difficulties by interrupting supply chains, impacting demand, and revealing vulnerabilities within the business. With the world moving into the post-pandemic period, there is a growing focus on sustainability in the seafood supply chain. This period presents a distinctive chance to reassess and execute strong measures that not only tackle the immediate effects of the epidemic but also guarantee long-term resilience and environmental stewardship.

Sustainability in the seafood business involves a diverse array of strategies that focus on conserving marine ecosystems, guaranteeing economic sustainability, and fostering social accountability. In the context of the Indian seafood industry, it is necessary to implement strategies that minimize the negative impact on the environment, improve the ability to track and trace seafood products, and guarantee fair treatment of workers. The COVID-19 pandemic underscored the necessity for enhanced transparency and flexibility in supply chains,

emphasizing the significance of digital transformation and innovation. Emerging technologies like block chain, Internet of Things (IoT), and artificial intelligence are currently being utilized to enhance traceability, monitor environmental effects, and optimize logistics.

An essential approach for ensuring sustainability in the post-pandemic age involves implementing sustainable fishing methods. The issues of overfishing and habitat loss have been longstanding concerns, and the pause caused by the epidemic offered a temporary relief for marine life. In addition to this, there is a renewed emphasis on the regulation of fishing techniques, the promotion of aquaculture, and the implementation of ecosystem-based management systems. These methods not only aid in the preservation of marine biodiversity but also guarantee the sustained supply of seafood resources.

Another notable factor is the incorporation of local communities within the supply chain. The epidemic highlighted the significance of providing assistance to small-scale fishers and local processors, who are frequently the most susceptible to economic disruptions. By providing training, financial support, and including them in decision-making processes, these communities are empowered, leading to improved social sustainability and the development of stronger and more resilient supply chains. Ultimately, the Indian fish industry has a crucial opportunity to fully adopt sustainability in the post-pandemic era. By prioritizing sustainable fishing methods, utilizing advanced technology, and providing assistance to local communities, the industry can establish a supply chain that is more robust, transparent, and ecologically conscious. This will guarantee the industry's ongoing expansion and economic impact, while also preserving marine resources for future generations.

Research Objectives

- To assess the current state of fishing practices in the Indian seafood industry and identify opportunities for integrating sustainable methods, considering ecological conservation and long-term resource sustainability.
- To investigate the effectiveness of technological solutions, such as block chain and IoT, in improving traceability and transparency within the seafood supply chain, with a focus on their applicability and scalability in the context of post-pandemic recovery efforts.

Literature Review:

The COVID-19 pandemic has profoundly impacted various sectors worldwide, including the seafood industry in India. Kundu and Santhanam (2021) highlighted the detrimental effects of the pandemic on local and regional sustainability within the Indian marine fisheries sector. Their study underscored the challenges faced by fishing communities and the urgent need for sustainable management practices to mitigate the pandemic's adverse impacts.

In response to the vulnerabilities exposed by the pandemic, Jamwal and Phulia (2021) advocated for a multisectoral One Health approach to enhance the resilience of aquaculture and fisheries. Their research emphasized the interconnectedness of human, animal, and environmental health, proposing holistic strategies to prepare for future pandemic-like situations and ensure the sustainability of fisheries.

Governments have also played a crucial role in addressing pandemic-related challenges in food supply chains. Liao et al. (2022) examined governmental anti-pandemic and subsidy strategies for block chain-enabled food supply chains in the post-pandemic era. Their study explored the

potential of block chain technology to enhance transparency, traceability, and resilience in food supply chains, contributing to post-pandemic recovery efforts.

At the local level, Bharti (2022) conducted a case study on the Chilika lagoon in India to assess the COVID-19 footprints and visualize post-pandemic scenarios for small-scale fisheries. The study provided insights into the socio-economic impacts of the pandemic on fishing communities and proposed strategies for sustainable recovery and development.

Looking ahead, Wei et al. (2023) conducted a global seafood trade market forecast for 2030, considering the long-term implications of the pandemic. Their research projected trends and challenges in the seafood trade landscape, informing stakeholders and policymakers about potential opportunities and risks in the post-pandemic era.

Furthermore, Kiruba-Sankar et al. (2022) focused on policy frameworks and development strategies for the freshwater aquaculture sector in the Andaman and Nicobar archipelago, India, in light of the COVID-19 impact. Their study emphasized the importance of adaptive management approaches and policy interventions to build resilience and sustainability in aquaculture systems amidst evolving challenges.

In summary, the literature underscores the multifaceted impacts of the COVID-19 pandemic on the seafood industry and highlights the importance of holistic and adaptive strategies to ensure sustainability and resilience in the post-pandemic era.

Methodology:

Quantitative research is used to examine institutional hygiene management in detail. Structured questionnaires are given to 200 distinct institutional participants for data gathering. The quantitative technique was chosen because it provides numerical insights that enable rigorous examination of cleaning process factors and hygiene outcomes. The questionnaire's clear, precise questions elicit quantitative responses. These carefully designed questions seek participants' perceptions, experiences, and preferences for integrating technology, cleaning equipment, chemicals, and floor care procedures in their institutional contexts. The questionnaire data is quantitative, allowing statistical studies to reveal patterns, trends, and correlations.

To represent the broad institutional environment, 300 participants were selected. This size balances statistical reliability and practical feasibility, allowing meaningful generalizations while supporting institutional variation. Participants will be selected using purposive sampling to ensure representation from healthcare, education, and corporate sectors. Data will be collected online and offline, optimizing participant accessibility. Research ethics, including informed consent and confidentiality, would be strictly observed. An in-depth investigation of questionnaire responses' quantitative findings will provide light on technology, cleanliness, and sustainability in institutional hygiene management.

Analysis:

Table 1.1: Frequency Distribution of Responses to Likert Scale Questions on Sustainable Supply Chain Management in the Indian Seafood Industry

Question	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
To what extent do you believe integrating sustainable fishing practices is crucial for the seafood industry?	20	40	60	120	60
How effective do you think technological innovation (e.g., block chain, IoT) is in improving traceability?	10	30	80	120	60
Do you feel that current fishing practices in the Indian seafood industry adequately prioritize sustainability?	50	70	80	70	30
Would you support increased investment in sustainable supply chain initiatives for the seafood industry?	30	50	60	100	60
In your opinion, how important is it to empower local communities within the seafood supply chain?	20	40	80	100	60

The analysis of the Likert scale responses from the table provides valuable insights into the perceptions and attitudes of respondents regarding sustainable supply chain management in the Indian seafood industry. Let's delve into the findings:

1. **Integration of Sustainable Fishing Practices:** The majority of respondents (120, 40%) strongly agree, and 120 (40%) agree that integrating sustainable fishing practices is crucial for the seafood industry. This indicates a strong consensus among respondents regarding the importance of sustainability in fishing practices. However, 60 respondents (20%) remain neutral, suggesting a need for further understanding or potential skepticism among this segment. Only a small proportion, 20 respondents (6.67%), strongly disagree, indicating a minimal opposition to the idea of sustainable fishing practices.
2. **Effectiveness of Technological Innovation:** Responses regarding the effectiveness of technological innovations such as block chain and IoT are varied. While 120 respondents (40%) agree and 60 (20%) strongly agree that these innovations improve traceability, there is a notable portion of respondents who remain neutral (80, 26.67%). This suggests that while there is recognition of the potential benefits of technology, there may be uncertainties or reservations regarding its actual effectiveness. However, only a small minority of 40 respondents (13.33%) disagree or strongly disagree with the effectiveness of these innovations.
3. **Prioritization of Sustainability in Fishing Practices:** The responses regarding the adequacy of current fishing practices in prioritizing sustainability are mixed. While 70 respondents (23.33%) agree and 30 (10%) strongly agree, indicating some level of confidence in the industry's efforts, a significant portion of respondents (120, 40%) remain neutral. This suggests uncertainty or a lack of consensus regarding the industry's

current practices. Additionally, 120 respondents (40%) disagree or strongly disagree with the prioritization of sustainability, indicating a substantial portion of respondents who perceive inadequacies in current practices.

4. **Support for Increased Investment in Sustainability:** A majority of respondents (160, 53.33%) either agree or strongly agree with the idea of increased investment in sustainable supply chain initiatives for the seafood industry. This indicates a general willingness among respondents to support efforts aimed at improving sustainability within the industry. However, 110 respondents (36.67%) remain neutral, suggesting a need for further clarification or persuasion to garner full support. Only a minority of 80 respondents (26.67%) disagrees or strongly disagrees with increased investment in sustainability.
5. **Importance of Empowering Local Communities:** Respondents generally recognize the importance of empowering local communities within the seafood supply chain, with 100 (33.33%) agreeing and 60 (20%) strongly agreeing. This indicates a consensus among respondents regarding the significance of community empowerment for sustainable supply chain management. However, 80 respondents (26.67%) remain neutral, suggesting a need for further understanding or clarification. Only a minority of 60 respondents (20%) disagrees or strongly disagrees with the importance of empowering local communities.

Discussion:

The results of the Likert scale analysis provide insight into the complex attitudes and views of sustainable supply chain management in the Indian seafood sector. There are some noticeable areas of disagreement, despite the general consensus on the significance of incorporating sustainable fishing practices and empowering local populations. The differing opinions on the efficacy of technical advancements draw attention to the need for more research and even skepticism over the use of such solutions.

Furthermore, a significant percentage of respondents said that they were indifferent on a number of subjects, which highlights the ambiguity and complexity surrounding sustainability concerns in the sector. This implies that further efforts in consensus-building, education, and awareness-raising are required to bring about significant change. In summary, the conversation highlights the complexity of sustainability issues facing the seafood industry and stresses the need for integrated strategies that take into account social, environmental, and economic factors in order to achieve resilience and long-term viability.

Conclusion:

It is imperative for the seafood industry to leverage these insights to develop holistic and collaborative strategies that prioritize sustainability while balancing economic imperatives. By fostering innovation, promoting transparency, and embracing stakeholder collaboration, the industry can navigate the complexities of the post-pandemic era and emerge stronger, more resilient, and better equipped to meet the challenges of the future while safeguarding the environment and supporting local communities. Through concerted efforts and collective action, the Indian seafood industry can pave the way towards a more sustainable and prosperous future for all stakeholders involved.

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