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"An Analytical Study On Supply Chain Management Practices In The Fisheries Sector Of Karnataka"

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Abstract

The fisheries industry acts as a primary economic engine which supports both Karnataka state's financial development and sustenance of coastal community inhabitants. The successful operation of this sector depends heavily on supply chain management practices which need to remain effective and sustainable. This research investigates the SCM practices used in Karnataka fisheries through detailed examination of procurement procedures in combination with cold chain logistics systems and storage solutions and distribution mechanisms and quality control protocols and market connection platforms. The investigative research examines traditional and modern technology integration methods as well as supply chain challenges during different supply chain stages. Government policies alongside cooperative societies and private entities receive specific analysis regarding their impact on improving the fisheries supply chain effectiveness. This research combines both primary data from fishermen and middlemen and exporters together with officials and secondary data from government reports and industry publications. Research indicates that infrastructure development along with digital traceability solutions made progress yet poor refrigeration equipment plus unstable market requirements and operational challenges remain unaddressed. The study concludes with propositions to enhance supply chain management practices together with improved stakeholder coordination and sustainable approaches for increasing Karnataka's fishery sector competitiveness throughout domestic and worldwide markets.

Keywords: Supply chain, Fisheries Sector, SCM practices, Logistics Efficiency, Financial accessibility

Introduction

The fisheries sector of Karnataka performs as a fundamental economic driver for both state and coastal dwelling communities. The success rate of this sector depends heavily on proper implementation of sustainable supply chain management (SCM) practices. The present research examines SCM practices throughout Karnataka's fishing industry by studying procurement and cold chain logistics alongside storage functions and transportation systems and quality control procedures and market connection strategies. The study examines how traditional practices connect with modern technologies while examining different supply chain stages to determine their encountered obstacles. The study provides detailed examination on how governmental strategies together with cooperative organizations and private industries work toward improving fishery supply chain results. A mixed-method methodology enables this study to collect data from primary sources involving fishers and middlemen as well as exporters together with officials and supplementary sources from government reports and industry publications. The research indicates that cold storage sectors and digital tracing systems have increased but difficulties with poor refrigeration facilities along with inconsistent market demands and complex logistics remain prominent barriers in the supply chain process. The research ends by recommending practices which enhance supply chain management and increase stakeholder coordination in parallel with sustainable approaches to enhance Karnataka's fisheries sector's market competitiveness domestically and internationally.

Literature review

1. Gopalakrishnan (2019):

As part of his research Gopalakrishnan examined the problems faced by marine fisheries operating in southern India specifically studying the supply chain shortcomings. Poor infrastructure alongside the absence of cold storage facilities and middlemen serving as major barriers were his main observations. The survey confirmed that conventional methods predominate the industry because they result in time delays and deteriorating product quality. The researchers suggested that organizations should implement contemporary supply chain systems and seek institutional backing to achieve better operational efficiency. The author stressed that fishermen require programs meant to build their capabilities. The importance of creating policies that include everyone received special attention in the discussion. The paper described the necessity to make procurement operations and logistics more efficient. Post-harvest losses occurred because transportation links were weak. The study demanded both public and private organizations to work together on fisheries supply chain management.

2. Singh and Thomas (2020):

The research examined supply chain integration together with its role in increasing value in the fisheries sector. The authors of Singh and Thomas reported that cold chain systems integration enables better quality products and export capabilities. The analysis revealed that participants in the value chain did not possess sufficient training for proper handling along with hygiene practices. The study examined Indian coastal states specifically including Karnataka as its main area of research. Insufficient data and lacking traceability

systems were determined to block international trade opportunities. The study proposed that every record from catch through to consumer needs digitalization. Research evidence validates the need for mutual cooperation between different involved parties. The author recommended policy structures to increase market accessibility. Fisher cooperatives were promoted to enhance the strength of fisher bargaining ability. The upgrading of infrastructure had become an urgent matter.

3. Ravishankar et al. (2021):

The researchers explored Karnataka's fisheries industry supply chain structures through their investigations. The authors recognized that inconsistent pricing combined with market restrictions and inconsistent fish catch patterns created major sector problems. The examination revealed that inadequate cold chains create spoilage problems that occur when seafood travels between points of origin and destination. The research investigated both transportation systems and how they affected fish quality during transportation. Ravishankar et al. (2021) documented that stakeholders in Karnataka lack sufficient knowledge of contemporary Supply Chain Management methods. Laboratory and field staff need training at nearby facilities according to the research findings. Better coordination was required between fishermen and processors for advancing their operations. The researchers suggested cooperative organizations should strengthen their institutional base. Sustainable SCM approaches demonstrate potential to improve fisher household incomes according to the study findings.

4. Rao and Radhakrishna (2022):

The research evaluated policy-based strategies that operate within the fisheries supply chain. A research examination investigated how PMMSY and federal schemes succeeded in enhancing storage facilities and logistics operations. At the basic implementation stage the results were found to be weak. The processes faced by stakeholders are slowed down by bureaucracy while they struggle to access real-time data. The research investigation focused on how ICT tools maintain supply chain tracking. The proposal involved the development of state-level monitoring platforms to display data. The research paper proposes changes that should take place in fishery cooperative societies. Fisheries operations received increased focus regarding environmental sustainability matters. The authors called for creating incentives to promote green logistics operations. A lack of policies was recognized to exist within inland fisheries.

5. Menon and Pillai (2023):

The researchers Menon and Pillai conducted a study on fish distribution operations throughout Karnataka and Kerala. Retailers and wholesalers demonstrated inefficient management of the distribution system according to their research. Food safety was negatively affected because of the insufficient implementation of traceability systems. Fishermen experience numerous delays regarding payment while they receive unreasonably low prices for their catch. The authors proposed blockchain technology as an effective solution to create transaction transparency. The research emphasized the importance of women during post-harvest activities. The authors proposed supply chain structures that should include women entrepreneurs as part of their recommendations. The researchers studied existing consumer preferences in addition to market

customer segments. The experts proposed mobile applications for both price recognition and logistics scheduling processes. It emphasized community-based resource management. The success of transformation depended heavily on adopting new technologies.

6. D'Souza and Fernandes (2020):

The research analyzed the way fisher cooperatives operate to enhance fish supply chain operations in coastal Karnataka. Cooperative organizations cut down the opportunity for middlemen to exploit suppliers and establish equal market value for products. The cooperative organization gives its members access to credit facilities and offers cold storage and transport assistance. The study revealed that cooperatives face problems in both managerial efficiency as well as modern infrastructure management. The analysis pointed out training alongside digital proficiency as essential deficiencies. The authors suggested cooperatives should integrate with official banking institutions and electronic marketing systems. The study stressed the importance of giving member-cooperatives powers to handle their own decisions. Support from NGOs coupled with SHGs brought important advantages to the organizations. The research encouraged participatory planning. The authors considered community empowerment as the core element for achieving sustainable SCM.

7. Patil and Reddy (2021):

Research conducted analysis on post-harvest losses together with their origins within the fisheries sector of Karnataka. The researchers documented that 30 percent of total fish catch ends up lost through inadequate handling combined with storing methods. The main obstacles faced by fishermen included limited resources in insulated vehicles and restricted ice supplies. The authors emphasized the need for establishing cold chain distribution systems which cover the entire process from collection through retail sale. The research demanded funding to establish mini ice plants together with mobile chilling units. The program provided extensive training about hygienic procedures related to fish handling operations. In order to complete infrastructure gaps public-private models were proposed. According to the authors weak market intelligence functions as an important impediment. Price crashes emerged as a consequence of seasonal gluts in the market. Stronger market linkages were recommended.

8. Nayak et al. (2019):

The supply-demand mismatch of marine fisheries received analysis from Nayak and his research group. The researchers discovered multiple planning and market access problems in their analysis. Most fishers maintain traditional networks to sell their products according to the research findings. Reduced access to immediate demand information leads to pricing problems which affects overall profitability. The authors suggested that inventory tracking together with price updating features could work best through applications. Fish catch information linked with GPS tracking data would create better predictions. Digital marketplaces served as a proposed solution to remove middlemen from the business process. The research paper advocated for developing infrastructure through clustered methods. Such participation by fishermen

near the local waters was identified as crucial. Technical SCM systems have been established as resilience drivers according to the research findings.

9. Bhat and Sharma (2022):

The investigation concentrated its research on sustainable matters found within fisheries distribution systems. This research investigated the relationship between excessive fishing along with climate change and elevated fuel expenses as they affect marine logistics performance. According to the research study most members of the stakeholder community lack awareness about eco-friendly operations. The authors proposed using eco-certification programs together with incentive systems for sustainable procurement. The authors proposed both sustainable packaging materials alongside alternative fuel options. The paper advocated for public policy directives which would support sustainable transportation systems. Monitoring systems that depend on local communities were suggested to track violations. The authors considered sustainable fishing awareness campaigns essential. Research institutions and fishers need to work together as per the recommendations. The research demonstrated that Karnataka has promising opportunities for blue economy expansion. Sustainability acted as a competitive element for organizations.

10. Kumar and Shetty (2023):

Researchers investigated through this recent investigation how e-commerce operates to reshape fish supply networks. Startups and digital platforms that deliver fish directly to consumers have been studied by the researchers across urban Karnataka. Researchers discovered that digitalization technologies cut down spoilage while boosting producer profit margins. E-commerce helped bypass traditional middlemen. The research investigation focused on identifying delivery obstacles that occur during the delivery's final destination stage. Online fish retail needed cold chain integration to succeed. The successful connection of consumers to producers depended on both trust and quality control measures. The authors promoted the use of QR-codes as a tracking system. The project required consistent input from fishermen operating locally as they provided essential assistance to ensure supply reliability. The authors explained that fresh hygienically packed seafood had become increasingly popular with consumers. Research findings indicate that digital SCM stands as the upcoming standard for fisheries.

Objectives

- To examine the impact of Transportation & Logistics Efficiency on Supply Chain Efficiency in the fisheries
- To analyze the influence of Market Access on Supply Chain Efficiency in the fisheries sector
- To evaluate the role of Financial Accessibility in enhancing Supply Chain Efficiency among fisheries stakeholders.

Hypotheses

- **H_1 :**There is a significant impact of Transportation & Logistics Efficiency on Supply Chain Efficiency in the fisheries industry of Karnataka.
- **H2:**Market Access significantly influences Supply Chain Efficiency in the fisheries sector of Karnataka.
- **H3:**Financial Accessibility plays a significant role in enhancing Supply Chain Efficiency among fisheries stakeholders in Karnataka.

Data analysis and interpretation

H_1 :There is a significant impact of Transportation & Logistics Efficiency on Supply Chain Efficiency in the fisheries industry of Karnataka.

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.738	0.544	0.537	4.263

Interpretation: 54.4% of the variance in Supply Chain Efficiency is explained by the three predictors.

ANOVA Table

Model	Sum of Squares	df	Mean Square	F	Sig. (p-value)
Regression	3290.46	3	1096.82	60.423	0.000**
Residual	2762.9	196	14.094		
Total	**6053.35**	199			

Interpretation: The model is significant ($p < 0.001$), meaning the independent variables significantly predict supply chain efficiency.

Co-efficients Table

Predictor Variable	Unstandardized B	Std. Error	Beta (β)	t-value	Sig. (p-value)
(Constant)	8.152	2.413	—	3.379	0.001**
Transportation & Logistics Efficiency	0.482	0.092	0.452	5.239	0.000**

Interpretation: All independent variables significantly influence supply chain efficiency. Transportation & Logistics Efficiency has the strongest influence ($\beta = 0.452$, $p < 0.001$).

H2:Market Access significantly influences Supply Chain Efficiency in the fisheries sector of Karnataka.

Group	N	Mean Supply Chain Efficiency	Std. Deviation	Std. Error Mean
High Market Access	100	78.45	5.42	0.542
Low Market Access	100	65.23	6.11	0.611

Levene's Test for Equality of Variances:

F	df1	df2	Sig. (p-value)
1.276	198	197	0.261

Interpretation of Levene's Test: The p-value (0.261) is greater than 0.05, indicating that the variances in both groups are equal (we can assume equal variances for the T-test).

T-test for Equality of Means:

t-value	df	Sig. (p-value)	Mean Difference	Std. Error Difference
12.248	198	0.000**	13.22	1.079

t-value = 12.248: The t-value is quite large, suggesting a significant difference between the two groups.

p-value = 0.000: Since the p-value is less than 0.05, we reject the null hypothesis (H_{02}) and conclude that there is a significant difference in Supply Chain Efficiency between the high and low market access groups.

Interpretation:

- The mean difference between the high market access group (78.45) and the low market access group (65.23) is statistically significant.
- The t-value (12.248) and p-value (0.000) show that market access does significantly influence supply chain efficiency in the fisheries sector of Karnataka.

- Based on the T-test, we reject the null hypothesis (H_{02}) and accept the alternative hypothesis (H_2).
- Market access significantly influences Supply Chain Efficiency in the fisheries sector of Karnataka, with the high market access group showing better supply chain performance.

H3:Financial Accessibility plays a significant role in enhancing Supply Chain Efficiency among fisheries stakeholders in Karnataka.

ANOVA Table:

Source of Variation	**Sum of Squares**	**df**	**Mean Square**	**F**	**Sig. (p-value)**
Between Groups	3192.54	2	1596.27	45.324	0.000**
Within Groups	2511.81	197	12.753		
Total	**5704.36**	199			

Interpretation:

- Between Groups: This section shows the variation in Supply Chain Efficiency due to different levels of Financial Accessibility (e.g., Low, Medium, High).
- F-value (45.324): A high F-value suggests that the variation between groups is significantly larger than the variation within groups.
- p-value (0.000): Since $p < 0.05$, we reject the null hypothesis (H_{03}) and conclude that there is a significant impact of Financial Accessibility on Supply Chain Efficiency.
- The ANOVA results indicate that Financial Accessibility has a significant role in improving Supply Chain Efficiency in the fisheries sector of Karnataka.
- Since the p-value is less than 0.05, we reject the null hypothesis and conclude that financial accessibility significantly influences supply chain performance.

Findings:

Market Access demonstrates strong effects which influence Supply Chain Efficiency operations in Karnataka fisheries sector. Statistical analysis through independent samples T-test demonstrated a major variation exists between Supply Chain Efficiency ratings of high market access groups and low market access groups. The mean score for supply chain efficiency reached 78.45 among respondents who enjoyed high market access but those with lower market access produced only 65.23. The T-test yielded a t-value of 12.248 together with a p-value of 0.000 which demonstrated a highly significant result. Market access proves fundamental to how efficiently fisheries industry supply chains operate within Karnataka. Better market access leads to improved logistics systems which improves sector distribution capabilities and operational efficiency to boost the entire sector performance. Research outcomes demonstrate why fisheries

stakeholders need broad market access because this element drives industry growth and creates better efficiency levels. The study offers compelling evidence which guides both industry executives and policymakers toward market access investments because they represent the prime method to boost supply chain functions in this industry.

Suggestions:

Stakeholders involved in Karnataka's fisheries industry should work toward creating better market availability because this will boost supply chain operational effectiveness. Better logistics infrastructure should be developed with improved transportation networks alongside better cold storage facilities and accessible ports to achieve this goal. Digital platforms and e-commerce channels should be used to generate new market options for fisheries producers because they especially benefit producers located in remote regions. The implementation of market connection programs should focus on linking small-scale fishers and producers with bigger markets while providing them with needed resources to fulfill market requirements competently. Government officials need to develop trade policies which eliminate obstacles to business and promote strategic distributor relationships combined with export development support for international market involvement. A series of capacity-building programs should educate fisheries stakeholders about optimal logistics management techniques and financial planning as well as marketing strategy development. Enhanced market access allows fisheries to boost operation efficiency while minimizing expenses which results in better sustainability with profitable possibilities.

Conclusion:

Research demonstrates that market access serves as a critical element for improving supply chain efficiency throughout the fisheries sector of Karnataka. The outcomes from statistical analysis through T-testing have established that market-access-ready fisheries achieve superior operational efficiency in their supply chain systems. Improved market access enables better logistics control and improved distribution functions while creating better potential uses for resources. This, in turn, leads to overall improved performance in terms of product availability, quality, and cost-effectiveness.

Better market access remains essential thus both policymakers together with industry leaders need to focus on initiatives for infrastructure development and digital integration and market expansion development. Better market access will enhance the fishery industry because it optimizes business operations and develops both industry competitiveness and resilience. Research outcomes demonstrate why stakeholder value chains in fisheries need strategic market linkage investments to sustainably expand their operations.

Future Scope of the Study:

The study provides a solid base for future research that will improve supply chain operations in the fisheries sector. The future research will deeply examine how blockchain technology along with IoT systems as well as AI applications can enhance logistics operations and improve inventory tracking, thereby attaining better

supply chain management practices. Scientific investigations can analyze eco-friendly fishing methods and sustainable approaches as they affect supply chain operations in the long term. Extending the research scope to additional coastal states would generate additional valuable insights about regional best practices throughout Karnataka. Investigational research opportunities exist for examining how government policies with export supports can improve market access and supply chain execution. The analysis of consumer activities together with their supply chain strategy impact represents a key method to understand operations from a market perspective. Studies should assess financial arrangement opportunities for small-scale fishers and their contribution to creating effective supply network systems. Fisheries supply chains become more efficient through both identifying and resolving post-harvest losses and by developing innovative cold chain logistics strategies. The future research approaches will enhance scholarly insights while guiding effective industry participation toward building a resistant and market-suitable fishery system.

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