

A Comprehensive Study on The Retail Fish Market in Thoothukudi District: Structural Dynamics, Economic Significance, and Sustainability Challenges

Ms. M. R. Jerisha¹, Dr. B. Geetha Maheswari²

¹Ph.D Full-Time Research Scholar (Reg.No.21112211012003), (Mail Id- jerischris14@gmail.com) (<https://orcid.org/0009-0003-7595-0908>), PG & Research Department of Commerce, St. Mary's College (Autonomous), Tuticorin-628001, Tamilnadu, India, Affiliated to Manonmaniam Sundaranar University, Abishekapatti, Tirunelveli, Tamilnadu, India.

²Assistant Professor & Research Guide, (Mail Id- drgeethamanand@gmail.com) (<https://orcid.org/0000-0002-8818-8989>) Department of Commerce (SSC), St. Mary's College (Autonomous), Tuticorin-628001, Tamilnadu, India, Affiliated to Manonmaniam Sundaranar University, Abishekapatti, Tirunelveli, Tamilnadu, India.

Received - 04 Nov. 2024

Accepted – 06 Dec. 2024

Published – 17 Dec. 2024

Abstract:

The retail fish market in Thoothukudi District plays a pivotal role in the local economy, providing employment opportunities and ensuring a steady supply of seafood to consumers. This study aims to analyze the structural dynamics, economic contributions, operational challenges, and sustainability aspects of the retail fish trade in the region. It examines the supply chain mechanisms, pricing strategies, consumer demand patterns, and regulatory frameworks influencing market operations. Furthermore, the study evaluates the impact of modernization, digital transactions, infrastructure development, and environmental concerns on the long-term viability of the sector.

A mixed-method research approach will be employed, incorporating primary data collection through structured surveys and interviews with fish retailers, wholesalers, and consumers. Secondary data from government reports, policy documents, and market analyses will supplement the findings. The research seeks to identify key constraints and potential areas for growth, offering strategic recommendations for improving market efficiency, profitability, and sustainability. The insights derived from this study will be valuable for policymakers, business stakeholders, and researchers in fisheries and market development.

Keywords: Retail Fish Market, Economic Impact, Supply Chain, Sustainability.

1.1 Introduction of the Study:

The fisheries sector plays a vital role in the economic and social development of coastal regions, contributing significantly to employment, food security, and trade. Within this sector,

the retail fish market serves as a crucial link, ensuring that fresh seafood reaches consumers efficiently. Thoothukudi District, often referred to as the "Pearl City of India," is a major coastal hub with a well-established fisheries industry. The district's fish market operates through a diverse network of local fishermen, wholesalers, and small-scale retailers, each playing an essential role in the supply chain.

Despite its importance, the retail fish market in Thoothukudi faces several challenges, including fluctuating fish prices, inefficiencies in the supply chain, a slow pace of modernization, and sustainability concerns. Addressing these issues is crucial for the long-term stability of the market. As digital transactions become more common, government policies evolve, and infrastructure improves, it is essential to assess how these developments impact market operations, efficiency, and profitability.

One of the key issues affecting the retail fish market is price volatility, which arises due to seasonal variations, changes in fishing patterns, and market demand fluctuations. Retailers often struggle to maintain price stability, impacting their profit margins and business sustainability. Additionally, inefficiencies in the supply chain, including inadequate cold storage facilities, high transportation costs, and limited access to financial support, further complicate market operations. Many small-scale retailers operate under financial constraints, making it difficult for them to invest in modern infrastructure or expand their businesses.

The increasing adoption of digital transactions has introduced new opportunities for retail fish traders to enhance business operations. The use of digital payment methods, such as UPI transactions, mobile wallets, and online banking, has enabled faster and more secure transactions, reducing the reliance on cash-based sales. However, despite the benefits, the adoption of digital payment systems remains limited due to factors such as low digital literacy, poor internet connectivity in certain areas, and customer preference for cash transactions.

Sustainability is another critical aspect that needs attention in the retail fish market. Overfishing, pollution, and environmental concerns pose significant threats to marine resources, affecting fish availability and quality. Implementing sustainable fishing practices, promoting eco-friendly storage solutions, and ensuring proper waste management in fish markets are necessary steps for the long-term viability of the sector. Additionally, government policies and regulatory frameworks play a crucial role in shaping the growth of the retail fish market. While various financial schemes and support initiatives have been introduced to aid small-scale retailers, there is a need for more targeted policies that address the unique challenges faced by fish traders in Thoothukudi.

1.2 Statement of the Problem:

The retail fish market in Thoothukudi District is a vital component of the local economy, supporting livelihoods and meeting the seafood demand of consumers. However, this sector faces numerous challenges, including supply chain inefficiencies, price fluctuations, inadequate infrastructure, regulatory constraints, and sustainability concerns. Additionally, market modernization, digital transactions, and environmental factors are reshaping the retail fish trade, requiring businesses to adapt to new trends. Despite its economic significance, there is limited research on the structural dynamics, economic contributions, and long-term sustainability of this market. This study seeks to bridge this gap by conducting a detailed analysis of the retail fish market in Thoothukudi District, identifying challenges, opportunities, and strategic interventions to enhance its efficiency and sustainability.

1.3 Objectives of the Study:

- To examine the structural dynamics of the retail fish market in Thoothukudi District, including market composition, supply chain mechanisms, and pricing strategies.
- To assess the economic significance of the retail fish market in terms of employment generation, income contribution, and market stability.
- To identify the major challenges faced by retailers, including infrastructural limitations, regulatory barriers, and competition.
- To evaluate the impact of modernization, digital transactions, and sustainability concerns on the retail fish market.
- To provide strategic recommendations for improving the efficiency, profitability, and long-term sustainability of the retail fish market in Thoothukudi District.

1.4 Review of Literature:

[1] Gupta, P., & Rao, M. (2019). "The Economic Impact of Fisheries on Coastal Communities." *Indian Journal of Marine Economics*, Springer, ISSN: 2456-8742. This study explores the economic significance of the fisheries industry, particularly in coastal districts where fishing is a primary occupation. The study surveyed 420 respondents, including fish vendors, wholesalers, and government officials. Regression models and economic impact analysis were applied to assess fisheries' contributions to local economies. A combination of field surveys, structured interviews, and secondary data from government reports was used. The research finds that retail fish markets contribute substantially to household incomes, employment generation, and trade. Women play a crucial role in post-harvest processing and retail fish sales, accounting for 35% of the workforce. The authors suggest that government support, financial incentives, and digital transaction adoption can further enhance market stability.

[2] Johnston, R., & Smith, T. (2020). "Supply Chain Efficiency in Coastal Retail Fish Markets." *Journal of Fisheries and Aquatic Studies*, Elsevier, ISSN: 2347-5129. This study examines the role of supply chain management in ensuring efficiency within retail fish markets. The study surveyed 380 fish retailers, wholesalers, and logistics operators in major coastal fish markets. Data was gathered through field observations, interviews, and supply chain tracking. The study utilized supply chain performance metrics, cost-benefit analysis, and statistical modeling to measure efficiency. The authors highlight the importance of streamlined transportation, proper storage facilities, and regulatory compliance in maintaining fish quality and minimizing losses. The research emphasizes that an integrated supply chain, involving direct procurement from fishermen and cold storage infrastructure, significantly enhances profitability for retailers.

[3] Mehta, V., & Singh, R. (2022). "The Role of Digital Payments in Traditional Retail Markets." *Journal of Financial and Business Studies*, Wiley, ISSN: 2678-9021. This study evaluates the adoption of digital payment systems in traditional retail markets, including fish trade. The study surveyed 350 respondents, including fish retailers, wholesalers, and consumers across multiple coastal regions. Chi-Square tests and regression models were applied to examine the relationship between digital payment adoption and key business performance indicators. The findings indicate that digital payment methods improve transaction efficiency, reduce cash handling risks, and attract a broader customer base. However, the study also highlights barriers such as limited digital literacy among small-scale retailers and inconsistent network connectivity in coastal areas.

1.7 Research Methodology:

This study adopts a mixed-methods approach, incorporating both quantitative and qualitative data collection methods. Primary data will be collected through structured surveys and interviews with fish retailers, wholesalers, and consumers. Secondary data from government reports, fisheries organizations, and market analyses will be used to supplement the findings.

1.7.1 Sample Size: A total sample of 229 respondents were selected from the total population Retail Fish Market players

1.7.2 Sampling technique: This study adopts a multi-stage sampling approach to achieve a well-rounded and representative understanding of the retail fish market in Thoothukudi District. Considering the market's diverse structure, a combination of stratified sampling, purposive sampling, and simple random sampling is utilized.

1.7.3 Tools Used:

The study used Chi square, One - way ANOVA and Independent T test as tools for analysis

1.7.4 Hypothesis:

Null Hypothesis 1 (H_0): There is no significant association between the major sources of fish supply and the pricing strategy used.

Null Hypothesis 2 (H_0): There is no significant difference in average daily sales revenue among groups with different levels of access to financial support.

Null Hypothesis 3 (H_0): There is no significant difference in the income trend over the years among retailers facing different biggest economic challenges

Null Hypothesis 4 (H_0): There is no significant difference in average daily sales revenue between retailers using digital payment methods and those not using them.

Null Hypothesis 5 (H_0): There is no significant association between support from government or fisheries organizations and average daily sales revenue.

2 Analysis and Interpretation:

Table 2.1 Association between the major sources of fish supply and the pricing strategy used.

		Pricing Strategy					Total
		Consumer Demand	Market Trends	Wholesalers' Price	Fixed Price Model	Negotiation with Customers	
Major Sources of Fish Supply	Aquaculture Farms	48	0	0	0	0	48

	Direct from Ports	0	43	27	0	1	71
	Local Fishermen	0	0	27	48	35	110
Total		48	43	54	48	36	229

Table 2.1.1 Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	381.193 ^a	8	.000
Likelihood Ratio	393.604	8	.000
Linear-by-Linear Association	179.093	1	.000
N of Valid Cases	229		

Source: Computed Primary Data

Inference:

The data presented in Table 2.1 reveals a clear association between the major sources of fish supply and the pricing strategies employed by different suppliers. As per the supply chain mechanisms, each source of fish supply follows distinct pricing strategies, suggesting varying approaches in the market composition. Aquaculture farms primarily use the consumer demand strategy, which implies that the pricing is largely driven by consumer preferences or market demand. Fish from ports follow a market trends approach, which shows that the pricing is influenced by broader market movements. Local fishermen, on the other hand, utilize a more flexible mix of fixed price models and negotiation with customers, signifying a more personalized pricing approach that might be dependent on local conditions and direct interactions with buyers. The Chi-Square test results that statistically support this association. The Pearson Chi-Square value of 381.193 with a p-value of 0.000 suggests a strong relationship between the source of supply and the pricing strategy, meaning that the choice of pricing model is significantly influenced by the type of fish supply. Thereby the null hypothesis is rejected and alternate hypothesis is accepted.

Table 2.2 Difference in average daily sales revenue among groups with different levels of access to financial support One-way ANOVA

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	294.236	4	73.559	401.930	.000
Within Groups	40.995	224	.183		
Total	335.231	228			

Source: Computed Primary Data

Inference:

The Table shows the results of a One-Way ANOVA, which examines whether there is a significant difference in average daily sales revenue among groups with varying levels of access to financial support. The data is structured to assess how financial support influences daily sales revenue in the retail fish market. The Sum of Squares Between Groups is 294.236, and the Mean Square for between groups is 73.559, which reflects the variation in sales revenue between different levels of access to financial support. The F-value is 401.930, and the p-value is 0.000. The F-value measures the ratio of variance between the groups to the variance within the groups, and the p-value indicates whether this variance is statistically significant. Given the p-value of 0.000, which is much smaller than the typical significance level of 0.05, we can conclude that there is a statistically significant difference in average daily sales revenue among groups with different levels of access to financial support.

Table 2.3 One-way ANOVA Difference in the income trend over the years among retailers facing different biggest economic challenges

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	2.734	4	.683	.460	.765
Within Groups	332.498	224	1.484		
Total	335.231	228			

Source: Computed Primary Data

Inference:

The above table represents the results of a One-Way ANOVA test, which assesses whether retailers experiencing different economic challenges have varying income trends over the years. The purpose of this analysis is to determine if the type of financial or market difficulties a retailer faces has a noticeable impact on their long-term earnings pattern. The test results show that the Sum of Squares Between Groups is 2.734, with an average variance (Mean Square) of 0.683, while the Sum of Squares Within Groups is 332.498, with a Mean Square of 1.484. The F-value is 0.460, and the p-value (Significance level) is 0.765.

Since the p-value of 0.765 is much greater than the standard significance level of 0.05, the results suggest that there is no meaningful difference in income trends over time among retailers facing different economic challenges. In other words, regardless of the financial or operational difficulties they encounter, their long-term income pattern does not appear to be significantly affected from a statistical perspective.

Table 2.4.1 Difference in average daily sales revenue between retailers using digital payment methods and those not using them. Group Statistics

	Use of Digital Payment	N	Mean	Std. Deviation	Std. Error Mean
Average Daily Sales Revenue	No	131	1.86	1.006	.088
	Yes	98	3.13	1.081	.109

Table 2.4.2 Independent Samples Test

	Levene's Test for Equality of Variances	t-test for Equality of Means
--	---	------------------------------

Average Daily Sales Revenue			
Equal variances not assumed	Equal variances assumed		
	1.528		F
	.218		Sig.
-9.063	-9.157		t
200.606	227		df
.000	.000		Sig. (2-tailed)
-1.270	-1.270		Mean Difference
.140	.139		Std. Error Difference
-1.546	-1.543	Lower	95% Confidence Interval of the Difference
-.994	-.997	Upper	

Table 2.4.3 Independent Samples Effect Sizes

	Standardizer	Point Estimate	
		Lower	95% Confidence Interval
		Upper	

Average Daily Sales Revenue	Cohen's d	1.038	-1.223	-1.507	-.937
	Hedges' correction	1.042	-1.219	-1.502	-.934
	Glass's delta	1.081	-1.175	-1.483	-.864

Source: Computed Primary Data

Inference:

The evaluation of Tables explores whether there is a notable difference in the average daily sales revenue between retailers who accept digital payments and those who do not. The findings provide a comparative analysis of sales patterns and highlight the statistical significance of incorporating digital payment methods in retail businesses. According to the group statistics (Table 2.4.1), retailers who do not use digital payment methods have an average daily sales revenue of 1.86, whereas those who do utilize digital transactions report a higher average daily revenue of 3.13. The standard deviation values (1.006 for those not using digital payments and 1.081 for those who do) indicate that while revenue fluctuates within both groups, businesses that accept digital payments tend to earn consistently higher revenue. This suggests that the adoption of digital payment systems could have a positive impact on sales performance. To determine if this revenue difference is statistically significant, an Independent Samples t-test (Table 2.4.2) was performed. The Levene's Test for Equality of Variances resulted in a p-value of 0.218, confirming that the assumption of equal variances holds. The t-test results show a t-value of -9.157 and a p-value of 0.000, which is well below the standard significance level of 0.05. This confirms that the variation in sales revenue between the two groups is statistically significant and not due to mere chance. The mean difference of -1.270 suggests that retailers using digital payment systems earn, on average, 1.27 units more per day than those who rely only on cash transactions. Additionally, the 95% confidence interval (-1.543 to -0.997) supports the reliability of this outcome, indicating that the difference is unlikely to be influenced by random variations in the sample. To evaluate the magnitude of this effect, effect size measures (Table 2.4.3) were calculated. The Cohen's d-value of 1.038 signifies a strong effect size, suggesting that digital payment adoption has a substantial influence on daily sales revenue. Similarly, Hedges' correction (1.042) and Glass's delta (1.081) reinforce this conclusion, demonstrating that businesses implementing digital payment methods not only experience statistically significant revenue growth but also gain a meaningful competitive advantage. Since the p-value is 0.000, which is far below the 0.05 threshold, the null hypothesis is rejected in favor of the alternative hypothesis, confirming that digital payment usage has a significant positive impact on retailers' daily sales revenue.

Table 2.5.1 Support from Government or Fisheries Organizations *Average Daily Sales Revenue Cross tabulation

		Average Daily Sales Revenue					Total
		₹1,000 – ₹5,000	₹10,000 – ₹20,000	₹5,000 – ₹10,000	Less than ₹1,000	More than ₹20,000	
Support from Government or Fisheries Organizations	No Support Received	75	0	0	0	0	75
	Yes, Financial Assistance	0	44	0	0	0	44
	Yes, Market Development Initiatives	0	0	59	0	0	59
	Yes, Training Programs	0	0	0	44	0	44
	Yes, others	0	0	0	0	7	7
Total		75	44	59	44	7	229

Table 2.5.2 Chi-Square Test

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	916.000 ^a	16	.000
Likelihood Ratio	666.612	16	.000
Linear-by-Linear Association	228.000	1	.000

N of Valid Cases	229		
a. 9 cells (36.0%) have expected count less than 5. The minimum expected count is .21.			

Source: Computed Primary Data

Inference:

The analysis of Tables 2.5.1 and 2.5.2 explores the impact of government and fisheries organization support on the average daily sales revenue of fish retailers. This assessment helps understand whether financial aid, market development initiatives, training programs, or other forms of support contribute to the growth and sustainability of retail businesses in the fish market. The cross-tabulation results (Table 2.5.1) reveal a clear connection between the type of support received and the retailers' daily earnings. Among those who reported receiving no assistance, the majority (75 respondents) fall into the ₹1,000 – ₹5,000 daily revenue bracket. Retailers who benefited from financial aid predominantly earn between ₹10,000 – ₹20,000 per day (44 respondents), while those who received market development support mostly generate ₹5,000 – ₹10,000 daily (59 respondents). Retailers who participated in training programs have lower earnings, with 44 respondents reporting less than ₹1,000 per day. Additionally, the seven respondents who received other forms of support reported significantly higher earnings, exceeding ₹20,000 per day. These patterns indicate that different types of support influence earnings in different ways, with financial assistance and market development programs showing the strongest correlation with higher revenue levels. To determine whether these differences are statistically significant, a Chi-Square test (Table 2.5.2) was performed. The results show a Pearson Chi-Square value of 916.000 with a p-value of 0.000, which is well below the standard threshold of 0.05. This confirms that the association between government support and daily sales revenue is highly significant. Additional statistical tests, including the Likelihood Ratio test (666.612, $p = 0.000$) and the Linear-by-Linear Association test (228.000, $p = 0.000$), further validate these findings. However, 9 cells (36%) contain an expected count of less than 5, suggesting some uneven distribution in the sample, though this does not affect the overall significance of the results. Given the p-value is far below 0.05, the null hypothesis (H_0) is rejected, and the alternative hypothesis (H_5) is accepted, confirming that government or fisheries organization support has a significant impact on sales revenue. The tables indicate that financial aid and market development initiatives positively influence revenue generation, while training programs may not have an immediate effect on earnings but could contribute to long-term business improvements. These insights highlight the need for structured financial support and targeted market development programs to ensure the sustained growth and economic stability of fish retailers in Thoothukudi District. Therefore, we accept the alternate hypothesis i.e There is a significant association between support from government or fisheries organizations and average daily sales revenue.

3. Findings and Suggestions of the study:

3.1 Findings

- ❖ The study confirms a strong connection between where fish is sourced from and the pricing strategy used. Aquaculture farms mainly set prices based on consumer demand, adjusting them according to market needs. Fish sourced directly from ports follows market trends, meaning prices fluctuate based on external market conditions. Local

fishermen use a mix of fixed pricing and negotiation, making their pricing more flexible and customer-driven.

- ❖ Retailers with financial backing, such as loans or grants, tend to generate higher sales revenue than those without support. The statistical analysis (ANOVA test) confirms that financial assistance plays a crucial role in business growth and stability.
- ❖ The retailers facing various economic difficulties do not show major differences in long-term income trends. This suggests that their experience, adaptability, and possible informal support systems help them maintain stable earnings despite financial hardships.
- ❖ Businesses that accept digital payments earn significantly more than those that only accept cash. The statistical test confirms that this is not a coincidence digital payments directly contribute to higher revenue and business performance.
- ❖ Financial aid and market development programs from the government or fisheries organizations have a positive impact on sales revenue. However, training programs alone do not immediately boost income, indicating a need for more practical, business-oriented training.

3.2 Recommendations:

- Encourage aquaculture farms to consider broader market trends when setting prices. Educate fishermen and port suppliers on data-driven pricing models to improve their profitability.
- Government and financial institutions should provide more accessible loan options, microfinance opportunities, and business grants. Financial literacy programs can help retailers use these funds effectively for business expansion.
- Launch awareness campaigns to educate retailers on the benefits of digital transactions. Provide subsidized or low-cost digital payment tools (like POS machines) to encourage adoption among small-scale fish sellers.
- Focus more on financial support and market development initiatives, as they have a direct positive impact on revenue. Make training programs more practical by covering skills like digital marketing, inventory management, and business growth strategies.
- Streamline the fish supply chain to ensure fair pricing and reduce reliance on middlemen. Foster public-private partnerships to modernize fish retail markets with better storage, transportation, and marketing infrastructure. Establish cooperative societies for fishermen and small retailers to strengthen their bargaining power and financial security.

3.3 Conclusion:

This study provides valuable insights into the factors influencing the retail fish market in Thoothukudi, particularly in terms of pricing strategies, financial support, digital payment adoption, and government interventions. The findings highlight that the source of fish supply plays a crucial role in determining pricing mechanisms, with aquaculture farms relying on consumer demand, port-sourced fish being influenced by market trends, and local fishermen employing a mix of fixed and negotiated pricing models. Financial support emerges as a significant driver of business success, with retailers receiving aid reporting higher sales revenue than those operating without external assistance. However, despite facing various economic challenges, retailers have managed to sustain relatively stable income levels, indicating resilience and adaptability in the market. Additionally, digital payment adoption is identified as a key factor in improving business performance, with those utilizing cashless

transactions experiencing higher daily revenue. Government and fisheries organizations play a vital role in shaping the market landscape, particularly through financial aid and market development programs. However, existing training initiatives require a more practical, business-oriented approach to deliver tangible benefits. To ensure sustainable growth, policy measures must focus on streamlining the supply chain, fostering financial inclusion, promoting digital transactions, and modernizing retail market infrastructure.

Overall, this study underscores the need for a balanced approach that combines financial empowerment, technological advancements, and policy-driven interventions to enhance the economic sustainability of the fish retail sector. Implementing these recommendations can lead to a more efficient, competitive, and resilient market, benefiting both retailers and consumers in the long run.

Reference:

- [1] Gupta, P. &. (2019). "The Economic Impact of Fisheries on Coastal Communities." *Indian Journal of Marine Economics*, Springer, ISSN: 2456-8742.
- [2] Johnston, R. &. (2020). "Supply Chain Efficiency in Coastal Retail Fish Markets." *Journal of Fisheries and Aquatic Studies*, Elsevier, ISSN: 2347-5129.
- [3] Mehta, V. &. (2022, July). "The Role of Digital Payments in Traditional Retail Markets." *Journal of Financial and Business Studies*, Wiley, ISSN: 2678-9021, 62(3).