

## Impact of Mechanisation of Marine Fishing Industry on the Socio-Economic Conditions of Traditional Marine Fishermen in Thoothukudi District

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### **Abstract**

Fishing is one of man's oldest occupations and a big industry worldwide. Fish is an excellent and irreplaceable source of animal protein. It is believed that fish supplies about 10% of the world's protein either directly or indirectly. Based on the research and debate presented in this paper, it is clear that the increased mechanisation of fishing vessels has far-reaching occupational consequences. This research examines the effects of mechanised fishing on several fronts, including the level of investment required, professional growth, and the efficiency with which technology is used. The investigation shows that the transition to mechanised boats and motorised vessels has led to a massive increase in the size of the fishermen's investments. The transition to motorised boats and vessels has affected several facets of fishing operations, including total fishing distance, fishing days, employment, fish catch, operating costs, and operating profit. The capital intensity in the industry has risen as fishermen have shifted to using motorised boats and other machinery. However, fishing in Thoothukudi District still requires much manual labour. The transition to motorised vessels and machinery has affected fishing's numerous facets of professionalism. It has also hampered the technical efficacy of operating a motorised craft and mechanised boats in the Thoothukudi area.

**Keywords:** mechanisation of fishing crafts, foreign exchange, job opportunities, export market, technical efficiency

### **INTRODUCTION**

Our economic fisheries are a bright spot. As a result of its efforts, food production has increased, new jobs have been created, the population's nutritional status has improved, and foreign exchange has been earned (D. Amutha, 2016). One of the most rapidly expanding industries, fisheries also

boast the highest volume of global food trade (Grimur Valdimarson, 2005). Andhra Pradesh, Gujarat, Maharashtra, Tamil Nadu, Pondicherry, Kerala, and Gujarat are the top states with the most fishing potential. Deep sea fishing opportunities are best in Maharashtra, followed by Gujarat, Tamil Nadu, and Kerala (Biju T. 2006).

Along the 8118 kilometres of coastline, there are 7 main fishing harbours, 45 minor fishing harbours, and 180 fish landing centres (Handbook on Fisheries Statistics, 2011). In 2012–13, the State exported marine products of 86585 metric tonnes with a total value of Rs. 333178 lakhs (Statistical Handbook of Tamilnadu, 2014).

While fishing is still a major component of local economies for many households throughout the poor world, fisheries have grown into a more dynamic segment of the global food business. This is in reaction to the expanding global demand for fish and fishery products (D. Amutha, 2016).

The findings demonstrate that many of the Tuticorin region's fish processing plants currently function at or near capacity (D.Amutha, 2015). Most likely, crab farmers are not professionals with any special training. Insufficient information is available to farmers on crab fattening (Amutha D., 2013). Education and training for fish vendors in safe handling practices and sanitation standards will improve the quality of their wares (D.Amutha, 2014).

Increases in the value of cuttlefish on the export market and the overall price of fish on the local market have resulted in the increased mechanisation and concentration of traditional fishing vessels in this area of the coast (Lazarus S and Joel J. J. 1979).

However, the greatest impact has come from the mechanisation of fishing vessels (Gnanadoss D.A.S. 1977). However, the modernisation of maritime fisheries has not significantly improved the living conditions of the fishermen, who remain socially and economically poor (Henry 2003). Traditional non-mechanised fishing methods use handlines, gillnets, and fish traps, whereas mechanised fishing methods employ vessels including huge ships, stern and outrigger trawlers, gill netters, purse seiners, long liners, and dol netters (Gary Moran, 1990). Mechanisation in India and other emerging countries has hastened the development of new trawling equipment (John Kurien, 1978).

## **OBJECTIVES**

The objectives of this study are

- 1) The sample group consists of mechanised maritime fishermen, and the study's goals include learning more about their demographics and working conditions.
- 2) To assess the amount of fish captured by each group.
- 3) This survey determines how well the public is informed about the fishing cooperative society's initiatives.
- 4) To test familiarity with fishing laws
- 5) To learn about proficiency with contemporary tools

## **METHODS & MATERIALS**

The research was conducted just in the Thoothukudi area of Tamil Nadu. The basic data came from a random sample of 220 mechanised maritime fishermen. Mechanised boats are used to conduct surveys in the Thoothukudi area. The study's 220 sample fishermen were drawn from the fishing communities of Thoothukudi Fishing Harbour, Tharuvaikulam, and Vembar in the Thoothukudi district. The present investigation was designed as a descriptive study. The secondary data was used to gather various print and digital sources, including books, e-books, periodicals, newspapers, research articles, journals, and e-journals. For this purpose, we employed various statistical techniques, such as mean and standard deviation, ANOVA and correlation. From March 2022 to June 2022, we used a personal interviewing approach to conduct the field survey.

## **REVIEW OF LITERATURE**

Chennubhotla et al. (1999) analysed the mechanical and non-mechanical tools and equipment of fishermen in Andhrapradesh. It was noted in the study that up until the middle of the 1960s, fishing off the coast of Andhrapradesh was done exclusively using traditional, non-mechanised fishing vessels. As a result, trawlers and mechanised vessels using gillnets improved Andhrapradesh's fish production.

According to Narayanakumar R. et al. (2000), modern technology is largely responsible for the marine fishery sector of Tamil Nadu's meteoric rise from a subsistence level to the position of an enterprise. Although total landings are higher than ever, some fishing operations are operating at a loss due to a combination of factors, including a decline in catch-per-effort and rising fuel prices.

Despite requiring greater initial capital and ongoing maintenance costs, the study found that mechanised vessels were more effective.

Rajasenan (2001) made an effort to examine how advances in technology have altered the lifestyles and working situations of traditional fishermen. According to the study, the modernisation process in the fishing industry brought about by introducing new technology altered the industry's occupational structure by transforming the direct producers into the sector's final wage earners. The traditional fisherman has become a despised and forgotten minority.

Henry's (2003) study of mechanised boat owners in the Keralan fishing villages of Sakthikulangara and Neendakara revealed a direct association between the owner's socio-economic standing and the boats' technological specifications. Many of the poor boat owners sailed vessels that had been previously owned.

Meenakumari (2011) looked at how major changes in fibre technology and modern gear materials have directly affected and led to big changes in how fishing gears are made, used, and handled.

## ANALYSIS AND INTERPRETATION

### AGE-WISE CLASSIFICATION OF THE SAMPLE RESPONDENTS

Sl. No.	Age (in years)	Thoothukudi Fishing Harbour	Tharuvaikulam	Vembar	Overall
1.	Below 30	6 (5.88)	4(5.19)	2(4.88)	12(5.45)
2.	30 – 40	29 (28.43)	25(32.47)	13(31.71)	67(30.45)
3.	40 – 50	54 (52.94)	37(48.05)	20(48.78)	111(50.46)
4.	Above 50	13 (12.75)	11(14.29)	6(14.63)	30(13.64)
	Total	102(100)	77(100)	41(100)	220(100)

Source: Survey Data.

Note: Figures in brackets are a percentage of the total.

Based on the data in the table, it appears that only 6.5% of the 102 respondents in the instance of Thoothukudi Fishing Harbour are under the age of 30, while 28.43% are between the ages of 30 and 40, 52.99% are between the ages of 40 and 50, and 12.75% are 50 or older. Those who answered the survey in Tharuvaikulam were classified as follows: Only 4.1% are under 30 years old, while 32.4% are in their 30s, 48.0% are in their 40s, 14.29% are in their 50s, and 87.5% are in their 60s or older. The ages of the 41 Vembar respondents break down as follows: 2 (4.88%) are under 30 years old, 13 (31.71%) are between 30 and 40 years old, 20 (48.78%) are in their 40s, and 6 (14.63%) are in their 50s.

### EDUCATIONAL STATUS OF THE SAMPLE RESPONDENTS

Sl. No.	Qualification	Thoothukudi Fishing Harbour	Tharuvaikulam	Vembar	Overall
1.	Primary & middle school	51(50.00)	38(49.35)	18(43.90)	107(48.64)
2.	High school	26(25.49)	23(29.87)	12(29.27)	61(27.73)
3.	Higher Secondary	17(16.67)	11(14.29)	7(17.07)	35(15.91)
4.	Degree & Diploma	8(7.84)	5(6.49)	4(9.76)	17(7.72)
	Total	102(100)	77(100)	41(100)	220(100)

Source: Survey Data.

Note: Figures in brackets are a percentage of the total.

The table indicates that, in the case of Thoothukudi Fishing Harbour, the majority of 51 fishermen (50.00%) have completed their elementary and middle school educations, followed by 26 (25.49%) who have finished their high school education, 17 (16.67%) who have finished their higher secondary educations, and only 8 (7.84%) who have finished their degree or diploma programmes.

When it comes to responders under Tharuvaikulam, 38 (49.35%) of them have completed elementary and middle school, followed by 23 (29.87%) who have finished high school, 11 (14.29%) who have finished higher secondary, and only 5 (6.49%) who have finished a degree or diploma programme. Out of the 41 Vembar respondents, 18 (43.90%) have completed their elementary and middle school educations, followed by 12 (29.27%) who have finished high school, 7 (17.07%) who have finished higher secondary, and 4 (9.76%) who have earned degrees or diplomas.

### MONTHLY INCOME-WISE CLASSIFICATION OF THE SAMPLE RESPONDENTS

Sl. No.	Monthly Income (in Rs.)	Thoothukudi Fishing Harbour	Tharuvaikulam	Vembar	Overall
1.	Below 15000	8(7.84)	5(6.49)	3(7.32)	16(7.27)
2.	15000 – 20000	16(15.69)	13(16.88)	6(14.63)	35(15.91)
3.	20000 – 25000	26(25.49)	19(24.68)	11(26.83)	56(25.45)
4.	25000–30000	41(40.20)	32(41.56)	17(41.46)	90(40.91)
5.	Above 30000	11(10.78)	8(10.39)	4(9.76)	23(10.46)
	Total	102(100)	77(100)	41(100)	220(100)

Source: Survey Data.

Note: Figures in brackets are a percentage of the total.

In the case of Thoothukudi Fishing Harbour, as shown in the table below, out of 102 respondents, 8 (7.84%) have monthly incomes below Rs. 15000, 16 (15.69%) have monthly incomes between

Rs. 15000 and Rs. 20000, 26 (25.49%) have monthly incomes between Rs. 20000 and Rs. 25000, 41 (40.20%) have monthly incomes between Rs. 25000 and Rs. 30000, and 11 (10.78%) have a monthly income.

Out of 77 respondents in Tharuvaikulam, 5 (6.49%) have monthly incomes below Rs. 15000, 13 (16.88%) have monthly incomes between Rs. 15000 and Rs. 20000, 19 (24.68%) have monthly incomes between Rs. 20000 and Rs. 25000, 32 (41.56%) have monthly incomes between Rs. 25000 and Rs. 30000, and 8 (10.39%) have monthly incomes over Rs. 30000.

Out of 41 Vembar respondents, 3 (7.32%) have a monthly income below Rs. 15000, 6 (14.63%) have a monthly income between Rs. 15000 and Rs. 20000, 11 (26.83%) have a monthly income between Rs. 20000 and Rs. 25000, 17 (41.46%) have a monthly income between Rs. 25000 and Rs. 30000, and 4 (9.76%) have a monthly income over Rs. 30000.

#### VALUE OF CATCHES PER TRIP

Sl. No.	Value of Catches per Trip	Thoothukudi Fishing Harbour	Tharuvaikulam	Vembar	Overall
1.	Up to Rs.10,000	7(6.86)	6(7.79)	2(4.88)	15(6.82)
2.	Rs.10,001 to Rs.20,000	15(14.71)	12(15.59)	7(17.07)	34(15.45)
3.	Rs.20,001 to Rs.30,000	27(26.47)	20(25.97)	12(29.27)	59(26.82)
4.	Rs.30,001 to Rs.40,000	43(42.16)	33(42.86)	15(36.58)	91(41.36)
5.	Above Rs.40,001	10(9.80)	6(7.79)	5(12.20)	21(9.55)
	Total	102(100)	77(100)	41(100)	220(100)

Source: Survey Data.

Note: Figures in brackets are a percentage of the total.

The table shows that, of the 102 respondents from the Thoothukudi Fishing Harbour, 6.86% of the fishermen catch fish worth up to Rs 10,000 on each trip, and 14.71% of the fishermen collect fish worth between Rs 10001 and Rs 20,000. Fish worth between Rs. 20001 and Rs. 30000 are collected by 26.47 percent of the sample's fishermen, Rs. 30001 to Rs. 40000 are collected by 42.16 percent of the sample's fishermen, and Rs. 40001 or more are caught by 9.80 percent of the sample's fishermen on each trip.

Out of 77 respondents in the Tharuvaikulam case, 7.79% of the fisherman receive fish worth up to Rs. 10,000 every trip, and 15.59% of the fishermen take between Rs. 10001 and Rs. 20,000 per trip. Meanwhile, 25.97% of the sample's fishermen collect fish value between Rs. 20001 and Rs. 30,000, 42.86% of the sample's fishermen gather fish worth between Rs. 30001 and Rs. 40,000, and 7.79% capture fish for Rs. 4001 and more on each trip.

4.88 percent of the fishermen in the sample—made up of the 41 Vembar respondents—catch fish worth up to Rs 10,000 per trip, compared to 17.07 percent of the fishermen who collect fish valued between Rs 1,000 and Rs 20,000 per trip. While this is going on, 29.27 percent of the sample's fishermen collect fish worth between Rs. 20001 and Rs. 30000, 12.0 percent of the sample's fishermen gather fish worth between Rs. 30001 and Rs. 40000, and 9.80 percent of the sample's fishermen grab fish for Rs. 40001 and more on each trip. From the data in the table above, we can infer that the vast majority of the fish caught by fishermen fall into the value range of 3,001 to 40,000 rupees.

#### ABILITY TO USE MODERN TECHNOLOGY

Sl. No.	Ability to use modern technology	Thoothukudi Fishing Harbour	Tharuvaikulam	Vembar	Overall
1.	Yes	84(82.35)	62(80.52)	33(80.49)	179(81.36)
2.	No	18(17.65)	15(19.48)	8(19.51)	41(18.64)
	Total	102(100)	77(100)	41(100)	220(100)

Source: Survey Data.

Note: Figures in brackets are a percentage of the total.

From this data, we can conclude that 84 (82.35%) of the 102 respondents in the case of Thoothukudi Fishing Harbour have the technological literacy to use today's tools, whereas 18 (17.65%) do not. Most responders have the technical skills necessary to use today's tools.

Of the 77 people surveyed in Tharuvaikulam, 62 (80.52 percent) are comfortable with technology, whereas 15 (19.48 percent) are not. This suggests that most responders are comfortable with and adept at using digital tools.

Twenty-three of the 41 Vembar respondents (80.59%) are tech savvy, while only eight (19.51%) are not. This suggests that most respondents are comfortable with and proficient in using digital tools.

#### CORRELATION OF SOCIO-ECONOMIC VARIABLES AND AWARENESS ABOUT THE APPLICATION OF MODERN TECHNIQUES

SL.NO	Variable	r	sig
1	Age	-0.638	0.311
2	Education	0.351	0.286
3	Monthly Income	-0.302	0.354

The arithmetic relationship between the socio-economic variable and knowledge of the application of modern techniques used by the fishermen. The table above shows a

relationship between socio-economic factors and knowledge of the application of modern techniques. It concluded that there are no meaningful relationships between socio-economic factors and knowledge of the application of modern techniques.

### KNOWLEDGE ABOUT FISHERIES REGULATIONS

Sl. No.	Knowledge about fisheries regulations	Thoothukudi Fishing Harbour	Tharuvaikulam	Vembar	Overall
1.	Yes	72(70.59)	51(66.23)	23(56.10)	146(66.36)
2.	No	30(29.41)	26(33.77)	18(43.90)	74(33.64)
	Total	102(100)	77(100)	41(100)	220(100)

Source: Survey Data.

Note: Figures in brackets are a percentage of the total.

From these data, we may conclude that 102 people responded to the survey on their experiences at Thoothukudi Fishing Harbour, with 72 (70.59 percent) having some familiarity with fishing rules and 30 (29.41 percent) having no such familiarity.

Of the 77 people polled regarding fishing rules in Tharuvaikulam, 51 (66.23 percent) are familiar with them, and 26 (33.77 percent) do not.

The survey results among 41 Vembar residents found that 23 (56.10 percent) were familiar with fishing laws, while 18 (43.90 percent) were not.

From this table, we can assume that most respondents are familiar with applicable fisheries laws.

### ANOVA FOR AGE AND KNOWLEDGE, AND COMPLIANCE WITH FISHING RULES

Sex	Sum of squares	df	Mean square	F	Sig
Between Groups	31.597	14	12.837	24.231	0.068
Within Groups	23.621	206	0.212		
Total	55.218	220			

The above table shows the calculated value (0.068) higher than the table value (0.05). Therefore, the Null hypothesis (Ho) is accepted, and the research hypothesis is rejected (H2). Therefore we can settle that there is no significant difference between the age of the respondents and their knowledge and compliance with fishing rules.

### MEMBERSHIP IN FISHERMEN'S ORGANISATIONS

Sl. No.	Membership in fishermen's organisations	Thoothukudi Fishing Harbour	Tharuvaikulam	Vembar	Overall
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1.	Yes	71(69.61)	53(68.83)	26(63.41)	150(68.18)
2.	No	31(30.39)	24(31.17)	15(36.59)	70(31.82)
	Total	102(100)	77(100)	41(100)	220(100)

Source: Survey Data.

Note: Figures in brackets are a percentage of the total.

One hundred and two people responded to the survey about the Thoothukudi Fishing Harbour; among them, 71 (69.61%) are members of fishermen's organisations, and 31 (30.39%) are not.

Out of 77 people surveyed in Tharuvaikulam, 53 (68.83%) are members of fishermen's organisations and 24 (31.17%) are not.

Of the 41 people who answered the survey, 26 (or 63.41%) are members of fishermen's organisations, and 15 (or 36.59%) are not. We can deduce from the data that the vast majority of responders are members of fishing groups.

## CONCLUSION

Based on the research and debate presented in this paper, it is clear that the increased mechanisation of fishing vessels has far-reaching occupational consequences. This research examines the effects of mechanised fishing on several fronts, including the level of investment required, professional growth, and the efficiency with which technology is used. The investigation shows that the transition to mechanised boats and motorised vessels has led to a massive increase in the size of the fishermen's investments.

The transition to motorised boats and vessels has affected several facets of fishing operations, including total fishing distance, fishing days, employment, fish catch, operating costs, and operating profit. The capital intensity in the industry has risen as fishermen have shifted to using motorised boats and other machinery. However, fishing in Thoothukudi District still requires much manual labour. The transition to motorised vessels and machinery has affected fishing's numerous facets of professionalism. It has also hampered the technical efficacy of operating a motorised craft and mechanised boats in the Thoothukudi area.

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