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Analysis of socio-economic and marketing constraints of different fishing methods in Andhra Pradesh: Henry Garrett's ranking technique

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Abstract

This study prioritises and ranks the major constraints faced by the marine fisherman in major coastal districts of Andhra Pradesh. The total sample size of the study was 270, which was further categorised into non-motorised, motorised and mechanised fishing crafts. Personal interviews were carried out for data collection. Henry Garrett ranking technique was used to assess and rank the constraints faced by different fishing crafts. The major common constraints faced by all the fishing crafts were high labour wages, reduction of experienced labour, reduction of catch due to overfishing, insufficient subsidies, variation in price of the catch, and marketing constraints. The non-motorised and motorised fishing crafts face common issues such as lack of infrastructure and berthing facilities in the landing centres. Furthermore, the increase in fuel prices poses a significant challenge for motorized and mechanized fishing crafts. The present study offers valuable insights that help in designing appropriate interventions and support mechanisms aimed at improving the resilience and adaptive capacity of marine fishing activities in the region.

Keywords: Constraints, fishing crafts, Henry Garrett ranking

Introduction

The fisheries sector plays a crucial role in global food security, nutrition, employment generation, and international trade. According to the Food and Agriculture Organization (FAO), global fisheries and aquaculture production has grown steadily over the past few decades, making aquatic foods an important source of high-quality protein and essential nutrients for billions of people worldwide. In addition to its nutritional importance, this sector also provides livelihoods to millions of people engaged in harvesting, processing, marketing, and export activities. Global fisheries production, including both capture fisheries (wild-caught) and aquaculture (farmed), has shown a consistent upward trend since the 1990s and reached a peak in 2022 with 185.4 million tonnes (live weight equivalent) of aquatic animals (excluding crocodiles and other mammals) and 37.8 million tonnes (wet weight) of algae (FAO, 2022) ^[4]. Within this global context, India occupies an important position in fisheries production and international seafood trade. The country was among the leading fish-producing nations and ranks second in total world fish production with a share of about 8 per cent, after China which contributes around 14.3 per cent in 2022

(FAO, 2022) ^[4]. India has an advantage of vast coastline of about 8,118 km, extending across nine maritime states and two Union Territories along the Arabian Sea, Bay of Bengal, and the Indian Ocean. Andhra Pradesh is one among the nine states having coastline. It is the third longest coastline state after Gujarat and Tamilnadu and contributes a significant share in marine fish landing of 1.90 lakh tonnes in 2023-24 and 1.73 lakh tonnes in 2024-25 (CMFRI, 2024) ^[3].

In Andhra Pradesh, three fishing methods were normally followed for marine fish harvest: non-motorised (traditional), motorised and mechanised fishing. According to Marine Fisheries Census ^[8], 2016, conducted by CMFRI, the total non-motorised fishing crafts contributed 34.44 per cent, motorised fishing crafts contributed 59.73 per cent and mechanised crafts contributed 5.83 per cent. The contribution of these crafts to the total landings of Andhra Pradesh in 2024-25 was: 50 per cent of from mechanised sector, 48 per cent from motorised sector and 2 per cent from non-motorised sector (CMFRI, 2024) ^[3]. The fisherman of these fishing crafts faces several socio-economic and marketing constraints which affects their total cost and gross returns and eventually their livelihood

conditions. Constraints were identified through an extensive review of literature and field surveys. The present study aims to identify and prioritize the problems faced by fishing crafts operating in the marine waters of Andhra Pradesh. The Henry Garrett ranking technique was used to systematically evaluate these constraints. This method is widely applied to identify and assess the challenges experienced by fishermen. The results obtained from the Henry Garrett technique help in gaining a clear understanding of the various difficulties faced by different types of fishing vessels. A similar constraint analysis concerning marine fishermen was also carried out by Boda *et al.*, (2024) ^[2] in West Bengal., R. Senthiladeban, *et al.*, (2015) ^[13] in Tamil Nadu., Patilkhede *et al.*, (2018) ^[10] at in Maharashtra., Immanuel, S and Rao, S. (2012) ^[6] in Andhra Pradesh., Noman *et al.*, (2022) ^[9] in Pakistan., Alam and Yousuf (2024) ^[1] in Bangladesh., Vishwakarma *et al.*, (2017) ^[14] in Chhattisgarh.

Materials and Methods

Sampling design

A multistage sampling technique was employed to select the study area and sample respondents. Andhra Pradesh was purposively selected for the study, as it ranks 3rd position in

the coastline in the India. Three districts from the state of Andhra Pradesh were purposively selected for the study. Srikakulam district which has second longest coastal length, Nellore district which has third longest coastal length (NCCR, 2024) and Visakhapatnam district which hosts the major fishing harbour of Andhra Pradesh were selected for the detailed analysis. From Srikakulam and Nellore districts, one mandal with the long coastline was identified and purposively selected. Subsequently, from each selected mandal, two villages were chosen based on their coastal length. In Visakhapatnam district, two mandals were selected—one with the longest coastline and another having a fishing harbour. From each mandal, two villages were selected, making a total of six villages for the study. From each selected village, 45 fishermen were randomly selected irrespective of the type of craft used, resulting in a total sample of 270 fishermen. The selected fishermen were then post-classified into three categories based on their fishing methods. Accordingly, the final sample comprised 100 non-motorised fishermen, 140 motorised fishermen, and 30 mechanised fishermen. Data regarding the obstacles faced by the fishermen was collected through personal interview method. The selected list of mandals and villages were presented in Table 1.

Table 1: Selected list of mandals, villages and number of respondents

S. No	District	Mandal	Fishing village	Total
1.	Srikakulam	Santabommali	Pata Meghavaram	45
			Bavanapadu	45
2.	Vishakapatnam	Bheemili	Bheemunipatanam	45
		Vizag (urban)	Vishakapatnam fishing Harbour	45
3.	SPSR Nellore	Muthukur	Nelatturu	45
			Krishnapatnam	45
Total	3	3	6	270

Statistical Analysis

Henry Garrett's ranking: Disruptions faced by the fishermen were ranked using Henry Garrett's ranking technique. Some major prevailing disruptions were highlighted during preliminary survey and from the past literature were collected and were ranked by the fisherman. The fishermen were asked to identify and prioritize the various constraints affecting marine capture fishing according to the order of severity. For example, if ten constraints were identified, fishermen were advised to rank limitations from 1 to 10 in ascending order based on severity. The percentage position of ranks was calculated using the formula:

$$\text{Per cent position} = \frac{100 \times (R_{ij} - 0.5)}{N_j}$$

where,

R_{ij} = Rank given for i^{th} item by j^{th} stakeholder

N_j = Number of items ranked by j^{th} stakeholder

0.5 subtracted from R_{ij} as rank is an interval on a scale and its midpoint best represents an interval.

In the case of non-motorized and motorised fishing crafts, 12 major constraints were identified so, the first factor's percentage position is calculated as $(100 \times (1-0.5)/12) = 4.16\%$. In case of mechanised fishing crafts 11 major constraints were identified, so, the first factor's percentage

position is calculated as $(100 \times (1-0.5)/11) = 4.54\%$. Similarly, the per cent position of all the factors were calculated and were presented in Table 2. The per cent position of each rank was converted into scores according to the table given by Garrett and Woodworth (1969) ^[5]. The corresponding Garrett Values were tabulated in Table 2.

Table 2: Percentage position and its corresponding Garrett Value for each factor.

Factor	Non-motorised		Motorised		Mechanised	
	%	Garret Value	%	Garret Value	%	Garret Value
1	4.16	83	4.16	83	4.54	82
2	12.50	73	12.50	73	13.63	72
3	20.83	66	20.83	66	22.72	64
4	29.17	60	29.17	60	31.82	59
5	37.50	56	37.50	56	40.90	55
6	45.83	52	45.83	52	50.00	50
7	54.17	48	54.17	48	59.09	45
8	62.50	44	62.50	44	68.18	40
9	70.83	40	70.83	40	77.27	35
10	79.17	34	79.17	34	86.36	28
11	87.50	27	87.50	27	95.45	17
12	95.83	17	95.83	17		

Fishermen were allowed to rank their constraints and the constraint for which the score value was highest was considered the most important problem faced by the fisherman.

Results and Discussion

The findings of the constraint analysis conducted using Henry Garrett ranking technique were presented in the following sub-sections. The major constraints faced by

fisherman of different crafts in Andhra Pradesh were identified, prioritised and ranked by fisherman and analysed and presented in table 3

Table 3: Socio-Economic and Marketing Constraints encountered by fishermen operating different types of fishing crafts.

Constraints faced by fisherman	Non-motorised		Motorised		Mechanised	
	Score	Rank	Score	Rank	Score	Rank
Social Constraints						
Unavailability of experienced labour	66.22	III	67.24	III	60.87	III
Lack of infrastructure facilities in landing centres	34.99	X	34.84	X		
Lack of proper berthing facilities	30.70	XI	32.04	XI		
Economic Constraints						
Increased labour wages	72.41	I	70.02	I	64.40	II
Reduced fish catch / Depleting of fish stock	68.52	II	68.26	II	71.20	I
Increased cost of fishing equipment	21.02	XII	24.37	XII	48.67	V
Increased fuel prices			59.29	IV	48.17	VI
High initial investment and interest rates					55.67	IV
Lack of institutional finance	39.35	IX				
Insufficient subsidies and incentives	53.07	VI	47.64	VII	41.83	IX
Marketing Constraints						
Lack of proper marketing channels for catch	60.55	IV	52.84	VI	44.83	VIII
Exploitation by middlemen	59.15	V	58.16	V	45.33	VII
No fair prices for the catch	48.61	VII	46.44	VIII	36.33	X
High variation in prices	45.20	VIII	38.52	IX	33.70	XI

Social Constraints faced by Fisherman

The analysis of social constraints indicates that the unavailability of experienced labour is a major issue across all categories of fishing crafts, consistently ranking third among non-motorised (66.22), motorised (67.24), and mechanised (60.87) units. This highlights the growing shortage of skilled manpower in marine fishing operations. This constraint raised due to migration of experienced fishermen to other states, particularly to major fishing harbours such as Veraval Harbour in Gujarat, where they are employed as khalasis and tindals in mechanized vessels (Roshan M, 2016). This migration has resulted in a shortage of skilled labour in the coastal fishing villages of Andhra Pradesh, thereby increasing labour costs for local fishing operations. Infrastructure-related issues such as lack of infrastructure facilities in landing centres and lack of proper berthing facilities were reported primarily by non-motorised and motorised fishermen, though they received relatively lower ranks (X and XI). This suggests that while these constraints exist, they are perceived as less severe compared to labour-related challenges. The non-motorised and motorised fishing crafts mostly operated from rural fishing villages and landing centres, where they lack proper jetty and berthing facilities, making it difficult to the fisherman to carry the craft to the shore manually to load and unload before and after fishing.

Economic Constraints faced by Fisherman

Economic constraints emerged as the most critical category affecting fishermen across all craft types. Among non-motorised and motorised crafts, increased labour wages ranked first (72.41 and 70.02, respectively), indicating rising operational costs as a major concern, while for mechanised crafts it was ranked second (64.40). However, for mechanised units, the most severe constraint was reduced fish catch/depleting fish stock, which ranked first (71.20), reflecting resource depletion and its impact on large-scale

operations. The issue of declining fish catch was also ranked second by both non-motorised (68.52) and motorised (68.26) fishermen, making it a universally significant constraint across all categories. Boda *et al.*, (2024) ^[2] identified reduced fish catch as 1st major constraint in non-motorised and 2nd major constraint in motorised and mechanised fisherman in West Bengal. Cost-related factors such as increased fuel prices (rank IV for motorised and VI for mechanised) and high initial investment and interest rates (rank IV for mechanised crafts) were particularly important for capital-intensive operations. Radhakrishnan *et al.* (2018) ^[11] identified increased fuel price was one of the major constraint for motorised and mechanised crafts, Raju, S.S. *et al.* (2022) ^[12] suggested that cheaper fuel rates were necessary to increase productivity in mechanized crafts. Similarly, the increased cost of fishing equipment was more prominent for mechanised units (rank V) compared to non-motorised and motorised crafts (rank XII), reflecting the increased reliance of mechanised crafts on capital-intensive equipment. Lack of institutional finance (rank IX for non-motorised crafts) indicates limited access to formal credit facilities among fishermen. Unlike non-motorised fishermen, motorised and mechanised fishermen generally do not face severe difficulties in accessing institutional credit, as their boats can be pledged as collateral security to obtain loans from financial institutions to some extent. Similarly, insufficient subsidies and incentives (ranks VI, VII, and IX across the three craft types respectively) further highlight the inadequate financial support available, particularly for small-scale operators. Insufficient subsidies emerged as a major policy-related constraint faced by fishermen. They rely heavily on marine resources and are exposed to various risks and uncertainties. Inadequate government support increases their vulnerability to adverse weather conditions, declining fish stocks, and health hazards (Kalikoski *et al.*, 2010) ^[7].

Marketing Constraints faced by Fisherman

Marketing-related issues also play a significant role in affecting fishermen's income and price realization. The lack of proper marketing channels was a major concern, ranking IV for non-motorised and VI for motorised crafts, while it was relatively less severe for mechanised units (rank VIII). The exploitation by middlemen was consistently reported across all craft categories, with ranks V (non-motorised and motorised) and VII (mechanised), highlighting the dependence of fishermen on intermediaries for selling their catch. Price-related challenges such as absence of fair prices (ranks VII, VIII, and X) and high variation in prices (ranks VIII, IX, and XI) further reflect market inefficiencies and instability. Unlike agricultural commodities, it was difficult to implement standard administrative price mechanisms such as the Minimum Support Price for fish due to the highly perishable nature of fish and fishery products. These issues were more pronounced among small-scale fishermen, who have limited bargaining power in the market. Patilkhede, B. *et al.* (2018)^[10] observed that the absence of pricing and market data has diminished the bargaining power of fishermen, leading them to rely on intermediaries for price setting and impacting their income.

Conclusion

Overall, the results indicate that while economic constraints dominate across all categories, social and marketing challenges also significantly influence the livelihood and operational efficiency of fishermen, with variations observed across different types of fishing crafts. The major constraints identified by non-motorised fishing crafts were increased labour wages, reduced fish catch, reduction in experienced labour, lack of proper marketing channels, exploitation by middle man, no fair price, high variation in prices, lack of proper incentives to fisherman, lack of institutional support, infrastructure and berthing facilities and increased cost of fishing equipment. The motorised and mechanised fisherman too faces similar constraints, but they additionally face the high fuel price constraints. The motorised and mechanised fishermen have some relaxation in terms of institutional support as they can have their craft as their collateral security. In addition, the mechanised fisherman do not face infrastructure constraints as Vishakapatnam fishing harbour have adequate berthing and infrastructure facilities, but face a constraint of high initial investment and interest rates.

From the analysis, it was revealed that labour shortage due to migration of skilled fishermen was a major constraint across all fishing crafts. Economic issues such as increased labour wages and depleting fish stock were the most severe challenges, while rising fuel costs and high investment requirements particularly effect the motorised and mechanised crafts. Marketing constraints, including middlemen exploitation and price fluctuations, further reduce the fishermen's income. Although infrastructure constraints exist, they were relatively less severe. Limited access to institutional finance remains a concern for small-scale fishermen. To address these issues, there is a need for skill development and labour retention strategies, promotion of sustainable fishing practices, provision of subsidies and affordable credit, and improvement in marketing systems.

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