IMPLEMENTATION OF MODERN TECHNOLOGY IN FISHING SECTOR -PERCEPTION AND CONCERN OF FISHER FOLK IN KERALA

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Abstract

The two main fundamental aspects to economic development and growth are technology and technological advancement. The technical change in both form and function are a result of invention and innovation. Technology change in practise is brought about by technology diffusion. The fishing industry plays a significant role in the growth of a country. The efficiency of fishing and related operations was improved by the modernization and advancement of existing fishing technologies. However, it has also had some detrimental effects on individuals who are unable or unwilling to keep up with advancements in fishing technology. Since it is related to fishing sustainability, the debate between fishing that is motorised and non-motorized has gained a lot of traction among academics. Mechanised fishing clearly had a positive economic impact on fishermen who adopted technology, but it had a negative impact on fishermen who did not. In this backdrop, the present study investigates the perception and concern of fisher folk regarding the implementation of modern technology in Kerala.

Keywords:- Technology, Modernisation, Fishing Sector, Marine Fisheries, Fisher Folk

Even though Kerala only makes up 10 per cent of India's coastline, it has long held a renowned place in the production of fish and continues to crown the glory with its history of sea farming, marine fishing, and maritime trade. In the past, fish was seen as a diet for the poor, but today, the people of all religious backgrounds in Kerala are passionate fish eaters. Fish and fisheries therefore play a very important role in Kerala's socio-cultural fabric. Kerala is blessed with the natural resources needed to develop a strong and thriving fisheries industry in line with the overall national policy.

Kerala, a state named "God's own country," has a 590-km-long coastline, 44

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rivers, and many other bodies of water that support a diverse aquatic ecosystem and an abundance of fish. Over 10 lakh fisherfolk are supported by the state's fisheries industry, which also helps with tourism, education, aquaculture, commercial fishing, and recreational activities. The fishing industry in Kerala is one of the most dynamic primary industries, providing employment for a significant proportion of the working population who reside along the shore. In order to benefit the economy and society, the coast and the coastal community coexist. The shore and its social and economic structure are made up of the coastal villages. The main economic activity along the shore has long been fishing, as it has been until the non-fishing economy arrived.(Source: Department of Fisheries).

The socioeconomic development of the nation has been significantly influenced by the fishing industry. Kerala's marine fisheries industry is crucial to this development among the maritime states of India. The constant adoption and effective use of technology in fishing techniques, equipment, and crafts has enhanced catch per unit of fish in Kerala.

The equipment that fisherman utilise is referred to as fishing gear. This covers a variety of fishing gear, such as bag nets, scoop nets, traps, plunge baskets, seines, drift grill nets, Chinese dip nets, and more. The fishing equipment may be traditional or sophisticated. Approximately 70 per cent of people own modern fishing equipment, including motorised boats, mechanised crafts, and other items. Of those, 45 per cent favour mechanised fishing methods, and the other 25 per cent employ motorised fishing methods. It should be mentioned that even in this day of rapid technological advancement, 30 per cent of fishermen still use or prefer traditional fishing practises that have been around for many years. In truth, a sizable percentage of the populace lacks knowledge of modern fishing equipment and techniques; hence, they may not be solely to blame. (Source: Department of Fisheries)

Modern Technologies in Fishing Sector

- **Fishing Vessels**

In fishing vessels, significant advancements have been made in the craft materials, hull optimisation, engine performance, propulsion systems, gear and catch handling deck equipment, onboard pre-processing, processing, preservation and packaging systems, and energy saving.

- **Fishing Gear**

Fish are caught using five mechanisms, including gilling and tangling (using gill nets and trammel nets), trapping (pound nets, trawls and other net fishing systems), hooking and spearing (using hook and line, harpoons and fish pumps) and filtering (using trawls, seines and other net fishing systems). The principles of catch, design, technological features, and operating procedures are used to classify fishing gear.

- **Fishing Gear Materials**

The synthetic fibres polyamide (PA), polyester (PES), polyethylene (PE), and polypropylene (PP) are used in fisheries

the most. Other synthetic fibres include polyvinyl alcohol (PVAA), polyvinyl chloride (PVC), and polyvinylidene chloride (PVD), which are less popular and typically only used in Japanese fisheries. Newer materials have recently been developed with improved high tensile strength, such as ultra high molecular weight polyethylene (UHMWPE) "dyneema," which is 15 times stronger than steel.

- **Techniques for Satellite-based Remote Sensing and Acoustic Fish Detection**

The historical evolution of fishing nets and how they functioned have been significantly influenced by developments in acoustic fish detection satellite-based remote sensing techniques, as well as the general awareness of the need for responsible fishing to ensure long-term sustainability of the resources, protection of the biodiversity, environmental safety, and energy efficiency.

- **Responsible Fishing**

Overfishing and its detrimental effects on ecosystems have been increasingly evident in recent years, underscoring the need for scientific management of the world's fishery resources to maintain their long-term viability and availability for future generations. Responsible fishing would maintain biodiversity, reduce negative environmental effects, and assure the long-term sustainability of the resources.

The fisheries industry can also use new ICTs like GPS, Wireless phone, Mobile phone, Eco sounder, Radar, and Beacon, among others, for resource evaluation, capture or cultivation to processing and commercialization.

Review of Literature

Narayanakumar (2012) studied the impact of mechanisation on the fishery sector. The study found that the fishing industry is facing management and financial issues as a result of resource exploitation with destructive fishing gear and methods, particularly in the 50–60 m depth zone. With the advent of mechanisation, overexploitation has become necessary for the fishing community to cover the rising cost of catching.

Ravanan and Muthalagu (2011) studied the perception of exporters towards problems of export of seafood in Tamilnadu found that India is one among the largest producer of fish in the world. The investment requirement towards expanding domestic as well as export market arena for sea food is the major cause for concern. After the implementation of Globalization and liberalization in India which has been attracting more foreign investments in the fishing processing sector.

Pillai, et.al. (2007) studied the effect of the proliferation of the number of mechanized vessels in Kerala Coast. They concluded that there is fierce competition for resources among the different sectors because Kerala's fishing industry now operates on a free and open access basis. They could investigate how the productivity of marine fisheries stagnated as a result of the emergence of some harmful fishing methods after the 1990s.

Rajasenan (2001) attempted to analyse the effects of new technology on

the occupational pattern and living conditions of the traditional fishermen. According to the study, the introduction of new technology into the fishing sector led to a modernisation process that altered the occupational structure by turning immediate producers into final wage earners.

Sathiadhas and Venkateswaran (2000) conducted a study on traditional fishery sector of Kerala. Since mechanised fishing had an impact on Tamil Nadu's traditional fishing industry, its economic effects were significant. The study came to the conclusion that while the introduction of mechanised watercraft increased fish productivity, it had a negative impact on traditional fishermen's livelihood.

Need and Significance of the Study

The management of the state's maritime resources may become more challenging as a result of the developing economy, diversified culture, and growing population.The fishing methods used in Kerala are intended to promote ethical and sustainable fishing, preserve marine resources, and guarantee the livelihood of fishing communities.To avoid overfishing and safeguard fish stocks, Kerala encourages various fishing techniques, such as regulated fishing seasons, size restrictions, and gear limitations. The development of numerous modern technologies helps in the preservation of vital maritime habitats, the protection of fragile species, and the maintenance of ecosystem health. Kerala also places a strong emphasis on research and development projects in the fishing industry to increase productivity, refine fishery management methods, and investigate sustainable practises. The study has significance for determining how modernization and technological change affect fishermen and fishing industry in Kerala.

Statement of the Problem

The modern era has seen significant advancements in numerous industries, including fisheries. This resulted in a significant acceleration of the usage of fisheries resources, together with fundamental advancements in catching technology and significant growth in marketing and commercial organisation. Overall, a wide variety of complex equipment was developed, including with better techniques for hauling gear and propulsion for boats, as well as highly developed navigation and fish location systems. The present study is an attempt to examine the perception of fisherfolk on modern technology and what are the challenges it poses on the fishing industry of Kerala.

Objectives of the Study

1. To identify the perception level of fishermen on the modern technologies introduced in the fishing sector.
2. To examine the challenges of introducing the modern technologies in the fishing sector in Kerala.

Research Methodology

Both primary and secondary sources were used in the course of the research. Primary data were acquired by conducting a scheduled survey and adhering to a

predefined interview schedule. Books, reports, theses, websites, and publications from the Department of Fisheries and its agencies were among the secondary sources of information. The study's respondents are the registered fisherfolk in Kerala. The sample for this study consisted of 300 registered fishermen from the districts of Thiruvananthapuram, Ernakulam, and Kannur. Using simple random sampling method, one fishing village was chosen from each district. Therefore, under Simple Random Sampling Method, Vizhinjam was selected from Thiruvananthapuram district, Azheekkal from Ernakulam and Pallissery from Kannur district. Using the Cluster sampling method, the required number of fishermen from each fishing village was chosen since the cluster consists of the registered marine fishermen of Primary Fishery Co-operative Society in each fishing village.

Statistical Techniques Used

Different statistical tools such as percentage analysis, one way Anova and Garret Ranking Techniques were used for the analysis of data.

Results and Discussion

The analysis is based on the primary data, which were acquired through in-person interviews with respondents in the study area. The results of this analysis are detailed below.

Table 1 shows the income from fisheries sector of Kerala. Kerala's economy benefits significantly from the fishing industry, which accounts for a sizeable portion of the state's gross domestic product. The GVA contribution from the fishing industry has been rising over time. The increasing percentage contribution of the fisheries sector to the primary sector indicates that fishery sector is growing faster than other primary sector industries.

Table 2 shows the district wise registered marine fisher folk in Kerala. They are individuals who are officially recognised as fishermen by the Kerala Fisheries Department, which gives them access to a number of government benefits and schemes intended for the fishing industry, such as insurance, pensions, and financial assistance during lean seasons. They can be inland or marine

Table 1

Income from Fisheries Sector

Items	2014-15	2015-16	2016-17	2017-18	2018-19
GVA from Fisheries sector (Rs in Lakhs)	704319	834359	973424	1119044	1147323
Percentage contribution of Fisheries sector to Primary sector	10.45	12.63	13.48	14.30	14.75
Percentage contribution of Fisheries sector to Total GVA of State	1.49	1.64	1.71	1.77	1.64
Per capita income of Fishermen (GDP at Current Prices) (In Rs)	74942	89939	105322	119826	123133

Source: Department of Fisheries, Govt. of Kerala

fishermen, and in order to receive these benefits, they usually need to register with the Kerala Fishermen's Welfare Fund Board (KFWFB).

Table 3 shows the region wise sample of registered marine fisherfolk in Kerala.

Table 4 shows attitude of fishermen towards modern technology in fishing. Majority of fisherman who have been fishing for more than ten years, are hesitant to adopt new technology. Interestingly, though, the majority of respondents (68 per cent) use modern technologies. In the study area, just 20 per cent of respondents do not use modern technologies. The fact that 12 per cent of fishermen are ignorant of modern technologies is also noteworthy. Therefore, it may be concluded that fishermen are not entirely opposed to modern technologies. They are willing to embrace changes in the field of technology.

Table 2

District wise Registered Marine Fisher folk in Kerala

District	Coastal length	Total
Thiruvananthapuram	78	53916
Kollam	37	19528
Alappuzha	82	26523
Eranakulam	46	12703
Thrissur	54	5464
Malappuram	70	35186
Kozhikkode	71	22145
Kannur	82	5166
Kasaragodu	70	10245
Total	**590**	**190876**

Source: Department of Fisheries, Government of Kerala

Table 3

Region wise Sample of Registered Marine Fisher Folk in Kerala

District	Fishing village	Total sample selected
Thiruvananthapuram	Vizhinjam	110
Ernakulam	Azheekkal	120
Kannur	Pallissery	70
Total		**300**

Source: Primary Data

Table 4

Modern Technology in Fishing

Sl. No.	Modern technology in fishing	Total sample selected	Percentage
1	Adopt modern technology	204	68
2	Do not adopt modern technology	61	20
3	No idea about modern technology	35	12
Total		**300**	**100**

Source: Primary Data

From Table 5 we can understand that, the perception level of fisher folk from southern, central and northern region of Kerala towards the implementation of modern technology in the fisheries sector not remains the same since some of the *P values* seem significant. This means that fisher folk from different regions have different opinions or attitudes towards the implementation of modern technology in the fisheries sector.

Garrett's ranking technique was employed to find out the challenges of the implementation of modern technology in fishing sector were explained in terms of ranks and total mean (score) presented in Table 5. For each challenge, scores of individual respondents were added together and then divided by total number of respondents for whom scores was added. Thus, mean score for each challenge was ranked by arranging them in the descending order.It shows how the percentage position of each rank was converted into scores using Garret's table. This is significantly because of the ranking method that puts up the highest mean value indicating it as an important factor in studying the challenges. The problems were outlined during the interviews with fisherfolk. The ranking on preferential order indicates the primary concerns of the fisherfolk.The constraint with the highest mean value was considered as the most important one and the others followed in that order. The results inferred that, lack of infrastructural facilities, insufficient training and skill-building facilities, overfishing etc are the major challenges faced by the fishing sector on the implementation of modern technology.

Findings of the Study

1. The fishery sector contributes significantly to Kerala's economy, with a substantial share in the state's GVA.
2. The fishery sector's contribution to Kerala's total GVA is substantial, with estimates suggesting around 2-3 per cent of the state's total GVA.
3. The increasing percentage contribution of the fisheries sector to the primary sector indicates that fishery sector is growing faster than other primary sector industries.

Table 5

Perception Level of Fisher Folk on the Implementation of Modern Technology

Items	Mean	SD	F	*P value*
The efficiency of fishing and related activities was improved by modernization, continuous improvement, and upgradation of existing fishing technologies.	2.8	1.331	1.702	0.184
When any form of modern technology is introduced into the fisheries sector, the results are significantly different.	2.96	1.251	5.039	0.001*
The only option to take advantage of the underutilised coastal resource is through the application of innovative technology.	3.21	1.306	0.476	0.621
New technologies raise the contour of fisheries in poverty reduction strategies especially in remote fishing communities	3.22	0.958	1.866	0.156
Technology can be a catalyst for the development of fisheries practises and regulations, even though it cannot alone resolve the global fishing problems.	3.12	1.216	1.285	0.278
The traditional fishing vessels can be motorised to improve productivity and shorten fishing operations.	3.59	0.96	4.497	0.012*
If the implemented modern technologies fail to produce the desired results, the upgrading of the fishing industry is meaningless.	3.41	0.818	2.242	0.108
The fishing technology sector has notably benefited from recent developments in electronic navigation, satellite-based remote sensing, and acoustic fish detection.	3.38	1.143	4.217	0.002*
In fact, a significant section of the population is ignorant of modern equipments and technology that are employed in fishing.	3.41	1.133	2.333	0.098
The government has made very proactive steps to modernise the fishing industry by incorporating the most modern technologies.	3.34	1.132	5.930	0.003*
With the help of technology, small-scale fishers may generate information about markets as well as fisheries, enabling them to make better business decisions and show their dedication to ocean conservation.	3.36	0.953	1.284	0.278

Source: Primary data

** Significant*

Table 6

Challenges of the Implementation of Modern Technology in Fishing Sector– Garrett Ranking Analysis

Sl. No.	Challenges	Mean Score	Rank
1	The use of modern fishing technology may result in economic inequality within fishing communities.	51.2	5
2	The setting up of modern technology is capital-intensive.	49.3	6
3	Modern fishing technologies cause environmental problems	41.7	8
4	Sectoral Conflicts among fishermen	47.9	7
5	Lack of infrastructural facilities	61.2	1
6	Lack of Financial support from government	54.3	4
7	Insufficient training and skill-building facilities	60.7	2
8	Modern fishing technologies, have contributed to overfishing in many regions.	57.5	3

Source: Primary data

4. Majority of respondents (68 per cent) use modern technologies and therefore, it may be concluded those fishermen are not entirely opposed to modern technologies.
5. Perception level of fisher folk from southern, central and northern region of Kerala towards the implementation of modern technology in the fisheries sector is not uniform since some of the *P values* seems significant.This means that fisherfolk from different regions have different opinions or attitudes towards the implementation of modern technology in the fisheries sector.
6. Lack of infrastructural facilities, insufficient training and skill-building facilities, overfishing etc is the major challenges faced by the fishing sector on the implementation of modern technology.

Suggestions

1. Organize workshops, seminars, and training programs to educate fisher folk about the benefits and advantages of modern technology in fishing.
2. Offer financial assistance and incentives to fisher folk to adopt modern technology, such as GPS, echosounders, and fishing gear.
3. Upgrade fishing harbours, landing centres, and market facilities to support the adoption of modern technology.
4. Promote sustainable fishing practices and encourage fisher folk to adopt eco-friendly fishing gear and technology.
5. Collaborate with stakeholders, including government agencies, researchers, and fishing communities, to develop and implement effective solutions.

Conclusion

The country's socioeconomic development places a significant emphasis on the fishing industry. The effectiveness of boats and equipment was improved by the ongoing modernization and upgrading of existing fishing technology. But it has pushed out the fishermen who are unable to adapt to the changes.

Development cannot happen without technology. It is a known fact that the use of any type of cutting-edge technology in any area of economic activity causes irreconcilable variations in the returns from those areas. The only option to take advantage of the underutilised coastal resource is through the application of innovative technology.Many new technologies can be adapted through the adoption process and introduced in all but the most distant areas. Once embraced by users, these technologies can have a positive impact on their production and lives.

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