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Creating entrepreneurship opportunities through mobile fish retail outlets in Telangana, India

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Abstract

In recent decades, *per capita* consumption of aquatic foods has been significantly impacted by increased supplies, changing consumer preferences and technological advancements globally. To support the livelihood of the coastal communities, the Government of India has implemented schemes such as Mobile Fish Retail Outlet (MFRO) under the Blue Revolution (BR) and Pradhan Mantri Matsya Sampada Yojana (PMMSSY). MFRO is a mobile kiosk designed to deliver hygienic fresh fish and Ready to Eat (RTE) products to consumers, aimed at increasing fish consumption and providing employment to fishers. Telangana State where the highest number MFROs (150) have been sanctioned under BR scheme was chosen for a study to assess the profile of beneficiaries, operational details and constraints faced by them. Primary data were collected from 30 MFRO beneficiaries using an interview schedule. The profile of the beneficiaries revealed that 73% belong to backward caste and 87% have land holding between 0.01 to 0.02 acres. About 61% of the MFROs are run by both men and women. Results indicated a statistically significant increase in beneficiary's income and quantity of fish sold after adoption of the MFROs. The study highlighted that MFROs have created entrepreneurship opportunities for both men and women. However, constraints like parking issues, poor battery backup and excess fuel consumption by vehicles were reported.



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Fish and fish products play a crucial role in nutritional security with their consumption witnessing a significant surge in recent decades. On an average, global *per capita* consumption of these foods increased by 1.4% annually, from 9.1 kg (live weight equivalent) in 1961 to 20.6 kg in 2021. This steady rise in consumption can be attributed to several factors such as increased supply, advancements in preservation and distribution technology, evolving consumer preferences, and rising incomes (FAO, 2024a). The fisheries sector holds a significant place in India's development programs due to its vital contributions to employment, food security and foreign exchange earnings. In 2020, the Indian fish market reached a value of ₹1,232 billion (USD 15.9 billion), driven by growing health awareness among consumers, rising disposable incomes and changing dietary preferences (FAO, 2024b; Padiyar *et al.*, 2024). Most of the fish catch is sold fresh

or chilled, primarily targeting the export market, though value-added products are gradually gaining traction (FAO, 2024b).

Padiyar *et al.* (2024) observed a significant shift in dietary habits across India. A recent study by WorldFish and the Indian Council of Agricultural Research on fish consumption patterns revealed that annual *per capita* fish consumption in India during the period 2005 to 2021, increased from 4.9 to 8.89 kg, an increase of 3.99 kg (81.43%) with a growth rate of 4.05%. Among fish eating population, the annual *per capita* consumption rose from 7.43 to 12.33 kg, marking a 66% increase of 4.9 kg. Despite its significant contributions to global fisheries and aquaculture, India's *per capita* consumption remained significantly lower at 8.89 kg, compared to world's average *per capita* fish consumption of 20.6 kg in 2021. This suggests a substantial opportunity to popularise fish consumption by making a diverse range of fish varieties more

available and accessible, thereby encouraging people from various socio-economic backgrounds to include fish in their diets (Padiyar *et al.*, 2024).

Recognising the importance of fish as a healthy and nutritious food, Governments around the world including India are providing support to those involved in the sector to improve livelihoods and create awareness among consumers about the benefits of increased fish consumption. In India, initiatives such as the Blue Revolution Scheme (BR 2016) and the Pradhan Mantri Matsya Sampada Yojana (PMMSY 2020) have been introduced to achieve these goals. A key initiative under both schemes is to provide alternative livelihoods and entrepreneurial opportunities for fishers and other stakeholders (DoF, 2022). The establishment of Mobile Fish Retail Outlets (MFRO) is one such initiative under both BR and PMMSY schemes, providing fishers and other stakeholders with subsidised units. The total unit cost of an MFRO is ₹10 lakhs. For SC, ST and women categories, a subsidy of 60% (₹6 lakh) is provided, while the general category receives a 40% (₹4 lakh) subsidy. The remaining cost is covered by beneficiary contributions of 40% (₹4 lakh) and 60% (₹6 lakh), respectively (NFDB, 2020).

MFRO is a kiosk on wheels which is a small commercial vehicle equipped with kitchen platform with burners and sink, deep freezer, insulated ice box and thermocol box, weighing balance, display unit, water tank, fire extinguisher, backup battery, power connections, dry and wet waste bins. The outlets are designed with the objectives to supply fish in hygienic and fresh condition at the consumers' doorstep, to promote fish-eating habits, to increase the *per capita* consumption of fish and to meet the diverse needs of consumers varying from raw fish to ready-to-eat (RTE) products as well as to provide employment to the beneficiaries by providing assured income.

Sarkar *et al.* (2013) developed a mobile fish vending unit designed for the transportation, storage and delivery of live, raw, semi-processed and processed fish to customers. The ICAR-Central Institute of Freshwater Aquaculture (ICAR-CIFA), Bhubaneswar, has developed a mobile fish vending trolley to assist fisherfolk in selling their harvests under hygienic conditions (Mohapatra *et al.*, 2017). Similarly, ICAR-Central Institute of Fisheries Technology (ICAR-CIFT), Kochi has developed a low-cost, energy-efficient, refrigerated mobile fish vending kiosk designed to sell fish directly to consumers' doorsteps under hygienic conditions. These kiosks, equipped with proper waste disposal systems, cater to village, urban and municipal areas, addressing consumers' hygiene concerns (The Times of India, 2020).

In response to the increasing demand for mobile eateries, the Telangana Fisheries Department has introduced an innovative initiative to create employment opportunities for fisherfolk, particularly women (Paithari, 2021). Suvana (2019) emphasised the importance of enhancing the capabilities of women *matsya mitra* groups and their members, as well as incorporating gender considerations into departmental activities. In line with this, 150 MFROs were provided to self-employed women's groups from marginalised communities (TSFD, 2023). Similarly, to benefit fisher women's self-help groups (SHGs), 20 mobile fish vending kiosks have been fabricated under a scheme by the Kerala State Fisheries Department, in collaboration with the Society for Assistance to Fisherwomen (SAF) (The Times of India, 2020).

Under the BR scheme, fishers from 11 states, including Telangana, Andhra Pradesh, Punjab, Maharashtra, Chhattisgarh, Goa, Karnataka, Madhya Pradesh, Odisha and Uttarakhand, have benefitted from MFROs. A total of 225 units have been sanctioned, with 221 implemented. Telangana has the highest number of sanctioned MFROs, with 190 units under both the BR and PMMSY schemes (NFDB, 2020; 2022). Sarkar *et al.* (2013) noted that information regarding mobile fish vending units is scarce. Lucan *et al.* (2013) also observed a similar trend with mobile food vendors. To address this gap, a study was conducted focusing on Mobile Fish Retail Outlets (MFROs) in Telangana. The study aimed to assess the profile of beneficiaries, operational details and constraints faced by the beneficiaries of MFRO.

MFRO is one of the successful components of blue revolution scheme and is an emerging entrepreneurial opportunity for fishers' and stakeholders of the sector. Under the BR scheme, a total of 150 MFROs was sanctioned in which, 126 MFROs are fully functioning in Hyderabad District, Telangana (NFDB, 2022). Out of which, 30 MFROs (24%) were randomly selected. Primary data was collected from 30 beneficiaries (one beneficiary from each MFRO) using a pre-tested interview schedule. Percentage analysis, graphical analysis and descriptive statistics were performed to analyse the data. Parametric paired t-test and Pearson correlation are performed to test the significant difference between income earned and quantity of fish sold before and after adoption of MFRO.

Parametric paired t-test provides an assessment of the hypothesis of the difference between population means for a set of random samples whose variations are almost normally distributed (Hsu and Lachenbruch, 2014). In testing, before-and-after scenarios are often used. The formula for the paired t-test is as follows:

$$t = \frac{\sum d}{\frac{\sqrt{n} (\sum d^2) - (\sum d)^2}{n-1}}$$

where, $\sum d$ = Sum of the differences; n = Number of samples

Additionally, the Pearson correlation was used to determine the relationship between the quantity of fish sold and income before and after the adoption of MFRO (Obilor and Amadi, 2018).

The profile of 30 beneficiaries of MFRO was studied using an interview schedule from which information was collected about their age, caste, operation of outlets, education, land owned, employment before MFRO, income before and after MFRO and source of family income.

Fig. 1a shows that 27% of the beneficiaries are between 26-35 years old, 40% between 36-45 years and the remaining 33% are between 46-55 years. This indicates that the MFROs are primarily managed by individuals in the middle age group with an average age of 40.5 y. It was observed that 76% of beneficiaries belong to backward caste (BC), 17% to general category and 7% belonged to scheduled caste (SC) (Fig. 1b). Beneficiaries belonging to the BC are primarily from the Bestha community, the predominant fisher community in Telangana (Maloth *et al.*, 2020). Of the 30 mobile fish retail outlets, majority (61%) of the outlets were operated by both men and women, 7% were operated exclusively by women and remaining 32% were operated exclusively by men as presented in Fig. 1c.

Sarkar *et al.* (2013) observed that the mobile fish vending units are operated by both men and women, finding it to be ergonomically and operationally efficient. Information on education attained by the beneficiaries (Fig. 1d) shows that 17% of them had completed secondary school education, 43% had attained higher secondary school level of education and 40% were graduates. Majority of the beneficiaries (87%) had a land holding between 0.01 to 0.02 acres and 13% had 0.02 to 0.04 acres of land (Fig. 1e). It is evident from

Fig. 1f that 37% of beneficiaries were engaged in fish marketing and remaining 63% were engaged in other occupations such as business (30%) and private sector jobs (33%) before adopting MFRO. With respect to source of family income, it was found that 37% earn from fish marketing and MFRO; 23% from private sector job and MFRO; 27% earn from business and MFRO and remaining 13% beneficiaries were solely dependent on MFRO as their source of income (Fig. 1g). It can be understood that majority (77%) of the beneficiaries took

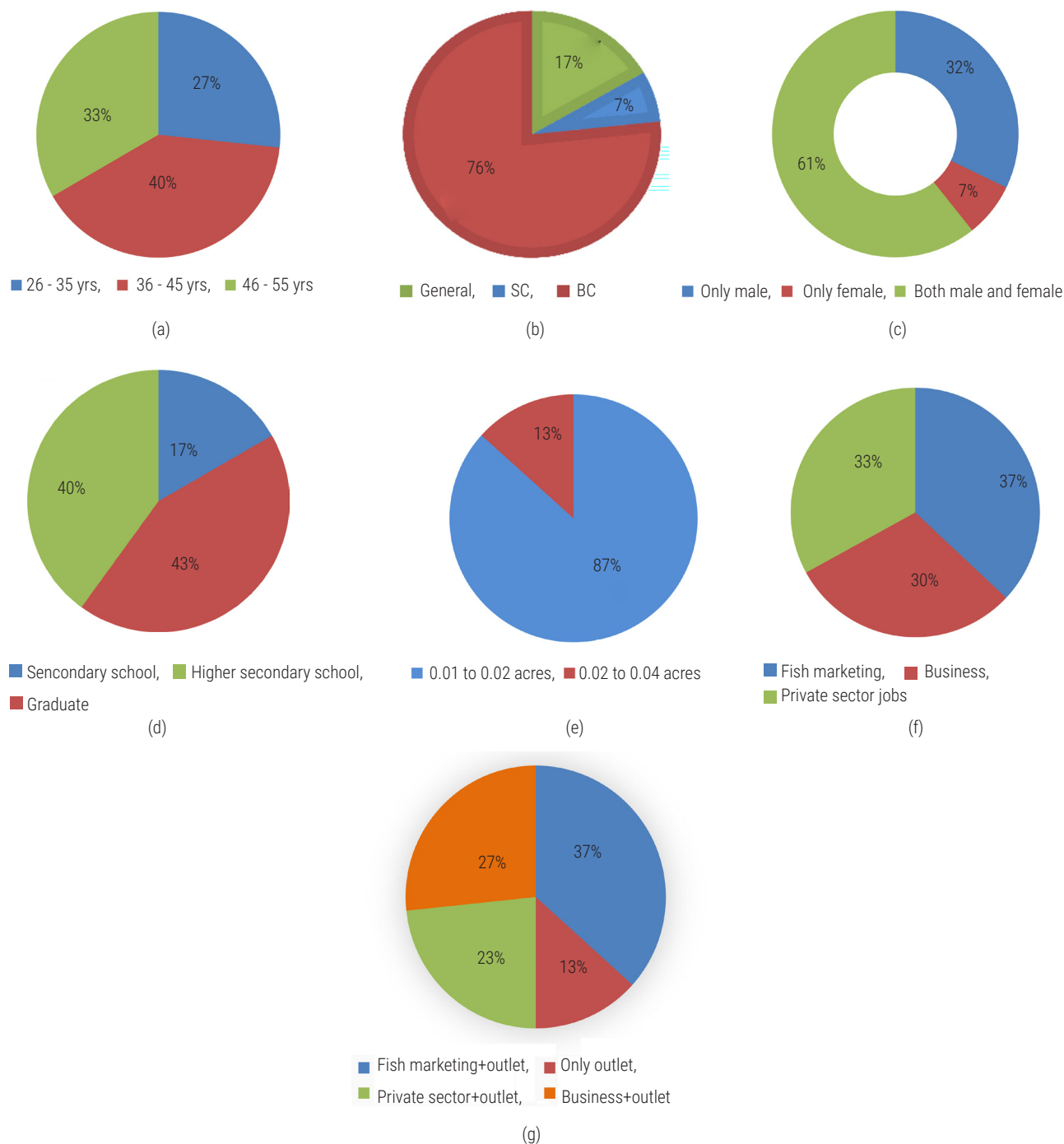


Fig. 1. Profile of MFRO beneficiaries. (a) Age, (b) Caste, (c) Operation of outlets by gender, (d) Educational status, (e) Extent of land owned, (f) Employment status, (g) Source of family income

up MFRO as their secondary occupation while 13% of beneficiaries had chosen MFRO as their primary occupation. MFROs are taken up as additional source of employment while continuing with their jobs (23%) and businesses (27%). Furthermore, 13% of the beneficiaries who experienced low employment in the private sector and business due to Covid-19 pandemic, took up MFRO as a source of employment.

Information on operational details of MFRO discusses form and kind of fish sold, type of RTE products sold, source of buying fish/prawn, average quantity of fish bought per day, average cost of buying fish, number of selling points, catchment area distance, frequency of selling, average time spent for selling, quantity of fish sold (before and after MFRO adoption), operational costs, average sale price of fish/prawn per kg, price difference from local markets, labour employed, wages of labour and constraints faced by the beneficiaries in operating the outlets. Fresh fish/prawn and RTE products were the two forms of fish sold by the beneficiaries through outlets. It was found that 27% of outlets sell only fresh fish and prawn, 33% sell only RTE products and the rest 40% of outlets were found to sell both fresh fish/prawn and RTE products (Fig. 2a). Sarkar *et al.* (2013) reported that vendors in mobile vending units sell fresh or chilled fish and dressed fish such as steaks and deboned products. Beneficiaries were found to sell four to seven kinds of fish in the outlets which includes Indian major carps like

catla and rohu; tilapia, murrels, pomfrets, tiger shrimp and white shrimp. Other kinds of fish sold in the outlets also include dry fish and sea fish. Kinds of fish sold vary and depend on the consumer's demand and weekdays (Fig. 2b).

One of the major objectives of MFRO is to promote fish-eating habits among people and to meet the diverse needs of consumers. RTE products are a group of food products that are intended for direct human consumption without prior cooking or other processing (Huang and Hwang, 2012). The RTE fish products that are made available to consumers through MFRO include fish fry, prawn fry, fish curry/prawn curry and fish/prawn biryani. It was found that 50% of beneficiaries sold only fish/prawn fry, 18.2% sold fish fry and fish curry, 13.6% sold fish fry and fish biryani and rest 18.2% beneficiaries were selling fish fry, fish curry as well as fish biryani (Fig. 2c). Average quantity of fish bought per day per MFRO varied (Fig. 2d) and depends on the consumer demand and weekdays. Average quantity of fish bought per day per MFRO on weekdays was 39.3 kg whereas on weekends the average quantity was 110.8 kg. Mohapatra *et al.* (2017) reported that vendors can sell approximately 100 kg of fish per day using a mobile fish vending trolley.

All the beneficiaries were found to procure fish from Musheerabad fish market, the biggest wholesale fish market in Telangana. Since it is the nearest fish market for all the beneficiaries with an average

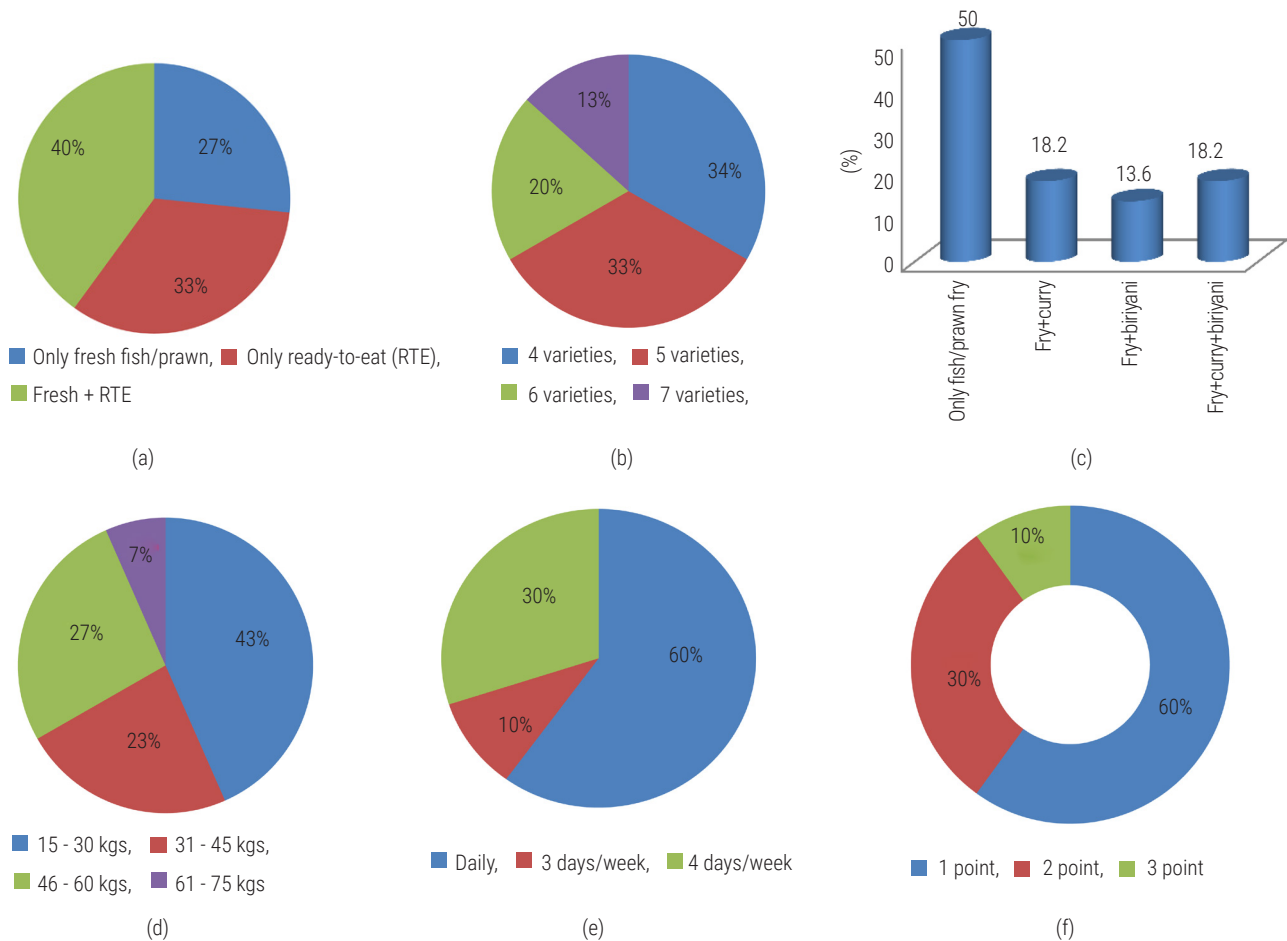


Fig. 2. Operational details of MFROs. (a) Form of fish sold; (b) Kinds of fish sold, (c) Types of RTE products sold, (d) Average quantity of fish bought per day, (e) Frequency of selling, (g) No. of selling points

catchment distance (distance between respondents' house to fish market) of 9.5 km, it was found to be the source of buying fish by all the beneficiaries at wholesale price. Additional information on purchasing cost of different fishes or the average cost of buying fish per kg was ₹40/- for tilapia, ₹483/- for murels, ₹550/- for pomfrets and ₹350/- for shrimps. It is clear from Fig. 2e that most of the beneficiaries (60%) operate the outlet on a daily basis, 10% of beneficiaries operate the outlet only 3 days per week and 30% operate the outlet only 4 days per week. Fig. 2f shows that majority (60%) of the beneficiaries sold their fish at a single selling point. Despite the MFRO being a mobile unit, these beneficiaries chose to sell at one location to avoid conflicts with local vendors and authorities. While, 30% beneficiaries sold at two different selling points and the remaining 10% were found to sell at three different selling points. Beneficiaries were found to spend an average time of 5.87 h per day in operating the outlet.

Average operating costs (include fish, groceries, fuel, ice and labour cost) for running MFRO per day was reported to be ₹5466.6/-. Sarkar *et al.* (2013) determined that the total operational cost of a mobile fish vending unit was ₹19,980/-. Average wage per labour was reported in the range of ₹5000-8000/- per month. The average sale price (per kg) for fresh fish was found to be ₹195/- for catla and rohu, ₹624/- for murels and ₹445/- for shrimps. Sarkar *et al.* (2013) reported that mobile fish vendors sold fresh fish at an average price of ₹140/- per kg, while dressed fish (including steaks and deboned products) fetched about ₹250/-. The average price difference from local markets was ₹35.6/- per kg fresh fish and ₹60/- for RTE products. Since the fish sold in MFRO were supplied in hygienic and fresh condition and fish is made available at the consumer door-steps, the consumers were willing to pay a higher price.

It is evident from Table 1 that average income of beneficiaries before MFRO adoption was ₹40,733 per month. Thus, there was an increase of 34.12% in income after MFRO adoption and a significant difference ($p < 0.05$) at 95% confidence level with regard to income earned before and after MFRO. Sarkar *et al.* (2013) also reported that the mobile fish vending unit is highly profitable. According to Mohapatra *et al.* (2017), economically, the mobile fish vending trolley from ICAR-CIFA is highly viable. It allows vendors to sell fish in hygienic conditions, thereby enhancing income potential through the sale of up to 100 kg of fish per day.

Paired t-test was performed to analyse the difference between the quantity of fish sold before and after the adoption of MFRO. It is evident from table 1 that the average quantity sold before and after MFRO was 50.9 kg day⁻¹ and 75.2 kg day⁻¹ respectively. Thus, the quantity of fish sold had increased by an average of 25% after MFRO adoption. There was a significant difference ($p < 0.05$) with regard to quantity of fish sold before and after MFRO adoption.

Table 1. Quantity of fish sold and income earned before and after MFRO adoption

Particulars	Mean	N	Std. Deviation
Quantity of fish sold (kg)			
Before	50.90	30	22.563
After	75.27	30	23.082
Income earned (₹)			
Before	26833.33	30	8145.586
After	40733.33	30	9104.502

Based on the Pearson correlation, it is evident that even before the adoption of MFRO, there was a positive correlation ($r = 0.065$) between the amount of fish sold (50.9 kg day⁻¹) and the income earned (₹26,833 per month). After the adoption of MFRO, the Pearson correlation indicated a positive relationship ($r = 0.238$) between the amount of fish sold (75.2 kg day⁻¹) and the income earned (₹40,733 per month). This correlation demonstrated that the adoption of MFRO had a positive impact on the beneficiaries' livelihoods, as evidenced by a 34.12% increase in income following MFRO adoption. This finding is further supported by a paired t-test analysis. Therefore, it is recommended to promote MFRO further, as it has proven to enhance the economic well-being of the beneficiaries.

The constraints faced by beneficiaries are illustrated in Fig. 3. The most prevalent constraint reported was the lack of permission for parking the MFRO, which sometimes results in conflicts with authorities. This issue parallels challenges encountered by mobile markets and food trucks, which frequently face traditional zoning ordinances that restrict their operation, thereby requiring extensive and complex zoning adjustments (EcoDistricts, 2016). The second major constraint identified was the inadequate battery backup of the vehicle, leading to excess fuel consumption. Additionally, the beneficiaries reported limited or no knowledge regarding the preparation of ready-to-eat (RTE) products. It was noted that no training on the preparation of RTE products was provided before the beneficiaries took over the outlets. Other constraints include the price hike of groceries, food oil and diesel/petrol, conflicts with local vendors and less foot-fall on weekdays.

Based on the constraints reported in this study, it is recommended that for parking-related issues, permissions from the concerned authorities can be provided. Specific area and time can be allotted for sale of fish and RTE products through MFRO. To address battery-related issues manufacturers registered with the state government or the Telangana State Fisheries Department (TSFD) can be advised to increase the battery capacities or add additional batteries while manufacturing the MFROs. Training on RTE products can be conducted by College of Fisheries, National Fisheries Development Board (NFDB) or TSFD. Conflicts with other local vendors can be overcome by parking the outlet in places away from local vendors so that their livelihoods are not affected. Marketing and advertisements to popularise MFRO should also be handled by the state government and NFDB. Beneficiaries of the MFRO should partner with online fish delivery chains also. Sarkar *et al.* (2013) emphasised that the mobile fish vending unit could be promoted in municipal and Notified Area Council (NAC) localities with government subsidies to alleviate retail fish vending challenges. Mishra (2024) suggested that vendors and fishers should establish e-commerce platforms and utilise online marketplaces to directly reach consumers with their products. It has been highlighted that consumers have identified poor hygienic conditions, lack of freshness in fish and limited availability of ready-to-cook and ready-to-eat fishery products as significant constraints negatively affecting overall fish consumption.

The present study concludes that, the objective of MFRO was found to have achieved, in terms, that MFROs have created entrepreneurship opportunities in the fisheries sector. This will also strengthen mobile marketing of fish through delivery of fresh and hygienic fish at the consumer door steps and serve as a mechanism to popularise RTE fish products. Furthermore, MFRO

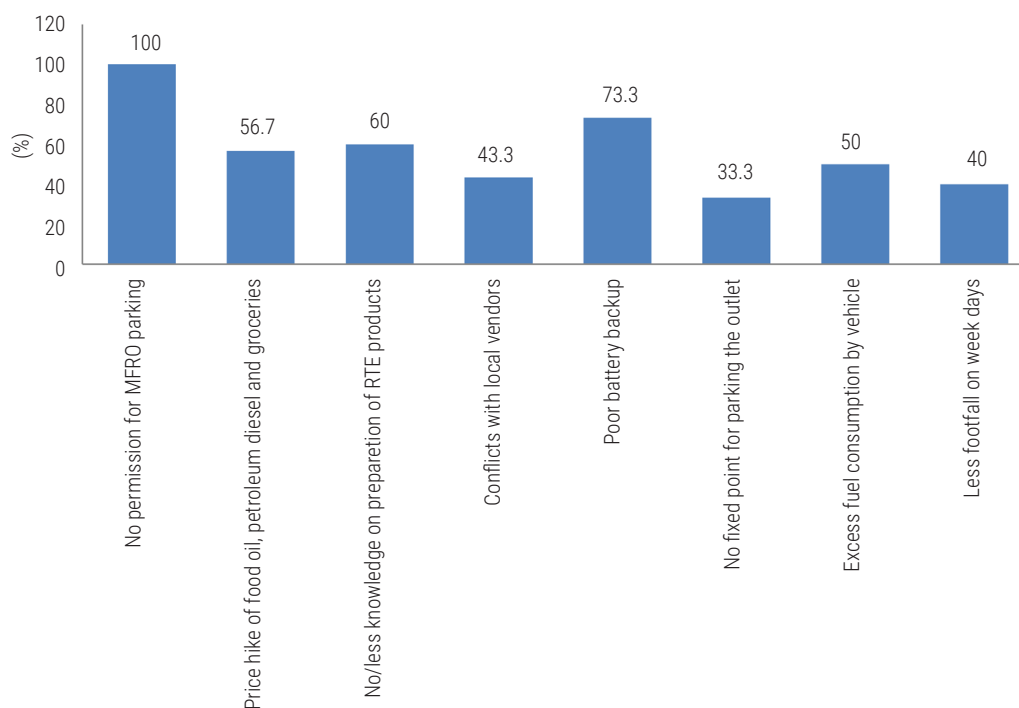


Fig. 3. Constraints faced by beneficiaries in operating MFROs

will not only help to increase fish consumption, nutritional security and entrepreneurship opportunities, but will also help promoting the 'Vocal for Local' agenda of the government.

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