



Impact of Pradhan Mantri Matsya Sampada Yojana (PMMSY) on Inland Fish Farming Economy in Kalyana Karnataka Region

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Abstract— The present study analysed the impact of the Pradhan Mantri Matsya Sampada Yojana (PMMSY) on the inland fish farming economy in Kalyana Karnataka region, with a specific focus on fish production, income and employment of fish farmers. The study was conducted in Raichur and Yadgir districts using a multistage purposive random sampling procedure, covering 80 respondents (40 beneficiaries and 40 non-beneficiaries). Primary data were collected for the years 2020-21 (before PMMSY) and 2023-24 (after PMMSY). Analytical tools such as percentage change and Difference-in-Difference (DiD) technique were employed to measure the scheme impact. A significant increase in fish production, income and employment of beneficiaries compared to non beneficiaries was noticed in the study area due to PMMSY introduction. It was observed that after the introduction of PMMSY, there was about 29.47 per cent increase in fish production among beneficiaries compared to only 0.94 per cent among non-beneficiaries. Similarly, the income of beneficiaries increased significantly by 81.24 per cent compared to 41.34 per cent recorded by non-beneficiaries, the increased in income for non-beneficiaries was mainly attributed to change in price. Employment generation also improved more prominently for beneficiaries, showing an increase of 12.61 per cent compared to only 2.31 per cent among non-beneficiaries. Later the Difference-in-Difference regression results confirmed that with an introduction of PMMSY, fish production increased by 1,151 tonnes per acre, there was an increase in income of beneficiaries by ₹1,18,549 per acre and employment generation by 22.23 man-days. The findings demonstrate that PMMSY effectively enhanced production, profitability and livelihood opportunities by improving access to quality inputs and technical support. This scheme has played a pivotal role in strengthening the inland fisheries sector and advancing sustainable rural economic development in the Kalyana Karnataka region.



Keywords— Difference-in-Difference, Kalyana Karnataka, Inland fisheries, PMMSY

I. INTRODUCTION

The world today faces three major interconnected challenges: alleviating poverty, meeting present and future food demands, and managing natural resources to ensure long-term sustainability. Poverty, coupled with population

growth, land limitations and the absence of suitable production technologies for agricultural intensification, significantly contributes to environmental degradation in low-income developing nations (Pinstrup & Pandya., 1994). Aquatic resources have been identified as important

for food security and economic development in many developing countries. Aquaculture has emerged as a fast-growing sector for meeting the increased demand for food and it holds immense scope for both horizontal and vertical expansion in the inland fisheries sector (Kumari and Patra., 2014).

The Indian fisheries sector is termed as the "sunrise sector" of the Indian economy, providing livelihoods to around 28 million fishers and fish farmers at the primary level, with many more involved along the value chain. Fish, being an affordable and nutritious source of animal protein, plays a significant role in combating hunger and malnutrition in the country. India's vast freshwater and brackish water resources, combined with its peninsular geography, offer tremendous growth potential for the sector. With an 8% share in global fish production, India is the second-largest producer of fish and aquaculture globally after China. India produced a total of 175.45 lakh tonnes of fish, with 44.32 lakh tonnes from marine fisheries and 131.13 lakh tonnes from inland fisheries (Anon., 2023).

Fisheries is an important sector in the Karnataka state and is blessed with both marine and inland resources offering immense opportunities for fisheries and aquaculture growth. This sector is making valuable contributions to the economic development of the state and has all the potentials to provide livelihood and nutritional security. In India Karnataka ranks third in total fish production with 12.24 lakh tonnes production, fifth in marine fish production with 7.30 lakh tonnes and seventh in inland fish production with 4.94 lakh tonnes (Anon., 2023).

The Pradhan Mantri Matsya Sampada Yojana (PMMSY) is a major scheme introduced to strengthen and modernize the fisheries sector in India. Launched in 2020 as part of the "Atma Nirbhar Bharat" package, the scheme involves an investment of ₹20,050 crore the highest-ever allocation made to the fisheries sector. PMMSY is being implemented across all states and union territories over a five-year period from FY 2020–2021 to FY 2024–2025.

The scheme aims to uplift fish farmers from backwardness by promoting improved farming practices, enhancing income levels and generating employment opportunities across the fisheries value chain.

Hence present study focus on impact of PMMSY on fish farming economy based on pre and post implementation of PMMSY. Therefore, the present study was undertaken in Kalyana Karnataka region with the following specific objectives 1. To analyse the impact of

PMMSY on fish production, income and employment of farmers in the study area.

II. MATERIALS AND METHODS

Study area

The study was conducted in two districts of Kalyana Karnataka region viz., Raichur and Yadgir based on their highest levels of inland fish production in Kalyana Karnataka region and the significant number of beneficiaries under the Pradhan Mantri Matsya Sampada Yojana (PMMSY) in Kalyana Karnataka region.

Sampling procedure

The Multistage purposive random sampling procedure was followed for selection of respondents for the study. In total 80 sample constituting 40 beneficiaries, 40 non-beneficiaries of Pradhan Mantri Matsya Sampada Yojana (PMMSY) were selected from the above mentioned districts in which 10 beneficiaries and 10 non-beneficiaries were selected from each taluka.

The primary data were collected on fish production, income and employment for the year 2020-21 to indicate scenario before implementation of PMMSY and for the year 2023-24 to indicate scenario after implementation of PMMSY.

Analytical tools employed

The data collected were presented in tabular form to facilitate easy comparison. The presentation has adopted to compile characteristics of the sample farmers. Data regarding number of beneficiaries involved in the scheme, income and employment of beneficiary farmers under the PMMSY were analysed by average and frequency.

Percentage Change

$$\text{Percentage Change} = \frac{\text{New value} - \text{old value}}{\text{old value}} \times 100$$

Difference in Difference (DiD) technique

$$DD = \left[\frac{1}{p} \sum_{i=1}^p (Y_{1ia} - Y_{1ib}) \right] - \left[\frac{1}{c} \sum_{j=1}^c (Y_{0ja} - Y_{0jb}) \right]$$

Where,

DD = Income difference between the respondents (beneficiaries and non – beneficiary)

P = number of beneficiary farmers

C = number of individuals in the control group (non – beneficiary farmers)

Y_{1ia} = Income variable of beneficiary after the

PMMSY scheme

Y_{1ib} = Income variable of participant before the PMMSY scheme

Y_{0ja} = Income variable of non-beneficiaries after PMMSY scheme

Y_{0jb} = Income variable of non-beneficiaries before PMMSY scheme

Difference-in-Difference Regression

$$Y = \beta_0 + \beta_1 \times D_t + \beta_2 \times D_i + \beta_3 (D_i \times D_t) + \varepsilon$$

Where

Y= Production /income /employment

β_0 = intercept

D_t (Time) = 1 for 2023-24 (after implementation of PMMSY)

0 for 2020 -21 (before implementation of PMMSY)

D_i (Intervention) = 1 if respondent is beneficiary of PMMSY (treatment)

= 0 if respondent is non-beneficiary of PMMSY (Control)

($D_i \times D_t$) Interaction = Actual scheme impact (Difference-in-Differences)

β_1 , β_2 and β_3 are coefficients.

Beneficiary of Pradhan Mantri Matsya Sampada Yojana (PMMSY)

Sample farmers who engaged in inland fish farming and availed the benefit of PMMSY.

Non-beneficiary of PMMSY

Non-beneficiaries are Sample farmers who do not received PMMSY subsidies and still engaged in inland fish farming.

III. RESULTS AND DISCUSSION

Production, income and employment of beneficiary farmers and non- beneficiary farmers of PMMSY.

Production, income and employment of beneficiary farmers and non- beneficiary farmers of PMMSY are presented in Table 1 After the implementation of the scheme beneficiaries increased their fish production from 4038 tonne to 5228 tonne per acre a rise of 29.47 per cent whereas non-beneficiaries showed only a minor increase from 4113 tonne to 4152 tonne a rise is only 0.94 per cent per acre. The higher production among beneficiaries is largely attributed to the use of quality feed and fingerlings provided under a PMMSY subsidy, along with technical guidance from the fish department which ensured proper management practices and efficient input utilization.

Similarly the income of beneficiaries rose significantly increased from ` 3,02,868 to `5,48,940, a rise of 81.24 per cent. Whereas non-beneficiaries income increased only marginally from `3,08,437 to `4,35,960 rise is 41.34 per cent which was mainly attributed to change in price. Employment generation also increased more substantially among beneficiaries from 215.65 to 243.03 12.61 per cent man-days compared to a smaller increase from 222.50 to 227.65 man-days 2.31 per cent for non-beneficiaries. This indicates that PMMSY not only enhanced profitability and productivity but also created additional employment opportunities by promoting better management and adoption of modern fish farming practices. The scheme effectively reduced the financial burden on beneficiaries, improved efficiency and contributed to sustainable inland fish production.

Table 1: Production, income and employment of beneficiary farmers as compared to non- beneficiary farmers of PMMSY

Sl. No.	Particulars	Beneficiary of PMMSY (n=40)		% change	Non- beneficiary (n=40)		% change
		Before PMMSY	After PMMSY		Before	After	
1	Production (tonnes)	4038	5228	29.47	4113	4152	0.94
2	Income (₹)	302868	548940	81.24	308437	435960	41.34
3	Employment (mandays)	215.65	243.03	12.61	222.50	227.65	2.31

Impact of PMMSY on fish production

The double difference estimates of the impact of

PMMSY on production as presented in Table 2 indicate a substantial positive effect on beneficiary farmers. Before

the intervention, beneficiaries produced 4,038 tonnes per acre which increased to 5,228 tonnes per acre after the implementation of PMMSY resulting in a mean increase of 1190 tonnes. In contrast non-beneficiaries showed a minimal increase from 4,113 tonnes to 4,152 tonnes per acre with a mean increase of only 39 tonnes.

The estimates of double difference of 1151 tonnes

Table 2: Double difference estimates of impact of PMMSY on fish production (n=80)

Sl. No.	Variable	Fish production (tonnes/acre)		Mean Difference	t - statistics
		Before	After		
1	Beneficiary of PMMSY	4038	5228	1190	7.84*
2	Non- beneficiary	4113	4152	39	5.10*
3	Double Difference	-	-	1151	8.85*

Note: * Indicates at 1 per cent level of significance

Impact of PMMSY on income

The double difference estimates of the impact of PMMSY on income, as presented in Table 3 indicate a substantial positive effect for beneficiary farmers. Before the implementation of PMMSY beneficiaries earned `3, 02,868 which increased to `5, 48,940 after participation in the program reflecting a mean income increase of `246072. In contrast non-beneficiaries recorded a smaller rise in income from `3, 08,437 to `4, 35,960 with a mean increase of `1, 27,522 which was mainly attributed to

change in price.

The estimated double difference of `1, 18,549 demonstrates that PMMSY had a significant impact on the income of beneficiary farmers. This improvement can be largely attributed to the access to high-quality fingerlings and feed under the PMMSY subsidy enabling beneficiaries to invest in better inputs for fish production. Technical guidance from the fisheries department ensured that these inputs were used efficiently optimizing stocking feeding and pond management practices.

Table 3: Double difference estimates of impact of PMMSY on income (n=80)

Sl. No	Variable	Income (₹/year)		Mean Difference	t -statistics
		Before	After		
1	Beneficiary of PMMSY	302868	548940	246072	9.10*
2	Non- beneficiary	308437	435960	127522	7.63*
3	Double Difference	-	-	118549	8.13*

Note: * Indicates at 1 per cent level of significance

Impact of PMMSY on employment

Double difference estimates of impact of PMMSY on employment generated from inland fish production presented in Table 4 Beneficiary farmers significantly increased their labour contribution from 215.65 man-days per household before the intervention to 243.03 man-days after reflecting a mean increase of 27.38 man-days which is statistically significant at the 1 per cent level. In contrast non-beneficiary farmers showed only a marginal rise from 222.50 man-days to 227.65 man-days with a mean increase of 5.15 man-days.

The double difference estimate of 22.23 man-days, significant at 1 per cent level, indicates that the observed increase in labor engagement among beneficiaries can be attributed to the PMMSY intervention. The higher employment among beneficiaries is primarily linked to the adoption of improved fish farming practices including optimal stocking regular feeding, and efficient pond management supported by quality fingerlings feed subsidies and technical guidance from the fisheries department.

Table 4: Double difference estimates of impact of PMMSY on employment

(n=80)

Sl. No	Variable	Employment (mandays)		Mean Difference	t -statistics
		Before	After		
1	Beneficiary of PMMSY	215.65	243.03	27.38	8.09*
2	Non- beneficiary	222.50	227.65	5.15	2.33**
3	Double Difference	-	-	22.23	5.56*

Note: * and ** Indicates at 1 and 5 per cent level of significance

Difference-in-Difference regression result for impact of PMMSY on Income, production and employment

The results of the Difference-in-Difference regression result for impact of PMMSY on fish production, income and employment are presented in Table 5 the Difference-in-Difference analysis confirmed a significant positive impact of PMMSY on fish production, income and employment of fish farmer in the study area. The intercept values for all three models were highly significant, indicating the baseline levels of production, income and employment before the programme implementation. The time coefficient (β_1) was positive for all variables, implying a natural growth trend over time even without the programme..

The intervention coefficient (β_2) was negative and significant for all three variables, indicating that prior to

the PMMSY implementation, the treatment group (beneficiaries) had lower fish production, income, and employment compared to the non- beneficiary group. This reflects the initial production and economic constraints faced by fish farmers before accessing programme benefits, such as limited technical support, lack of access to quality seed, and financial limitations.

The interaction term (β_3), which represents the DID effect, was positive and highly significant for all variables, demonstrating that PMMSY had a substantial positive impact on beneficiary farmers. After the introduction of the scheme, fish production increased by 1,151 tonnes, income by `1, 18,549 and employment by 22.23 mandays per farmer compared to non-beneficiaries. The high R^2 values for production (0.91) and income (0.98) indicate strong model fit, while employment (0.38) shows moderate explanatory power.

Table 5: Difference-in-Difference regression result for impact of PMMSY on fish production, income, employment in the study area

(Rupees Per acre)

Fish Production (tonnes)					Income (₹)			Employment (mandays)		
Sl. No.	Explanatory Variable	Coefficient	Std. Error	t-value	Coefficient	Std. Error	t-value	Coefficient	Std. Error	t-value
1	(Intercept)	4 113**	23.45	175.45	3 08 437**	2 006	153.78	222.50**	2.018	110.24
2	Time (β_1) 1= After PMMSY 0= Before PMMSY	38.50	33.16	1.16	1 27 523	2 837	44.96	5.150	2.854	1.80
3	Intervention (β_2) 1= Beneficiary 0= Non-beneficiary	-75.25*	33.16	-2.27	-5 569*	2 837	-1.96	-6.850*	2.854	-2.40
4	Interaction (β_3) (DiD) (time x treatment)	1 151**	46.89	24.55	1 18 549**	4 012	29.55	22.23**	4.037	5.51
5	R^2	0.91			0.98			0.38		
6	F value	581.5**			3421**			33.23**		
7	Number of	160			160			160		

	observations			
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Note: * and ** Indicates at 1 and 5 per cent level of significance

IV. CONCLUSION

The study concludes that the Pradhan Mantri Matsya Sampada Yojana (PMMSY) has a significant positive impact on the inland fish farming economy in the Kalyana Karnataka region. Beneficiary farmers recorded substantial improvements in fish production, income and employment compared to non-beneficiaries, mainly due to access to quality inputs under subsidies, and technical support provided under the scheme. The double difference and Difference-in-Difference analysis further confirmed that PMMSY increased fish production by 1151 tonnes per acre, income by ₹1, 18,549 per acre and employment by 22.23 man-days. PMMSY has effectively enhanced productivity, profitability and livelihood security among fish farmers, demonstrating its importance in strengthening the inland fisheries sector and promoting sustainable rural economic development.

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