Extension Journal

International Journal of Agriculture Extension and Social Development

Constraint perceived by beneficiaries in adoption of fisheries development programmes in Vidarbha region of Maharashtra

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DOI: https://doi.org/10.33545/26180723.2024.v7.i2f.364

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Abstract

Maharashtra is one of the important state with respect to fisheries considering its vast fisheries resources. Several fisheries development programmes are implemented in the state for development of inland fisheries. With the implementation of schemes like Blue revolution and Pradhan Mantri Matsya Sampada Yojana (PMMSY), more numbers of stakeholders are seen to be involved as beneficiaries of schemes in fisheries sector. Present study was carried out with the objective of assessing the constraints faced by the beneficiaries in the Vidarbha region of Maharashtra. A total of 35 constraints were categorized under five heads - 'Extension' (07), 'Financial' (06), 'Infrastructure' (07), 'Core Fisheries' (07) and 'Administrative' constraints' (08). Information was collected from 450 beneficiaries from 11 districts of Vidarbha region of Maharashtra. The responses were statistically analyzed using weighted average technique and Friedman test. Maximum severity score was 180 and minimum was 0. The results revealed that, overall severity of constraints among the beneficiaries was found to be medium. However, among these, financial constraints (107.89) and administrative constraints (94.05) were found to be more severe than other constraints.

Keywords: Constraints, beneficiaries, DoF, fisheries

Introduction

Fisheries and aquaculture play an important role in ensuring food security, enhancing economic growth, and creating employment in the country's rural sector. Fisheries and aquaculture sector has recorded faster growth over the years. It is booming and contributing to the economic development of the nation continuously. India is one of the largest aquaculture nations globally with 162.48 Lakh tonnes (DoF, Ministry of Fisheries, Animal Husbandry & Dairying, India, 2022). Indian fisheries shares about 8% of the total global fish production, account for 121.21 lakh tons production from the inland sector and 41.27 lakh tonnes from the marine sector. The sector with a growth of 10.34%, has contributed to the extent of 1.1% to national Gross Domestics Products and 6.72% of agriculture GDP. (DoF, Ministry of Fisheries, Animal Husbandry & Dairying, India, 2022). The sector provides livelihood to about 28 million fishers and fish farmers at the primary level and twice the number along the value chain. Inland fisheries have emerged as a major contributor to the overall fish production in the country.

Each state in India is blessed with diverse water resources therefore, fisheries extension plays a very important role in the development of the sector. States play a major role in executing the extension programs at field levels through their respective Department of Fisheries (DoF). Maharashtra is one of the important state with respect to fisheries considering its vast fisheries resources. The inland fisheries resources of Maharashtra include 16,000 km rivers and canals, 2,99,000 ha reservoirs & 72,000 ha tanks ponds (DoF, Maharashtra, 2022). During 2021-22, the total fish production of the State was 5.89 lakh tonnes of which 4.32 lakh tonnes was from the marine sector and 1.57 lakh tonnes from the inland sector (DoF, Maharashtra, 2022). Several fisheries development programmes are implemented in the state. However, with the implementation of schemes like Blue revolution and Pradhan Mantri Matsya Sampada Yojana (PMMSY), more numbers of stakeholders are seen to be involved as beneficiaries of schemes in fisheries sector. But often they face constraints. Constraint based studies have been done in other states and Union Territories like Panday *et al.* (2014) [34] reported that the extension constraints faced by fishers of Manipur were lack of need-based training program, lack of farm and home visits by the extension workers, literacy, lack of family encouragement, inadequate family labor, insurgency and high wages of labor. Kumar *et al.* (2017) [13] reported lack of awareness about scientific fish culture practices as a major extension constraint faced by fish farmers in Bihar. Jana (2016) [9] revealed that lack of extension services, lack of government

support, inadequate family labor and the norms and religious values excluded women or other groups from participating in certain activities were the extension constraints the fish farmers perceived Odisha, India. Angral *et al.* (2017) [2] reported lack of awareness regarding fisheries programs, lack of proper training/exposure visits, and no cooperation & coordination among the implementing agencies, like departments and financial institutions, as constraints perceived by fishers of Jammu & Kashmir. Chittem and Kunda (2017) [4] while studying constraint of shrimp farmers of Prakasam district, Andhra Pradesh reported lack of regular training programmes as a major extension constraint. Patil and Sharma (2020) [19] revealed lack of regular training program, less extension and technical support as major extension constraint by shrimp farmers of konkan region of Maharashtra. Yadav (2022) [32-33] reported less coordination of fishers with fisheries organizations less mobility, low literacy of fishers, gender issues and less fisheries information were major extension constraints faced by fishers in Rajasthan.

Katre *et al.* (2024) [11] have assessed the problems faced in fisheries governance in reservoirs of M.P and Katre *et al.* (2023) [10] also studied the role of DoF in M.P. regarding fisher women participation. Agnes and Sharma (2023) [1] discussed the issues in extension systems of shrimp farmers of Tamil Nadu. Prusty and Sharma (2023) [21] assessed the occupational issues of inland fishers and role of DOF in Odisha and Sharma *et al.* (2023) [21] discussed the issues faced by Indian shrimp farm workers. Patil and Sharma (2021) [20] have also studied the information sources used by fisheries officials of Maharashtra. Thapa *et al.* (2023) [28] studied the constraints faced by Jhora fish farmers in the Darjeeling Himalayas. Yadav and Sharma (2022) [32-33] performed the gender Analysis of ornamental fish production units in Maharashtra and role of DoF. Pal *et al.* (2022) [14] reported hazard maps as aid for critical area-specific information during the disaster for quick evacuation and to prepare management strategy and also be used to evolve a new facility and for insurance purposes. Relekar *et al.* (2022) [25] Livelihood Enhancement of Women Self Help Groups through Development and Marketing of Value-Added Fish Products in Vidarbha Region. Ghosh *et al.* (2022) [8] analysed the livelihood developmental interventions in Indian Sundarbans and role of DoF in West Bengal; Yadav *et al.* (2022) [32-33]: Yadav *et al.* (2022) [32-33] and Rathod *et al.* (2024) [24] studied the role of extension service providers and constraints faced by them. Bhendarkar *et al.* (2017) [3] studied the profile of socio-economic condition of fishermen in selected village in Kabirdham district, Chhattisgarh state, India. Patil *et al.* (2021) [20] studied knowledge level of shrimp farmers in Maharashtra towards better management practices (Bmps) in shrimp farming. Patil and Sharma (2021) [20] prioritised the training

needs of extension personnel in Ratagiri and studied the constraints faced by them. Patil and Sharma (2021) [20] recorded the constraints faced among shrimp farmers of Palghar district in Maharashtra.

There are a few studies done with reference to the constraints faced by the beneficiaries/fishers/fish farmers in context of Maharashtra, particularly in Vidarbha region constraints study of various stakeholders involved in fisheries are very meagre. Nevertheless, it seems from the few studies that the beneficiaries/fishers/fish farmers face constraints and these can differ as per administrative difficulties they face in adoption of fisheries development programmes, fisheries based technical problems, extension and training on recent technologies etc. Thus, present study was done with the objective of assessing the constraints perceived by beneficiaries in adoption of fisheries development programmes in Vidarbha region of Maharashtra.

Materials and Methods
To achieve objective of the study, a total of 450 fishers who were beneficiaries of fisheries development programmes/schemes were selected (225 from Amravati Division and 225 from Nagpur Division). To enlist the constraints faced by beneficiaries, a thorough review of the literature was done, and a list of constraints was made. After that, same expert group of objective second was used. The expert group added constraints to the list. So a total of 35 constraints were then categorized under five heads - 'Extension' (07), 'Financial' (06), 'Infrastructure' (07), 'Core Fisheries' (07) and 'Administrative' constraints' (08). Information regarding constrains faced by beneficiary was collected by using an interview schedule. A five point Likert scale was used to test the level of severity of beneficiaries towards the respective constraints. This scale was 0 to 4, where, *viz.*, 0 - strongly disagree, 1 - disagree, 2- moderately agree, 3 - agree and 4 - strongly agree.

The reliability of the above scale was tested by test-retest method as follows:

The list of constraints was given to 15 beneficiaries to provide the scores for level of agreement towards each constraint. The same was repeated after 15 days. Based on the two sets of scores provided by beneficiaries, correlation coefficient was calculated. Correlation coefficient can take value between 0 and 1. So the closer to 1 means the more reliable of the scale. Test-retest reliability coefficient was 0.82 indicated that whole scale was reliable.

The final scale consisting of 35 constraints were administered to beneficiaries and asked to give their agreement on a five point continuum *viz.*, 0 - strongly disagree, 1 - disagree, 2- moderately agree, 3 - agree and 4 - strongly agree.

The expert group added constraints to the list

1.	Extension Constraints	:	Poor Coordination with Government departments Getting proper information Low literacy of beneficiaries Less mobility Gender issues Awareness about rights Less trainings on fisheries
2.	Financial Constraints	:	Less credit availability Interest rate Untimely subsidies High lease amount High cost for nets and gears High labour charges
3.	Infrastructure Constraints	:	Poor electricity Lack of market shed Lack of market availability Lack of ice storage facility Lack of transportation facility Poor roads Lack of warehousing facility
4.	Core Fisheries Constraints	:	Availability of input (Seed/feed/fertilizers) Availability of nets and gears Availability of ice Quality of pond water and soil Aquatic weeds/insects Weed fishes Fish disease
5.	Administrative Constraints	:	Lack of cooperation between government officers and beneficiaries Undue delay in sanction of scheme Lack of proper supervision More paperwork Undue delay in selection of beneficiaries Improper coordination between financial institutions and local officials Inadequate information and education about the development programme More frequent visits to DOF to get scheme sanctioned

Statistical analysis
Weighted average technique
The weighted average technique was applied to analyze and rank various constraints faced by shrimp farmers and extension personnel (Yadav *et al.*, 2017; Patil and Sharma, 2020) [32, 19]. The weighted average for each constraint was calculated by multiplying frequency of each constraint with respective weight/score. The weighted values taken for calculating weighted average were: 0 - strongly disagree, 1 - disagree, 2- moderately agree, 3 - agree and 4 - strongly agree.

The formula for weighted average is as follows:

Weighted average = Sum $(X_1.W_1 + X_2.W_2 + X_3.W_3 + X_4.W_4 + X_5. W_5)$ / Sum $(W_1+W_2+W_3+W_4+W_5)$

Where,
X_1, X_2, X_3, X_4, X_5 = Frequency of the respective constraints
W_1, W_2, W_3, W_4, W_5 = Weighted values i.e. 0,1, 2, 3 and 4

Table 1: Maximum and minimum weighted score for each region for beneficiaries

Region	Sample size (n)	Minimum weight	Maximum weight	Sum of weights	Minimum Score	Maximum Score
A	B	C	D	E	(B x C)/E	(B x D)/E
Amravati	225	0	4	10	0	90
Nagpur	225	0	4	10	0	90
Overall (N)	450	0	4	10	0	180

Accordingly, the constraints faced by beneficiaries were ranked based on the scores obtained. The constraints with score between 0 to 60 were considered as less severe, score between 60.1 to 120 as medium severe and score above 120 as most severe constraints.

Friedman rank test for differences among constraints
Friedman rank test, a non-parametric test (distribution-free) used to compare observations repeated on the same subjects. It was used to test if there was a significant difference between each constraint. Hypothesis used is as follows;

H_0 = There is no significant difference between each constraint faced by beneficiaries
H_1 = There is a significant difference between each constraint faced by beneficiaries

$$F_R = \frac{12}{rc(c+1)} \sum_{j=1}^{c} R_j^2 - 3r(c+1)$$

Where,

$R2j$ = square of the total of the ranks for group j (j = 1,2, …..,c)

r = number of blocks

c = number of groups

Based on the p-value of corresponding parameters, the decision has been taken on those parameters which are having p-values less than 0.05 and this led to the decision toward rejection of H_0, suggesting a statistically significant difference and for p-values greater than 0.05 the decision was to accept H_0.

Results and Discussions

The constraints faced by beneficiaries in adoption of fisheries development programmes in Vidarbha region of Maharashtra are as follows.

Constraints faced by beneficiaries

1. Extension Constraints
2. Financial Constraints
3. Infrastructure Constraints
4. Core fisheries Constraints
5. Administrative constraints

Constraints faced by beneficiaries

Constraints faced by beneficiaries in adoption of fisheries development programmes in Vidarbha region were recorded. A total of 450 beneficiaries provided their responses under five heads of constraints. The weighted average, severity and ranking of constraints are presented in Table 2.

Table 2: Constraint faced by beneficiaries

S. No.	Constraints	Weighted Average (Max Score = 180.0)	Severity	Rank
1	Financial	107.89	Medium	I
2	Administrative	94.05	Medium	II
3	Core Fisheries	91.88	Medium	III
4	Infrastructure	90.26	Medium	IV
5	Extension	88.88	Medium	V
		94.58	Medium	

The constraints faced by beneficiaries of fisheries development programmes in Vidarbha region were ranked based on weighted average and categorized as low (0 – 60), medium (60.1 – 120) and high (> 120). It can be concluded from table 1 that overall severity of constraints among the beneficiaries was found to be medium. However, among these, financial constraints (107.89) and administrative constraints (94.05) were found to be more severe than other constraints.

Further, non parametric Friedman test was applied to test the significance among the constraints faced beneficiaries in Vidarbha region. The results of Friedman test is depicted in Table 3.

Table 3: Friedman test results for constraints faced by beneficiaries

S. No	Constraints	N	NMS*	Mean Rank	Chi-Square Value	Decision
1	Extension	450	0.49	2.72		
2	Financial	450	0.60	3.88		
3	Infrastructure	450	0.50	2.70	49.464	Reject H_0
4	Core Fisheries	450	0.51	2.79		
5	Administrative	450	0.52	2.92		

The non-parametric Friedman test revealed that there was a significant difference among the constraints at a 5% level of significance and the null hypothesis (H_0) is rejected ($p<0.05$). This indicates the constraints affects the beneficiaries differently based on the difficulty they face while adopting the fisheries development programmes. Further, considering the mean ranks of constraints, it can be concluded that, financial constraints (3.88) is most severe, followed by administrative constraints (2.92) and core fisheries constraints (2.79).

The results of individual constraints are presented as follows

1. Extension constraints

The extension constraints faced by the beneficiaries included seven sub categories such as poor coordination with government departments, getting proper information about the programmes/schemes, low literacy of beneficiaries, less mobility, gender issues, awareness about rights and less trainings on fisheries.

Weighted average of each sub category under extension constraints were calculated and ranked based on severity and non parametric Friedman test for significant difference among these constraints was applied (Table 4).

Table 4: Weighted average ranking and Friedman test results for extension constraints

S. No.	Constraints	WA	Severity	Rank	NMS*	Mean Rank	Chi-Square Value	Decision
1	Less trainings on fisheries	143.25	High	I	0.8	5.48		
2	Awareness about rights	138.75	High	II	0.77	5.53		
3	Getting proper information about the programmes/schemes	111.38	Medium	III	0.62	4.61		
4	Low literacy of beneficiaries	95.63	Medium	IV	0.53	4.24	283.923	Reject H_0
5	Less mobility	46.5	Low	V	0.26	2.75		
6	Gender issues	45.38	Low	VI	0.25	2.75		
7	Poor coordination with government departments	41.25	Low	VII	0.23	2.63		
	Overall	88.88	Medium		0.49			

It is clear from table 4 that overall the extension constraints were of medium severity. However, among the extension constraints, Less trainings on fisheries (143.25) and awareness about rights (138.75) were found to be high in severity, whereas, getting proper information about the programmes/schemes (111.38) and low literacy of beneficiaries (95.63) were medium severe based on weighted average scores. The non-parametric Friedman test revealed that there was a significant difference among the constraints at a 5% level of significance and the null hypothesis (H_0) is rejected ($p<0.05$) indicated that there is effect of extension constraints on beneficiaries in adoption of fisheries development programmes/schemes as the distribution of constraints based on mean rank shows disparity in severity of constraints.

The beneficiaries revealed that very less trainings conducted by Department of Fisheries on various aspects of fisheries are very less. Even if, the trainings are conducted, the seats for participation are limited. Many times the beneficiaries miss their participation in trainings as the venue is far from their place. Sometimes the topic of training is matter of concern. Government has introduced new schemes, but scientific knowledge is a barrier in adoption of new schemes. Trainings on advance technology should be provided for better adoption of new schemes. Similarly, many people are unaware about the schemes and their rights. This is because of poor publicity of schemes by department of fisheries affecting the dissemination of information about the programmes/schemes.

Studies on constraints faced by fishers/fish farmers have been reported by many workers. Similar results to present study were reported by researchers in India. Panday *et al.* (2013) [16] reported that the extension constraints faced by fishers of Manipur were lack of need-based training program, lack of farm and home visits by the extension workers, literacy, lack of family encouragement, inadequate family labor, insurgency and high wages of labor. Kumar *et al.* (2017) [13] reported lack of awareness about scientific fish culture practices as a major extension constraint faced by fish farmers in Bihar. Jana (2016) [9] revealed that lack of extension services, lack of government support, inadequate family labor and the norms and religious values excluded women or other groups from participating in certain activities were the extension constraints the fish farmers perceived Odisha, India. Angral *et al.* (2017) [2] reported lack of awareness regarding fisheries programs, lack of proper training/exposure visits, and no cooperation & coordination among the implementing agencies, like departments and financial institutions, as constraints perceived by fishers of Jammu & Kashmir. Chittem and Kunda (2017) [4] while studying constraint of shrimp farmers of Prakasam district, Andhra Pradesh reported lack of regular training programmes as a major extension constraint. Patil (2020) [19] revealed lack of regular training program, less extension and technical support as major extension constraint by shrimp farmers of konkan region of Maharashtra. Yadav (2022) [32-33] reported less coordination of fishers with fisheries organizations less mobility, low literacy of fishers, gender issues and less fisheries information were major extension constraints faced by fishers in Rajasthan.

Financial constraints
The financial constraints faced by the beneficiaries included six sub categories *viz.* Less credit availability, interest rate, untimely subsidies, high lease amount, high cost for nets and gears and high labour charges.
Weighted average of each sub category under financial constraints were calculated and ranked based on severity and non parametric Friedman test for significant difference among these constraints was applied (Table 5).

Table 5: Weighted average ranking and Friedman test results for financial constraints

S. No.	Constraints	WA	Severity	Rank	NMS*	Mean Rank	Chi-Square Value	Decision
1	Untimely subsidies	143.63	High	I	0.73	4.23		
2	High labour charges	133.88	High	II	0.80	4.50		
3	Less credit availability	130.88	High	III	0.74	4.08		
4	Interest rate	94.5	Medium	IV	0.53	3.08	153.176	Reject H_0
5	High cost for nets and gears	81.75	Medium	V	0.45	2.83		
6	High lease amount	62.63	Medium	VI	0.35	2.28		
	Overall	107.89	Medium		0.60			

The severity of financial constraints can be seen in Table.5. The overall severity is found to be medium with 107.89 weighted average score. Highest severity was found in the constraints such as untimely subsidies (143.63), high labour charges (133.88) and less credit availability (130.88). The severity of other constraints was found to be medium based on weighted average scores.

It was also reported the beneficiaries have to wait for inputs in culture practices until disbursement of subsidies. Many times subsidies are not disbursed in time, this extends the culture period ultimately increasing the production cost. Lack of credit availability for inputs also results the same as untimely subsidies. Until the subsidies are disbursed, the beneficiaries have to depend on money lenders for borrowing capital to carry out venture. The money lenders charge high-interest rates for borrowed money. Similarly, the non-availability of labor and labor charges are too high in the state, increasing fish production costs.

The non-parametric Friedman test revealed that there was a significant difference among the constraints at a 5% level of significance and the null hypothesis (H_0) is rejected ($p<0.05$) indicated that there is effect of financial constraints on beneficiaries in adoption of fisheries development programmes/schemes.

Many researchers have worked on financial constraints faced by fishers/fishermen in adoption of technology. The results of present study meets the findings of work carried out in different states of India. Panday and Diwan 2006 [15], reported that the lack of finance was the most deterrent constraint in fish farming, as inadequate and fewer bank funds for fish culture in Uttar Pradesh. Radheyshyam *et al.* (2011) [22] reported the lack of financial support for culture

operation and also revealed that community fish farmers have no sufficient funds for investment in leased community ponds and often failed to meet the requirement of operational expenditure in fish farming in Odisha. Jana (2016) [9] also revealed lack of adequate financial institutions in the locality, inadequate labor force to perform different activities, and unavailability of insurance facilities for fishers of Odisha as financial constraints. Patil (2020) [19] reported less availability of credit facilities as major financial constraint, followed by availability of crop insurance, the high-interest rate for a loan, and lack of financial support in shrimp farming of Maharashtra. Yadav (2022) [32-33] studied the financial constraints perceived by fishers of Rajasthan and revealed that less credit availability, high labor charges, high lease amount as major financial constraints. The study also found that the fishers usually do not have sufficient funds for investment and delay in sanctioning the subsidy/schemes affects the fisheries works.

Infrastructure constraints
The infrastructure constraints faced by beneficiaries are studied under seven sub categories – poor electricity, lack of market shed, lack of market availability, lack of ice storage facility, poor transportation facility, poor roads and lack of warehousing facility.

The weighted average score was calculated for all the constraints under financial constraints and ranked based on the severity. Further, the scores of each capital were normalised and normalised mean score was computed to apply Friedman test. Friedman test was applied to test the significance among the constraints at 5% level of significance based on mean ranks and chi-square value.

Table 6: Weighted average ranking and Friedman test results for infrastructure constraints

S. No.	Constraints	WA	Severity	Rank	NMS*	Mean Rank	Chi-Square Value	Decision
1	Lack of warehousing facility	138.38	High	I	0.77	5.36		
2	Lack of market availability	132.38	High	II	0.74	5.31		
3	Lack of Market shed	112.88	Medium	III	0.63	4.68		
4	Poor transportation facility	74.63	Medium	IV	0.41	3.58	203.629	Reject H_0
5	Poor roads	60	Low	V	0.33	3.05		
6	Lack of ice storage	57.38	Low	VI	0.32	3.02		
7	Poor electricity	56.25	Low	VII	0.31	2.99		
	Overall	90.26	Medium		0.5			

The severity of infrastructure constraints is presented in Table.6. Among the infrastructure constraints, lack of warehousing facility (138.38) and lack of market availability (132.38) were high in severity, whereas, lack of market shed (112.88) and poor transportation facility (74.63) were medium severe. The constraints such as poor road (60.00), lack of ice storage (57.38) and poor electricity (56.25) were found to be low in severity. Further, Friedman test results revealed that there was significant difference among the sub categories of financial constraints ($p< 0.05$). Therefore, the null hypothesis (H_0) was rejected. The mean ranks of the constraints were found to be in similar pattern of weighted average. Lack of warehousing facility is of major concern among the beneficiaries. The beneficiaries reported some instances that, many times the left over or unsold fish produce have to be kept in ice boxes or domestic refrigerators or freezers. The material cannot be stored in such conditions for long time resulting in degradation of

quality. Therefore, warehouses are required to store the fishes. Unavailability of warehouses leads to loss in quality that fetches less price of product in market. The beneficiaries also reported that unavailability of market facility and market sheds as a major problem. This lead to poor marketing chain and dependency on middleman or commission agents. If the market is developed near to the production area or nearby town, the producer can sell his/her produce by oneself. Presently, the producers have to take the produce to district level market (which is also unregulated) and sell the product. Further, the beneficiaries reported that because of unavailability of market sheds they have to sit roadside for marketing of fishes.

Panday and Dewan (2006) [15] also reported that the infrastructure constraints faced by the fish farmers of Uttar Pradesh, like ponds connectivity to road, cold storage, transportation facilities, markets, etc. that are essential from the viewpoint of taking fish produce to different markets in

good condition. Rahaman *et al.* (2013) [23] revealed that the lack of storage facility, the unsuitable position of the market yard, lack of processing units are the major infrastructure constraints faced by the fishers of West Bengal. Keshave (2015) [12] noted the major constraints faced by the fishers of Vidhrbha Region, Maharashtra, were poor storage facilities followed by high price volatility and more intermediaries. Patil (2020) [19] also noted the lack of storage facility at pond site, lack of good roads, lack of good transportation facility, and non-availability of a cold storage facility were the major infrastructure constraints faced shrimp farmers of Maharashtra. Yadav (2022) [32-33] reported lack of proper market availability in nearby areas, no regulated/organized market availability, lack of ice storage facility, lack of transportation facilities, improper roads and erratic electricity as infrastructure constraint in Rajasthan.

The results of the present study are in support to the other studies reported by researchers in other states. The fisheries infrastructure facilities in the state can be developed with the support of Fisheries and Aquaculture Infrastructure Development Fund and Pradhan Mantri Matsya Sampada Yojana, like organized/modern fish markets and ice-storage facility to reduce post-harvest losses and strengthen fish markets.

Core fisheries constraints
The core fisheries constraints faced by the beneficiaries included seven sub categories *viz.* availability of input (Seed/feed/fertilizers), availability of nets and gears, availability of ice, quality of pond water and soil, aquatic weeds/insects, weed fishes and fish diseases.

Weighted average of each sub category under core fisheries constraints were calculated and ranked based on severity and non parametric Friedman test for significant difference among these constraints was applied (Table 7).

Table 7: Weighted average ranking and Friedman test results for core fisheries constraints

S. No.	Constraints	WA	Severity	Rank	NMS*	Mean Rank	Chi-Square Value	Decision
1	Fish disease	151.13	High	I	0.84	5.6		
2	Weed fishes	124.88	High	II	0.69	4.92		
3	Aquatic weeds / insects	112.88	Medium	III	0.63	4.5		
4	Availability of input (Seed / feed / fertilizers)	88.13	Medium	IV	0.49	3.95	191.099	Reject H_0
5	Quality of pond water and soil	63.75	Medium	V	0.35	3.26		
6	Availability of nets and gears	52.88	Low	VI	0.29	2.96		
7	Availability of ice	49.5	Low	VII	0.28	2.83		
	Overall	91.88	Medium		0.51			

The severity of core fisheries constraints can be seen in Table.7. The overall severity is found to be medium with 91.88 weighted average score. Highest severity was found in the constraints such as fish diseases (151.13) and weed fishes (124.88). The severity of other constraints was found to be medium to low based on weighted average scores with the least score of 49.50 for availability of ice.

The beneficiaries reported that timely remedy or solutions to tackle fish diseases is not available. In case of severe disease outbreak in water body, complete stock of fishes is lost due to mortality. Many times proliferation of weed fishes results in less production from stocked fishes. This is because of impurity in fish seed purchased from unauthorized seed sources. Similarly, weed and insect infestation also result in mortality of seed. It was also reported that the beneficiaries have to wait for inputs in culture practices until disbursement of subsidies. Many times subsidies are not disbursed in time, this extends the culture period ultimately increasing the production cost.

The non-parametric Friedman test revealed that there was a significant difference among the constraints at a 5% level of significance and the null hypothesis (H_0) is rejected ($p<0.05$) indicated that there is effect of core fisheries constraints on beneficiaries in adoption of fisheries development programmes/schemes.

Panday and Diwan (2006) [15] and Radheyshyam *et al.* (2011) [22] reported the less availability of fish seed, seepage, excess weeds, etc., as constraints. Fish seed is considered to be the most crucial input for fish farming. Rahaman *et al.* (2013) [23] and Angral *et al.* (2017) [2] reported that the non-availability of adequate quantity and quality of seeds, feeds, and other inputs are the constraints faced by fishers of West Bengal and Jammu & Kashmir. Vignesh *et al.* (2017) [29] revealed that the presence of weeds/predatory fishes in ponds/water bodies causes poor fish recovery and production. These weeds/predatory fishes compete for feed, shelter and harm the fish seed. This was reported to be a severe issue that affected fish production. The overgrowth of aquatic plants and excessive algal blooms in ponds adversely affects primary productivity and fish production. Aquatic weeds remove many nutrients, deplete dissolved oxygen, cut off light penetration in water, restrict fish movement, and interfere with fishing operations. Sharma *et al.* (2018) [27] reported that the irregular supply of feed, lack of good quality feed, high cost of artificial and supplementary feed are the main constraints faced by fishers in Southern Rajasthan. Patil (2020) [19] revealed disease management as major constraint perceived by shrimp farmers in coastal districts of Maharashtra, followed by high cost of feed and less availability of quality seed. Yadav (2022) [32-33] reported presence of weed fishes like Amblypharyngodon mola, Channa spp., Notopterus spp., Wallago attu, Mastacembelus spp., etc. as most severe constraint followed by aquatic weeds/insects in pond/water bodies and fish disease management. The study also reported other constraints like quality of pond water (low and high pH, ammonia, turbidity, alkalinity, dissolved oxygen, salinity, etc.) and soil, less availability of input (Seed/feed/fertilizers), less availability of ice and less availability of nets and gears.

Results of the present study are similar to the other studies reported by researchers in other states. It was revealed that

proper guidance and awareness about management of fish diseases, eradication of weed fishes, insects and weed is required in order to enhance the fish production. This can be achieved through trainings and demonstrations.

Administrative constraints
Detailed inquiries were made concerning the administrative constraints faced by the beneficiaries. These constraints were sub categorized as – lack of cooperation between government officers and beneficiaries, undue delay in

sanction of scheme, lack of proper supervision, more paperwork, undue delay in selection of beneficiaries, improper coordination between financial institutions and local officials, inadequate information and education about the development programme, more frequent visits to DOF to get scheme sanctioned.
Weighted average of each sub category under administrative constraints were calculated and ranked based on severity and non parametric Friedman test for significant difference among these constraints was applied (Table 8).

Table 8: Weighted average ranking and Friedman test results for administrative constraints

S. No.	Constraints	WA	Severity	Rank	NMS*	Mean Rank	Chi-Square Value	Decision
1	More paperwork	137.63	High	I	0.76	6.02		
2	More frequent visits to DOF to get scheme sanctioned	122.63	High	II	0.68	5.16		
3	Inadequate information and education about the development programme	120.75	High	III	0.67	5.23		
4	Improper coordination between financial institutions and local officials	93.38	Medium	IV	0.52	4.52	193.840	Reject H₀
5	Lack of proper supervision	85.88	Medium	V	0.48	4.35		
6	Undue delay in sanction of scheme	82.88	Medium	VI	0.46	4.18		
7	Lack of cooperation between government officers and beneficiaries	81.38	Medium	VII	0.45	4.26		
8	Undue delay in selection of beneficiaries	27.75	Low	VIII	0.15	2.28		
		94.05	Medium		0.52			

The severity of administrative constraints is presented in Table 8. The overall severity is found to be medium with 94.05 weighted average score. Highest severity was found in the constraints such as more paperwork (137.63), more frequent visits to DoF to get scheme sanctioned (122.63) and inadequate information and education about the development programme (120.75). The severity of other constraints was found to be medium based on weighted average scores except undue delay in selection of beneficiaries (27.75). The non-parametric Friedman test revealed that there was a significant difference among the constraints at a 5% level of significance and the null hypothesis (H_0) is rejected ($p<0.05$) indicated that there is effect of administrative constraints on beneficiaries in adoption of fisheries development programmes/schemes.
The beneficiaries reported that there is more paperwork required for the submission of application of the schemes. Some beneficiaries also mentioned about following online process for submission of application, but unfortunately such provision or online system has not yet developed in department of fisheries. Beneficiaries also reported that frequent visits for updates on the application have to be done to department office. Proper information on schemes is also a matter of concern mentioned by many beneficiaries. However, it was also stated that the officials are not involved in selection of beneficiaries and selection is unbiased.
Studies done in other states have also reported similar results. Panday and Dewan (2006) [15] studied constraints in fish farming practices in Uttar Pradesh, India. The study reported that inadequate subsidy, lack of knowledge and extension support, non-existence/inactive cooperative societies are the major administrative constraints. Panday et al. (2014) [34] reported poor implementation of the fisheries development scheme, lack of policy support, inadequate extension contact, lack of a need-based program for any organization as major administrative constraints faced by fish farmers of Manipur. Jana (2016) [9] revealed that the

complicated procedure to get a loan involves a lot of paper works, lack of suitable policies of Government for the development of fishery sector, absence of an enforcement agency to monitor the supply of good quality seeds and feeds, absence of synchronized farming approach which makes a conducive environment, and lack of sufficient extension activities such as fair, demonstration, meeting, etc., were problems of fish farming in India. Patilkhede et al. (2018) [17] reported that inefficient execution & implementation of government programs, government grants not being properly distributed, lack of package of fish production, no training facilities, no timely information about the fish catch, inadequate resources, and infrastructural facilities were the main constraints in sustainable livelihood activities of fisherman of Konkan region of Maharashtra. Debbarma et al. (2019) [5] found constraints faced by tribal fishers of Tripura as inefficient implementation, delayed departmental proceedings, lack of timeliness in providing inputs, lack of coordination with the DoF staff, poor seed quality, transportation problems, improper selection of beneficiary and political influence. Yadav (2022) [32-33] reported that administrative constraints had a very high severity such as delay in sanction of scheme by fisheries organizations, less supervision by officials and improper coordination between fisheries institutions. The study also revealed that delays in selection of fishers, more paperwork, less cooperation between government officers and fishers, inadequate information and education about the development programmes and more visits required by fishers to fisheries organizations to get the scheme sanctioned are major administrative constraints faced by fishers of Rajasthan.

Conclusions
It can be concluded from the study that overall severity of constraints among the beneficiaries was found to be medium. However, among these, financial constraints and administrative constraints were found to be more severe

than other constraints. The non-parametric Friedman test revealed that there was a significant difference among the constraints. Highest severity was found in the constraints such as untimely subsidies, high labour charges and less credit availability. The beneficiaries have to wait for inputs in culture practices until disbursement of subsidies. Many times subsidies are not disbursed in time, this extends the culture period ultimately increasing the production cost. Lack of credit availability for inputs also results the same as untimely subsidies. Until the subsidies are disbursed, the beneficiaries have to depend on money lenders for borrowing capital to carry out venture. In this context, timely disbursement of subsidies from government department will be more helpful for beneficiaries. It was also reported that removal of weed fishes, aquatic weeds/insects from water bodies before seed stocking should be carried out and the water bodies should be stocked with fingerlings / advanced fingerling, this ultimately would be helpful for enhancement in production. Modern fish markets can be built with convergence of government organizations, fisherman associations and private organizations with the help of PMMSY and FIDF Fund. It is recommended that fisheries cooperatives should get training on new forms of marketing like online and fast home delivery methods to compete with modern trends.

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