

ROLE OF SHRIMP FARMING IN GENERATING EMPLOYMENT AND INCOME: A STUDY OF SMALL- SCALE SHRIMP FARMING IN WEST BENGAL, INDIA

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ABSTRACT

In the light of the usual allegation against shrimp farming as an employment displacing activity, this paper tries to examine the role of shrimp farming in generation of employment and income for small scale shrimp farmers in West Bengal, India using primary data collected from 208 traditional and scientific shrimp farmers in West Bengal. The analysis reveals that the labour used (including family labour) for traditional and scientific shrimp farming were 101 mandays per acre and 300 mandays per acre respectively. Both the figures were more than the labour requirement for paddy cultivation in West Bengal. The finding refutes the allegation against shrimp farming as an employment displacing activity as compared paddy cultivation. A comparison of the household income of sample shrimp farmers with the rural poverty line in West Bengal revealed that shrimp farmers of all the categories (small, medium and large) were above the poverty line. However, per capita annual household income of marginal traditional shrimp farmers was quite close to the poverty line which emphasizes the need for pondering special extension facilities to these shrimp farmers. The study also shows that on the whole shrimp farming accounted for about 70% of the annual household income of the sample households. However the importance of shrimp farming was lesser in the case of shrimp farmers with lesser shrimp farm size. This indicates the quest of marginal and small shrimp farmers to diversify their source of income in order to cover the risk associated with shrimp culture. On the whole shrimp farming was proved to be an employment generating activity and had contributed significantly to the income of the sample households.

Keywords: Shrimp farming, Family labour, Hired Labour, Employment, Household income

INTRODUCTION

One of the main reasons of the promotion of shrimp farming by the government is that, it has a potential to create employment in the coastal regions. The employment generated by shrimp farming consists of both direct and indirect employment in the processing, packaging and export sectors. Given the strong sectoral linkages, shrimp farming is expected to generate considerable amount of direct and indirect employment. The empirical literature gives mixed evidences about the employment generation from shrimp culture. The worldwide commercial shrimp culture employs about one person per tonne of produce i.e., approximately one million persons [1]. In order to capture the direct and indirect employment effects of shrimp culture Siriwardena [2] has calculated the employment multiplier in Sri Lanka. The multiplier was found to be one, which implies that for every one direct job created in shrimp industry one indirect job was created in Sri Lanka. The employment multiplier is higher in the developed countries like US, where the secondary sectors are much more developed. In 1994 it was reported that the Thailand shrimp culture industry employed around 97,000 people directly and 53,000 indirectly[3] . The ADB/NACA [4] report based on a survey of extensive, semi-intensive and intensive shrimp farms of Asian countries suggests that more intensive farming requires more labour than extensive farming, although India is an exception to this general rule. The report also asserts that semi-intensive and intensive shrimp farming may require at least as much labour as rice farming (which typically requires 6-12 person months/ha) or other feasible alternatives on brackish coastal

soils. Even though available literature suggests positive employment generation by shrimp culture at industry level and/or at country level, many micro level evidences contest the view about positive employment generation by shrimp culture. In the Indian context, Selvam and Ramaswamy [5] and Reddy *et al.* [6] in their studies of shrimp farms in Andhra Pradesh and Pondicherry respectively, have reported loss of employment due to extension of shrimp farming. Reddy *et al.*'s (2004)[6] study reveals a loss of 54 mandays employment per crop per acre as compared to paddy. The study by Selvam and Ramaswamy [5] also reports lesser labour employment of 90 mandays per hectare in shrimp culture as against 183 mandays per hectare in the production of rice. But none of the above studies has analysed in detail the pattern of labour use across the various activities in shrimp farming as well as among different size classes of shrimp farmers. Moreover, the micro-level studies by Selvam and Ramaswamy [5] and Reddy *et al.* [6] have not accounted for the family labour use in shrimp culture. Furthermore, these studies based on household level shrimp culture data have not examined the contribution of shrimp culture to the overall household income which could have shed light on the importance of shrimp farming in the rural economy and its potential to increase farm incomes and alleviate poverty. In this backdrop the present paper attempts to analyse the labour use pattern and employment generation capacity of shrimp farming and its contribution to household income in the case of household level small scale shrimp farming in West Bengal India

DATA SOURCE

The paper is based on an in-depth survey of 208 shrimp farmers, i.e. 100 scientific and 108 traditional shrimp farmers from West Bengal, which accounts for major share of shrimp area and output in India. Two districts, North 24 Parganas and East-Midnapur where traditional and scientific shrimp farming are predominant, and one block from each district, namely, Sandeshkhali –II and Khejuri were purposively selected for the survey. From each block two village (Gram) panchayats have been selected randomly to choose the households for the survey. Stratified random sampling method has been used to select the shrimp farming households, covering different strata of holdings^a. The reference year for the study is the shrimp culture year 2004-2005.

PATTERN OF LABOUR USE AND EMPLOYMENT IN SHRIMP FARMING

In the present paper labour use in shrimp farming has been examined in terms of the number of mandays used for shrimp farming per acre of area. Shrimp farming involves activities like excavation of shrimp ponds, construction of dykes around the ponds, farm operations like application of feed and other inputs, checking the water quality etc, harvesting and overall supervision which require labour. In this context it would be interesting to examine the quantum and the types of labour used by different size classes of shrimp farmers. Table I furnishes the information regarding hired and family labour used in traditional and scientific shrimp culture across different categories of shrimp farmers. It can be observed from the table that in the case of traditional shrimp culture the use of total labour input, more or less, shows an inverse relation with the size groups of shrimp farmers. While the marginal and small traditional shrimp farmers used 102 and 106 mandays of labour per acre respectively, medium and large shrimp farmers used 101 and 90 mandays of labour per acre respectively.

Table I: Use of Hired and Family Labour in Traditional and Scientific Shrimp Farming (mandays/acre) across Different Categories of Shrimp Farmers

Categories of shrimp farmers	Hired labour		Family labour		Total labour	
	T	S	T	S	T	S
Marginal	35 (34.31)	182.4 (54.79)	67.0 (65.69)	150.5 (45.21)	102 (100.00)	332.9 (100.00)
Small	74.1 (69.97)	192.3 (79.96)	31.8 (30.03)	48.2 (20.04)	105.9 (100.00)	240.5 (100.00)
Medium	85.9 (85.05)	217.7 (89.2)	15.1 (14.95)	26.3 (10.8)	101.0 (100.00)	244.0 (100.00)
Large	85.6 (94.69)	-	4.8 (5.31)	-	90.4 (100.00)	-
Total	67.8 (66.92)	187.7 (62.57)	33.5 (33.08)	112.3 (37.43)	101.3 (100.00)	300.0 (100.00)

Note: Figures in the parentheses indicate the percentages of total labour used. T and S denote Traditional and Scientific shrimp farming systems respectively

Source: Primary survey

The pattern of labour use across size groups of traditional shrimp farmers supports the findings of Farm Management Studies for Indian agriculture which shows that there is an inverse relationship between labour use and farm size, due to the higher availability of family labour relative to their land for the smaller size groups of farmers.

In the case of scientific shrimp farming the labour used per acre was highest for the marginal shrimp farmers but it did not differ much for the small and medium shrimp farmers. Though the amount of total labour used for these two size classes of shrimp farmers did not vary much, but the composition of hired and family labour varied. The medium scientific shrimp farmers used higher proportion of hired labour than the small shrimp farmers. The total labour used in scientific shrimp farming per acre was conspicuously higher than that of the traditional shrimp farming. On an average 300 mandays of labour per acre were used for scientific shrimp farming taking all the scientific shrimp farmers together as compared to 101 mandays per are for traditional shrimp farming. This result differs from the results of the [5]ADB/NACA (1995) report which suggests that the extensive shrimp culture with lower intensity used more labour than the more mechanized semi-intensive shrimp culture. This is not unexpected as we have considered purely village based household level shrimp farming. In this case the advanced machineries used might not be available to the scientific (semi-intensive) shrimp farmers which they have substituted by labour. Moreover, most of these shrimp farmers produced shrimp on a very small scale, which might also be the reason for their greater dependence on labour. For instance, sludge removal and cleaning of shrimp ponds after each year of farming should ideally be done with the help of tractors and pumping of water. But the sample shrimp farmers mainly depended on hired labour for performing these activities. In the case of scientific shrimp farming the labour used per acre was quite high for the marginal shrimp farmers. This indicates the complementary relationship between use of labour and the use of machines (like pumps, aerators etc.) for operations like cleaning and digging of shrimp ponds in the case of scientific shrimp farming.

Table I further reveals the types of labour used in traditional and scientific shrimp farming across different size groups of shrimp farmers. The table shows that on an average 33.08% of the total labour used for traditional shrimp farming was family labour when we take all the traditional

shrimp farmers into consideration. It is important to note that about 66% of the labour used by marginal traditional shrimp farmers was family labour. The percentage of family labour to total labour consistently declined with the increase in the shrimp farm size, while the percentage of hired labour varied directly with the size of shrimp farms. This could be explained by the higher availability of working members per unit of land holding for the marginal and small shrimp farmers as compared to those who owned shrimp farms of higher sizes. Moreover, as mentioned earlier the large shrimp farmers were big landholders too. Thus, the factors like considerations of traditions, caste, status, customs etc. might have accounted for relatively low use of family labour by the large shrimp farmers [7]

In the case of scientific shrimp farming the percentage of family labour used as a percentage of total labour is 37.43% which is slightly higher than that of traditional shrimp farming. Since, scientific shrimp farming involves use of machines for aeration, cleaning and dewatering of shrimp ponds for harvesting the product, the higher use of labour seems to be surprising. But it should be noted that the quantum of family labour required for supervising the scientific shrimp farms for ensuring proper application of feed, fertilizer and medicines was quite high. The shrimp farmers often spent months together in the sheds of their farms for supervising and guarding the shrimps from theft. The percentage of family labour used for scientific shrimp farming varied inversely with the size groups of shrimp farmers. The higher availability of family workers per unit of total landholdings can explain the higher use of family labour for scientific shrimp farming. Table I also reveals that the percentage of hired labour was distinctly higher than that of the family labour in scientific shrimp farming system for all the categories of shrimp farmers. In the case of traditional shrimp farming, except the marginal shrimp farmers, all the other categories of shrimp farmers used more hired labour than family labour. On the whole, both the shrimp farming systems employed higher percentage of hired labour than family labour. This states that shrimp farming has potential to generate employment to the rural folk who work as casual workers in the area.

Now let us examine the question of loss of employment due to shrimp farming in the rural areas as compared to other competing activities like paddy cultivation in the context of our study areas in West Bengal. As per the report of Commission for Agricultural Cost and Pricing [8](CACPC, 2004-2005), the average labour required for paddy cultivation in West Bengal is 141.4 man days per hectare which is equal to 57 mandays per acre (considering one man-day equal to 8 working hours)[9] [GOI,2005]. Comparing the labour required for paddy in the state and the labour input used by shrimp farmers in the study area, it can be said that labour used by shrimp farmers was much higher than that for paddy in the state. But this has to be scrutinized carefully. In case, there was high inefficient use of family labour (or underemployment of family labour), the statement that there was no loss of employment because of the advent of shrimp farming has to be interpreted with caution. Still, the use of hired labour input for both the shrimp farming systems per acre was higher than that of the labour required to cultivate paddy in West Bengal. This strengthens the argument regarding higher employment generating capacity of shrimp farming as compared to paddy cultivation especially when it is undertaken at small scale and at household level.

IMPORTANCE OF SHRIMP FARMING IN HOUSEHOLD INCOME

Despite the high risk involved with shrimp farming, the sample shrimp farming households switched to shrimp culture because of its better returns as compared to agriculture. Shrimp farming emerged as an alternative to agricultural activities in the study area and led to a change in the land use and occupational pattern of the sample shrimp farming households. Thus it is important to examine the relative contribution of shrimp farming in the net annual income of the sample households. Even though the economics of shrimp farming has been addressed by a number of studies, the contribution of shrimp farming to the household income has not been

adequately dealt with. Hence we may examine the contribution of shrimp farming to the household income for traditional and scientific shrimp farmers. The composition of household income across the categories of shrimp farmers is presented in Table II. The figures for income in the table represent the net annual income as reported by the sample shrimp farmers. The income from shrimp, livestock and agricultural income indicates the net income after deducting paid-out costs for the respective activities. It can be observed from Table II that the total income of the shrimp farming households in the case of traditional shrimp farming taking all the shrimp farmers together was Rs. 112452.5 per annum per household. But the average annual net income of the traditional shrimp farming households varied widely with the size of shrimp farms owned by the households. The average annual income ranged from Rs. 25081 for marginal traditional shrimp farmers to Rs. 474049 for the large shrimp farmers. The net annual income for medium traditional shrimp farmers was reported to be Rs. 76942 which is quite less than the large shrimp farmers in the case of traditional shrimp farming. The table further reveals that shrimp farming contributed to 78.3% of the annual household income of the traditional shrimp farmers taking all the traditional shrimp farmers into consideration. But it should be pointed out that the percentage contribution of shrimp farming to total household income increased with an increase in the size of the shrimp farms. While among the marginal traditional shrimp farmers shrimp farming accounted for only 25% of the total household income, for large and medium traditional shrimp farmers its share was quite high. Another striking observation from the table is, that non-fisheries related business was also a major source of income for the marginal traditional shrimp farmers accounting for 28% of their annual household income followed by other fisheries related activities. This indicates that the marginal traditional shrimp farmers diversified the risk associated with shrimp farming by engaging also in other activities. The higher income from shrimp farming might have given them the opportunity to invest on other activities like petty businesses etc.

In the case of scientific shrimp farmers the average annual income per household was Rs. 145687. In this case also we can observe a wide range of variation across different size groups of shrimp farmers. In this case the average household income per annum ranged from Rs. 52604.7 for marginal shrimp farmers to Rs. 731807 for medium shrimp farming households. On an average, 77.5% of the annual household income was contributed by shrimp farming. But it can be noticed that the medium scientific shrimp farmers depended almost entirely on shrimp farming which contributed more than 92% of their income. In the case of scientific shrimp farming also the contribution of shrimp farming in the annual income of the marginal shrimp farmers was 38% which is quite lower than the contribution of shrimp farming to the household income of the other categories of shrimp farmers.

Table II also reveals that the percentage contribution of shrimp farming in the households income for marginal, small and medium scientific shrimp farmers are higher than that of their counterparts in the case of traditional shrimp farming. This signifies that shrimp farming is a more important source of income for these categories of shrimp farmers in the case of scientific shrimp farming.

Table II : Distribution of Household Income for Traditional and Scientific Shrimp Farmers

Categories of shrimp farmers	Agriculture		Shrimp farming		Other fisheries related activities		Other business and services		Labour		Livestock		Total	
	T	S	T	S	T	S	T	S	T	S	T	S	T	S
Marginal	4698.3 (18.7)	13503.6 (25.7)	18729.7 (25.2)	20054.3 (38.1)	4931.0 (19.7)	3416.7 (6.5)	6931.0 (27.6)	17118.9 (32.5)	1007.1 4 (4.0)	-	593.1 (2.4)	-	25081.3 (100.00)	52604.7 (100.00)
Small	3325.0 (10.5)	6697.5 (5.3)	32424.7 (40.2)	102467.2 (81.3)	5358.9 (16.7)	4708.3 (3.7)	9637.5 (30.4)	13416.1 (10.6)	400.00 (1.3)	-	370.0 (1.2)	-	31706.5 (100.00)	126085.2 (100.00)
Medium	7952.3 (10.3)	17557.4 (2.4)	79052.4 (64.0)	677400.5 (92.6)	6904.76 (9.00)	27727.3 (3.8)	12809.5 (16.6)	10818.2 (1.5)	0.0 (0.0)	-	47.6 (0.06)	-	76942.3 (100.00)	731807.5 (100.00)
Large	7166.7 (1.5)	-	333872.1 (88.8)	-	18611.11 (3.9)	-	27083.3 (5.7)	-	0.0 (0.0)	-	166.7 (0.03)	-	474079.6 (100.00)	-
All	5233.8 (4.7)	12194.3 (8.4)	88055.1 (78.3)	112954.1 (77.5)	7775.70 (6.9)	6557.9 (6.9)	12435.1 (11.1)	15421.2 (10.6)	413.0 (0.36)	-	333.3 (0.29)	-	112452.5 (100.00)	145687.1 (100.00)

Note: Figures in the parentheses imply the percentages of total income, T and S denote traditional and scientific shrimp farmers respectively. Source: Primary survey.

Now let us examine how far the sample rural households culturing shrimp fare in relation to the poverty line. In order to compare the household income of the shrimp farmers with the poverty line we have considered the poverty line estimated by the Planning Commission (GOI, 2004-2005) for West Bengal. The rural poverty line estimate by the Planning Commission for West Bengal is Rs. 382 per capita per month implying Rs. 4584 per capita per annum. Table III presents the per capita household income of traditional and scientific shrimp farmers.

Table III: Per capita Household Income per Annum for Traditional and Scientific Shrimp Farmers (Rs. per annum)

	Traditional shrimp Farmers	Scientific shrimp farmers
Marginal	4606.40	7048.02
Small	5188.15	25406.75
Medium	12359.06	112368.99
Large	82984.24	-
All	19392.30	23223.01

Source: Primary survey

Taking all the shrimp farmers together the per capita household income per annum for the sample traditional shrimp farmers was reported as Rs. 19392 which was quite higher than the poverty line estimated for West Bengal. Moreover, the annual household income for all the categories of shrimp farmers is above the poverty line. While the position of marginal traditional shrimp farmers were not much above the poverty line, the per capita per annum household income of large traditional shrimp farmers were as high as above Rs. 80,000.

In the case of scientific shrimp farmers the average per capita annual household income was Rs. 23223 which was quite high and above the poverty line. In this case also the difference in the per capita income of the shrimp farming households across different size groups was quite high. The average per capita household income for traditional shrimp farmers was less than the average per capita annual household income of the scientific shrimp farmers. The above analysis reveals that shrimp constituted a major portion of the household income in the case of both traditional and scientific shrimp farming. The contribution of shrimp farming in total household income increased with the increase in shrimp farm size. The marginal and small shrimp farmers depended on fisheries and other business related activities for spreading the risk involved in culturing shrimp. As shrimp farming constituted a major part of the household income it was quite an important activity in improving the economic status of the sample shrimp farm households.

CONCLUSION

The present paper examines the pattern of labour employment in shrimp farming and its contribution to the household income using primary data collected from 108 traditional and 100 scientific shrimp farmers in West Bengal, India. An examination on the labour use pattern of shrimp farms reveals that traditional shrimp farming absorbs lesser labour than scientific shrimp farming. This is opposite to the fact found by other studies that in India the extensive/traditional shrimp farming is more labour intensive. But, both the shrimp farming systems absorb more labour on the whole as compared to that required for paddy cultivation in West Bengal. This finding refutes the allegation against shrimp farming an employment displacing activity. An analysis of the productivity of labour shows that in case of both traditional and scientific shrimp farming systems, the productivity of labour was positively related with the size of the shrimp farms. Shrimp farming also contributed significantly in the household income of the sample shrimp farmers, accounting for about 70% of the household income for both traditional and scientific

shrimp farming. It was also observed that the importance of shrimp farming was less in the case of shrimp farmers with lower farm size. It is significant to note that the shrimp farmers of all the categories were above the poverty line. Considering the high income from shrimp farming most of the traditional shrimp farmers wanted to continue shrimp farming. But a considerable number of shrimp farmers also expressed their opinion that even if they were not interested to continue shrimp farming given the high risk associated with shrimp farming, they had no alternative, since they had already converted their lands into shrimp farms. As a whole shrimp farming was proved to be an employment generating activity and had contributed significantly to the income of the sample households.

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ENDNOTES

- a. Shrimp farm households were classified into four categories according to their operating area under shrimp farming, i.e, marginal - less than 1 acre operational holding under shrimp farming, small - greater than or equal to 1 acre but less than 2.5 acres operational holdings under shrimp farming, medium - greater than or equal to 2.5 acres but less than 5 acres of operational holding under shrimp farming and large - greater than or equal to 5 acres of operation holding for shrimp farming