

# IAMWARM SRI Method of Rice Farmers and non IAMWARM Rice Farmers in Tiruvannamalai District- A comparative Analysis

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**ABSTRACT:** : This paper examine involvement of farmers in agricultural scheme (IAMWARM) that too specifically SRI method of rice cultivation and non IAMWARM Rice Farmers. The study made use of primary data which was collected from the farmers of Tiruvannamalai district is analyzed by simple percentage analysis. The results, family composition that the average size of family was 6.59 and 5.89 in both IAMWARM and non IAMWARM farmers. An analyzed in to age-wise composition of respondent reflects, younger farmers had an inclination in accepting SRI of Paddy cultivation in under a IAMWARM scheme. The level of literacy influences the understanding of new technology and scheme. Size of farm holding, the both IAMWARM and non IAMWARM farmers own land only constituted 100 per cent. Farming activities was the major contributor to the total income of the households in the study area. The total cost of paddy production ranged from Rs.31366 / ha in IAMWARM and Rs.36165/ha in non IAMWARM farmers. Data Envelopment Analysis was used to estimate the technical, scale efficiency and return to scale. Majority of the farmers of Tiruvannamalai district gets benefited by adopting SRI method. It paves a income to the farmers, thereby reducing the inputs charge.

**Key Words:** SRI, IAMWARM, Data Envelopment Analysis, Technical efficiency

## INTRODUCTION

Tamil Nadu Irrigated Agriculture Modernization and Water bodies Restoration and Management (IAMWARM) is a multidimensional project that envisages bringing about positive changes in the context of Irrigated Agriculture and Farm ecology & economics, involving multiple stake holders both at facilitation and Implementation levels. The project is being implemented in 63 sub basins in Tamil Nadu. The Project intends to expand the area under Irrigated Agriculture through effective and efficient Irrigated Water Management practices in order not only to grow more crops per drop, more meat, milk and more fish per drop but also to facilitate the farmer in achieving more income per drop of water that he uses for agriculture. The project formulated with World Bank assistance was approved by the Government with an outlay of Rs.2, 547 crore, over a period of six years from 2007 to benefit 6.17 lakh hectares. Eight Line Departments are involved in implementation of the Project viz. Water Resources, Agriculture, Agricultural Engineering, Agricultural Marketing, Horticulture, Animal Husbandry, Fisheries and Tamil Nadu Agricultural University. The IAMWARM Scheme is one of the Important Scheme in Tiruvannamalai district which paves the way for economic level of the farmers. This Scheme was implemented in the year of 2009-10. Tiruvannamalai district includes six sub basins. The TN IAMWARM operation starts from 2010 -11 and 2012-13 in Thurijjalar and Pamanar-Varatar sub-basins respectively. Out of 89 revenue villages in the block 54 villages comes under TN IAMWARM project in which 34 villages with the ayacut area of 1621 ha located in Tirunjalur sub-basin and 1213.54 ha ayacut area in 20 villages located in Pamanar-Varatar sub-basin.

The concept of SRI was developed in Madagascar in early 1980's by late Fr. Henri de Laulanie' and can be adopted with suitable modifications to any ecosystem. Many countries like Indonesia, Madagascar, Bangladesh, Srilanka, China etc. reported many fold increase in rice grain yield with adopting SRI method. In Tamil Nadu, an amount of Rs. 40.5 cores has been allocated in the World Bank-funded IAMWARM project for supporting SRI during the period 2007- 2008 to 2012-2013. Introduction of SRI in India began in 2000 in Tamil Nadu, Puduchery, and Tripura.

## OBJECTIVES

- To analysis the socio economics status of IAMWARM and non IAMWARM farmers
- To analyses the crop yield and income of IAMWARM and non IAMWARM farmers
- To estimate the technical efficiency of SRI method of rice in IAMWARM and non IAMWARM farm.

## METHODOLOGY

The study was based on primary as well as secondary data. There are six rivers in this District, there forms this Varahanadhi, Ongur, Pambanar & Varatter, and Pambar to Tirukoilur, Thrinjilar, Cheyyar & Kiliya sub basins are divided Thiruvannamalai District, IAMWARM operated in the all the six sub basin, among that two were randomly selected viz., Thuringalar (4442.63ha) and Pambanar & Varattar (1213.54 ha). The two sub-basins are covered 54 villages.

**Sampling:** The sample of 60 IAMWARM SRI Farmers and 60 non IAMWARM SRI Farmers in Thiruvannamalai District. The District cover the 18 Blocks among that 2 were randomly selected Viz., Thiruvannamalai and Thandarpattu. The relevant primary data are collected from the IAMWARM respondents using interview schedule the collected data are classified and tabulated with the help of computer programming.

**Tools of Analysis:** The following statistical tools were employed for the analysis and the interpretation of the data. 1) Percentage analysis was used for making simple comparisons. 2) Cropping Intensity was measured as ratio of sum of area planted under different crop and harvested in a single year, to the net cultivated area the cropping intensity was expressed percentage. 3) Cost of cultivation and Data Envelopment Analysis was used to estimate the technical, scale efficiency and return to scale.

## RESULTS AND DISCUSSIONS

### Family Composition:

The family composition of the sample households is presented in Table-1

**Table-1 Family Composition of Sample Farmers (in Avg)**

S.No	Particulars	IAMWARM	Non IAMWARM
1	Males	0.96 (14.50)	0.93 (15.81)
2	Females	1.81 (27.20)	1.73 (29.40)
3	Children	1.91 (29.20)	(1.55) (26.30)
4	Dependents	1.91 (29.20)	1.68 (28.60)
5	Average Size of Family	6.59 (100)	5.89 (100)

It could be seen from the above table that the average size of the family was lower in Non IAMWARM farmers, which accounted for 6.59 followed by 5.89 As usual, the children shared a higher percentage in IAMWARM farmers and the percentage of dependent farmers more in IAMWARM farmers.

### Age of the Sample Farmers:

The age of the heads of farm house holds were analyzed and results are furnished in Table-2

**Table-2 Age Distribution of the Sample Farmers (in no)**

S.No	Age in Year	IAMWARM	Non IAMWARM
1	< 35	3 (5)	3 (5)
2	36-50	43 (72)	23 (38)
3	>50	14 (23)	34 (57)
	Total	60 (100)	60 (100)

Table 2 showed that among the total IAMWARM sample farmers, 43 farmers (72per cent) were in the age group of between 36 to 50 years, but the Non IAMWARM farmers, 34 farmers (57 per cent) were in the age group of between the 50 years respectively; Other then, Non IAMWARM farmers, 23 (38 per cent) were in the age group of between 36-50 years correspondingly. An analysis in to age-wise composition of respondent reflects, younger farmers had an inclination in accepting SRI of Paddy cultivation in under IAMWARM scheme.

### Education Status

The educational status of the heads of farm house holds was analyzed and the results are presented in Table-3.

**Table-3 Education Status of Sample Farmers (in no)**

S.No	Education Status	IAMWARM	NON IAMWARM
<b>I</b>	<b>Illiterates</b>	<b>3</b> <b>(5)</b>	<b>8</b> <b>(13)</b>
II	Literates'	11	9
1)	Primary	(18)	(15)
2)	Secondary	27 (45)	22 (37)
3)	Higher secondary	9 (15)	13 (22)
4)	College level	10 (17)	8 (13)
<b>III</b>	<b>Total literates</b>	<b>57</b> <b>(95)</b>	<b>52</b> <b>(87)</b>
<b>IV</b>	<b>Total</b>	<b>60</b> <b>(100)</b>	<b>60</b> <b>(100)</b>

The level of literacy influences the understanding of new technology and scheme. As revealed from the table the literacy level of sample farmers was relatively high at 95 per cent and 87 per cent for IAMWARM and Non IAMWARM farmers respectively.

### Size of Farm Holdings:

The farm holdings of the sample respondent were analyzed and results are furnished in Table-4

**Table-4 Average Size of Farm Holding (in ha)**

S.No	Type of land	IAMWARM	Non IAMWARM
		Area in ha	Area in ha
1	Owned land	4.44	3.27
2	Leased in land	-	-
3	Leased out	-	-
	<b>Total size</b>	<b>4.44</b>	<b>3.27</b>

It could be seen from the above table that the average size of the IAMWARM farms was 4.44 hectares, while it was 3.27 hectares for Non IAMWARM farms. Own land only constituted 100 per cent in both IAMWARM and Non IAMWARM farms.

### Source of Income

The source of Income the sample households is presented in Table-5

**Table -5 Source of Income (Rs in Lakh)**

S.No	Sources	IAMWARM	NON IAMWARM
1	Farm Income	370398.25 (73.11)	168917.5 (66.50)
2	Off Farm income	36022.72 (19.80)	25083.33 (23.70)
3	Non Income	100200 (7.11)	60000 (9.87)
4	Total Income	506620.97 (100)	254000.83 (100)

It could be seen from the above table that among the various source of income, farming activities was the major contributor to the total income of the households in the study area, but a closer look revealed many interesting facts. As expected, not only the farm income in non IAMWARM farms was higher in absolute term but its share in total family income was relatively high. The IAMWARM farmers' income was 73 per cent of total farming income, non IAMWRAM farmers income was 66 per cent of total farm income.

**Experience of Farmers in IMWARM SRI Cultivation**

The experience in farming would have helped the farmer to take concrete and appropriate decision regarding their involvement in farm activities. In present study, farming experience means the total number of years of experience possessed by an individual in farming including SRI.

**Table -6: Experience of Sample Farmers in SRI method of Paddy Cultivation (in no)**

S.No	Experience in year	IAMWARM
		Numbers
1	1year	9 (15)
2	2-5 years	19 (32)
3	>5years	32 (53)
<b>Total</b>		<b>60 (100)</b>

It could be seen in the above table and that most of IAMAWRM beneficiaries have a farming experience of above 5 years because the IAMWARM farmers adopted the new technology under a IAMWARM scheme. IAMWARM beneficiaries with such period of farming it was easier for IAMWARM introduce new technology practices because those farmers are still fresh to adopt any farming so the table depicted that 53 per cent and 32 per cent are IAMWARM beneficiaries that have above 5 years, 2 -5 years of farming respectively

**Experience of non IAMWARM Farmers of Paddy Cultivation**

Experience of non IAMWARM farmers of paddy cultivation is presented in Table 8

S.No	Experience in year	IAMWARM
		Numbers
1	<5 year	3 (5.00)
2	5-10 years	8 (13.33)
3	11-15years	13 (21.66)
4	16-20 years	15 (25)
5	21-25 years	8 (13.33)
6	>25 years	13 (21.66)
<b>Total</b>		<b>60 (100)</b>

It could be seen in the above table that the most of the non IAMWARM beneficiaries have a farming experience above 25 years (21%) followed by 5-10 years (13.33%) experience of paddy.

**Area under Paddy**

The area spread on the sample rice farmers are furnished in Table - 9

**Table - 9 Area under Paddy in Sample Farmers**

SI. No.	Size Group	IAMWARM SRI			Non IAMWARM		
		Number	Total Area	Percentage	Number	Total Area	Percentage
1.	Marginal (> 1 ha)	12	0.12	20.00	15	0.11	25.00
2.	Small (1 - 2 )	24	0.752	40.00	21	0.475	35.00
3.	Medium	24	0.575	40.00	24	0.745	40.00

	(2 - 4)						
	<b>Total</b>	<b>60</b>	<b>1.78</b>	<b>100.00</b>	<b>60</b>	<b>1.98</b>	<b>100.00</b>

It would be inferred from the table 9 This accounted for more than 70 per cent of the farmers which indicated the SRI method of rice cultivated under a IAMWARM scheme was cultivated mostly in small and medium farmers.

The average area under paddy was 1.78 hectares in SRI farms in IAMWARM scheme. In non IAMWARM SRI farm, 40.00 percent of sample area cultivated paddy medium farms. The average area to under non IAMWARM SRI farm was 1.98 ha.

### Economic of Production

#### Total Cost and Returns

The cost of cultivation and net returns realized per hectare in IAMWARM, non IAMWARM beneficiaries in SRI method were worked out and presented in table 10

##### i. Variable Cost

The variable costs incurred by the sample farmers in IAMWARM, non IAMWARM farmers are presented in table 10

**Table -10 Cost of Production of Paddy SRI in IAMWARM and Non IAMWARM Beneficiaries (Rs. /ha)**

S.No	Particulars	IAMWARM	Non IAMWARM
<b>I</b>	<b>Cost A1</b>		
1	Human Labour	5623 (25.63)	7,123 (28.04)
2	Machine Labour	7650 (34.94)	7,752.45 (30.52)
3	Seed	217.18 (0.99)	1,729.17 (6.81)
4	Manures	2,318.75 (10.59)	1,900.29 (7.48)
5	Fertilizers	3,436.56 (15.69)	3,645.54 (14.35)
6	Plant protection chemicals	733.54 (3.35)	938.54 (3.64)
7	Irrigation charge	484.33 (2.21)	649 (2.56)
9	Interest on working capital	1,432.43 (6.54)	1,661.66 (6.54)
10	Total variable cost	<b>21,895.8</b> <b>(100)</b>	<b>25,399.11</b> <b>(100)</b>
	<b>Cost A2</b>		
11	Impact mental value of owned land	3270.50 (34.50)	4150.20 (38.54)
12	Rent paid for leaded in land	3740 (39.50)	3905 (36.27)
13	Interest on fixed assets other than land	1653.60 (17.46)	1850.40 (17.18)
14	Deprecation on building	670.80 (7.08)	695.30 (6.50)
15	Land revenue and cess	435 (1.42)	165.50 (1.53)
<b>II</b>	<b>Cost AII</b>	9470 (100)	10766.4 (100)
	<b>Total cost(A1+AII)</b>	31366.08 (100)	36165.51 (100)

A scan over the table explains that, the variable cost was higher in non IAMWARM farmers with 25,1399 per hectare and was lower in IAMWARM with Rs.21895 per hectare are cost of human labour accounted for largest share in total variable costs with 25.68 per cent and 28.04 per cent respectively. **Cost of machine labour value in IAMWARM and non IAMWARM farmers paddy cultivation** with 34.94 per cent and 30.52 per cent of total cost. In IAMWARM farmers, the cost fertilizers were 15.69 per cent and in non IAMWARM farmers it was 14.35 per cent. The other items contributed only 14.93 per cent of the total variable cost when compared to IAMWARM farmers, the variable cost of non IAMWARM farmers paddy cultivation was high (17.06 per cent) because of more level of human laborers, seed, fertilizers and plant protection chemicals were used.

**ii. Fixed Cost**

Fixed costs are those which do not vary the level of output. The fixed costs incurred by the sample farmers in IAMWARM and non IAMWARM SRI method were worked out and the results are given in table 10.

From the table it could be observed that fixed cost was higher in non IAMWARM SRI farmers. Paddy cultivation as compared to IAMWARM SRI farmers paddy cultivation, which accounted for Rs.9470 per hectare in the former and Rs. 10766 per hectare respectively.

**iii. Total Costs**

**Table 11 Total Cost incurred in IAMWARM and non IAMWARM**

S.No	Particulars	IAMWARM value	Non IAMWARM value
1.	Variable cost	21895.8 (69.80)	25,399.11 (70.23)
2.	Fixed cost	9470 (30.19)	10766.40 (29.76)
	<b>Total</b>	<b>31366.08</b> <b>(100)</b>	<b>36165.51</b> <b>(100)</b>

The cost of cultivation was Rs 31366 per hectare in IAMWARM SRI method and Rs 36165 in non IAMWARM SRI method. In IAMWARM SRI method and non IAMWARM conventional method, the contribution of fixed cost was 30.19 per cent and 29.76 respective. The contribution of variable cost was 69.80 per cent and 70.23 per cent respectively. Total cost non IAMWARM SRI Method was significantly higher because of high variable cost and fixed cost involved in non IAMWARM SRI Method of paddy cultivation.

**Returns**

The gross income and net income realized per hectare of IAMWARM SRI and non IAMWRAM SRI are presented in Table 12

**Table 12: Income from IAMWARM SRI and non IAMWARM SRI of Paddy Cultivation**

S.No	Particulars	IAMWARM	Non IAMWARM
1	Gross Income		
	i) Grain income	64205.03	48776.21
	ii) Straw income	7500	7500
2	Total cost Rs/ha	31366.08	36165.51
3	Net profit Rs/ha	40338.95	201107

It could be seen from the table that the gross income was higher in IAMWARM SRI Rs.71705 and non IAMWARM SRI 56276 per hectare respectively. The indicated the economic advantage of IAMWARM SRI over non IAMWARM SRI.

**Technical Efficiency of IAMWARM and non IAMWARM**

Data Envelopment Analysis was attempted to measure the technical efficiency of IAMWARM and non IAMWARM. Data Envelopment Analysis was attempted to measure the technical efficiency of Rice. The Data method is frontier method that does not require specification of a functional or distributional form, and can accommodate scale issue, in this methodology based on the works of Farrell (1957) and Farser and cordina (1999). The result of DEA, technical and scale efficiencies of rice is furnished in Table 13

To obtain efficiency level of each of the farm as decided by the physical inputs (quantities), DEA modals, which are inputs- oriented, were used at different production scale under the assumption of

constant returns to scale (CRS). After introducing convexity in the CRS model, the variable returns to scale (VRS) were estimated by using the efficiency level of these CRS and VRS models, the scale efficiency for each farm was obtained the results on efficiency measures (with constant and variable returns) and the descriptive statistics for IAMWARM, non IAMWARM SRI paddy production farms table 13 The criterion used by Ferreira (2005) was used in the present study to decide the cut- off score for efficient farms- farms that operated at 0.90 or more score were considered as “efficient farms”.

**Table 13 Efficiency Measures and Descriptive Statistics for IAMWARM, non IAMWARM Rice Producing Farms according to Scale of Operations in the Study Area**

Scale of operation	Efficient firms (0>0.90)		Efficiency measures			
	No.	%	Mean	Standard deviation	Maximum	Minimum
<b>IAMWARM</b>						
Technical efficiency (constant returns)	25	37.70	0.89	0.20	1.00	0.63
Technical efficiency (variable returns)	18	28.80	0.86	0.20	1.00	0.65
Scale efficiency	22	33.56	0.95	0.07	1.00	0.94
<b>Non IAMWARM</b>						
Technical efficiency (constant returns)	28	36.60	0.72	0.15	1.00	0.45
Technical efficiency (variable returns)	19	25.50	0.74	0.15	1.00	0.45
Scale efficiency	29	37.97	0.98	0.02	1.00	0.86

It could be observed from the Table 13 that the variation in the level of technical efficiency (constant return) of IAMWARM ranged from 63.00 to 100.00 with mean efficiency of 89.00 per cent followed technical efficiency (variable returns) of IAMWARM ranged from 65 to 100.00 with mean efficiency of 86.00 per cent and another scale operation is scale efficiency of IAMWARM ranged from 94.00 to 100.00 with mean efficiency of

95.00 per cent. the variation in the level of technical efficiency (constant return) of non IAMWARM ranged from 45.00 to 100.00 with mean efficiency of 72 per cent and technical efficiency (variable returns) of non IAMWARM ranged from 45.00 to 100.00 with mean efficiency 74 per cent another operation is scale efficiency ranged from 86.00 to 100.00 with mean efficiency 98 per cent.

### Summary and Conclusion

To summarize the results, an analyzed in to age-wise composition of respondent reflects, younger farmers had an inclination in accepting SRI of Paddy cultivation in under a IAMWARM scheme. The level of literacy influences the understanding of new technology and scheme. As revealed from the results the literacy level of IAMWARM sample farmers was relatively high (8%) compared to Non IAMWARM farmers. More proportion of primary level and high education of IAMWARM farmers indicated the literacy level of farmers had a positive effect of adoption of IAMWARM scheme. Own land only constituted 100% in both IAMWARM and Non IAMWARM farms. The average size of the IAMWARM farms relatively high (1.17ha), compared to Non IAMWARM farms. Farming activities was the major contributor to the total income of the households in the study area, but a closer look revealed many interesting facts. As expected, not only the farm income in non IAMWARM farms was higher in absolute term but its share in total family income was relatively high. The IAMWARM farmers income was 73% of total farming income, non IAMWARM farmers income was 66 % of total farm income. The most of IAMAWRM beneficiaries have a farming experience of above 5 years because the IAMWARM farmers adopted the new technology under a IAMWARM scheme The cost of cultivation was Rs 31366/ha in IAMWARM SRI method and Rs 36165/ha in non IAMWARM SRI method. In IAMWARM SRI method and non IAMWARM conventional method, the contribution of fixed cost was 30.19% and 29.76% respectively and contribution of variable cost was 69.80% and 70.23%. Total cost non IAMWARM SRI method was significantly higher because of high variable cost and fixed cost involved in non IAMWARM SRI method of paddy cultivation. The gross income was higher in IAMWARM SRI Rs.71705

and non IAMWARM SRI 56276/ha. The indicated the economic advantage of IAMWARM SRI over non IAMWARM SRI. The level of technical efficiency of IAMWARM average ranged from 65.00 to 100.00 with mean efficiency of 89.00%. The level of technical efficiency of non IAMWARM average ranged from 45.00 to 100.00 with mean efficiency of 72%. In SRI method of cultivation, difficult crop management practice was the major problem in the study area.

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