Chapter I

Introduction
CHAPTER I

INTRODUCTION

Much of the credit for the impressive strides made on the agricultural front in India goes to the several million small farming families that form the backbone of Indian agriculture and economy. Enhanced production strategies, research and extension for crops and alike have significantly helped to increase food production and its availability. Yet, India accounts for one-fifth of the world’s poor.

India has high population pressure on land and other resources to meet its food and development needs. The natural resources like land, water and bio-diversity are also under severe pressure. India demands an extra 2.5 million tones of foodgrains annually to feed the rising population.

But, the supply of land being fixed in nature, there is no possibility of increasing the quantum of production by expanding the area of cultivation. Virtually all of the increase in production has to come from yield gains rather than by expansion of cultivated area.

Increased agricultural productivity and rapid industrial growth in the recent years have significantly contributed for the growth of the economy. But, the productivity level in India is comparatively lower than in the advanced nations and the countries which indulge in scientific farm cultivation. There is also a tendency of declining factor productivity in major
cropping systems because of gaps in both yield potential and technology transfer.6

This necessitates the strengthening of adaptive research and technology assessment, refinement and transfer capabilities of the country so that the existing wide technology transfer gaps could be bridged.7

It is also important for India to maintain a steady growth rate in total factor productivity since it influences the nation’s economy to a greater extent. Raising the productivity of irrigated and rainfed agriculture combined with soil and water conservation techniques is essential for faster development.8

The projected availability of water for agricultural use in India may decrease by 21 per cent by 2020 which may have an adverse effect on the productivity of agricultural produce especially rice.9 The per capita availability of water was 5000 cubic metre per annum in 1950 and it is projected to decline as 1500 cubic metre by 2025. There is a tendency of depletion of ground water and the quality of available water is also deteriorating. So, in order to attain food security and alleviate poverty, India will be required to produce more and more from less and less water and land resources.10

This necessitates the use of hybrid varieties of seeds, fertilizers, etc. which are water conserving in nature. This requires genetic innovations which
depend on continued high levels of investments in agricultural research at the National level. So, the thrust of Indian agriculture in the post green revolution period is on enhancement of agricultural productivity through sustainable practices.

In addition to this, investments in infra-structure, particularly in irrigation, transport and market developments are also equally important for sustaining the productivity and profitability of food crops. But, in India, the public investment in agriculture is decreasing over the plans. Agricultural sector received 31% of the total outlay in the First Five Year Plan whereas it has been reduced to 18.5% in Eleventh Plan. This may be a reason for the declining productivity and low capital formation in the agricultural sector.

India needs to maintain the quality of the agricultural produce in order to enhance the contribution of agriculture to export which is extremely low.

Since nearly 70% of the people in India still live in villages, agricultural growth will continue to be the engine of economic growth and poverty alleviation.

Research Gap

So, it becomes essential to study the farm size - productivity relationships in terms of income and profitability between large farms and small farms.
Most of the previous studies relating to farm size-productivity relations were carried on in the agriculturally developed areas where the basic amenities for agricultural growth were already in existence. The cultivation in those areas was related to market economy with well developed infrastructural facilities. Also, most of them used aggregated data collected by Studies in the Economics of Farm Management and established the inverse relationship between farm-size and productivity.

Some studies\textsuperscript{16} analysed the size - productivity relationship with special reference to pump set irrigation. The farms selected for those studies were fertile in nature. The quality of soil and water were good.

Very few studies\textsuperscript{17} concentrated on a single village in a backward region.

No previous study has emerged regarding the cultivation of paddy in a coastal area with extremely poor quality soil and water. So, in order to fill up this gap, this study was taken up.

This study re-investigates the established hypothesis with the help of disaggregate farm level data and tries to make inferences on the nature of relationship. As such this is an attempt to know the farm size - productivity relationship in the cultivation of paddy in the agriculturally backward Radhapuram Taluk, Tirunelveli District, Tamil Nadu.
Rationale for Selecting the Study Area

Tirunelveli district in Tamil Nadu comprises nine heterogeneous taluks. They differ in type and quality of soil, irrigation facilities, extension agency contacts, etc.,

The nine taluks are Ambasamudram, Nanguneri, Palayamkottai, Radhapuram, Sankarankovil, Shencottai, Sivagiri, Tenkasi and Tiruneveli. Since they differ in many aspects, it becomes incompatible to study the farm-size productivity relationship for the district as a whole. So, the only coastal taluk Radhapuram, which is unique in nature has been selected for this study.

Most of the farm studies have been conducted in the river basins and deltaic regions which are having fertile soil, high irrigation potentialities and an infra-structure conducive for production and marketing of agricultural products. They have made use of aggregated data. They didn’t concentrate on the areas which are backward in nature having a high degree of dis-incentives for production and productivity.

So, it is intended to conduct a study on this type of neglected area. For this, all the informations regarding the nine taluks in the district were collected and analysed in the light of six indicators and identified Radhapuram taluk as the most suited area for this study. The indicators are;

1. Mean annual rainfall of the Taluk.
2. Percentage of area under extremely poor quality soil in the taluk to the net geographical area.
3. Percentage of area under average quality soil in the taluk to the net geographical area.

4. Percentage of area under rice cultivation in the taluk to net geographical area.

5. Irrigation potentiality of the taluk.

6. Percentage of agro-industries located in the taluk to the number of agro industries in the district.

These indicators are shown in Table I-1.
Table I-1
Rainfall, Soil Conditions and Area under Paddy Cultivation in Tirunelveli District

<table>
<thead>
<tr>
<th>Taluk</th>
<th>Mean Annual Rainfall (in mm)</th>
<th>Net Geographical Area (in hectares)</th>
<th>Area under good quality soil and its percentage to net geographical area</th>
<th>Area under average soil and its percentage to net geographical area</th>
<th>Area under poor quality soil and its percentage to net geographical area</th>
<th>Area under extremely poor quality soil and its percentage to net geographical area</th>
<th>Area under rice in hectares and its percentage to net geographical area</th>
<th>Number of agro industries and its percentage to total agro industries in the District</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ambasamudram</td>
<td>1037</td>
<td>69016</td>
<td>6432 (9.31)</td>
<td>22179 (32.13)</td>
<td>200 (0.28)</td>
<td>38704 (56.07)</td>
<td>26000 (37.67)</td>
<td>59 (19.28)</td>
</tr>
<tr>
<td>Nanguneri</td>
<td>660.5</td>
<td>72534</td>
<td>4990 (6.87)</td>
<td>25635 (35.34)</td>
<td>130 (0.17)</td>
<td>37855 (52.19)</td>
<td>12000 (16.54)</td>
<td>15 (4.90)</td>
</tr>
<tr>
<td>Palayamkottai</td>
<td>759.4</td>
<td>29632</td>
<td>2651 (8.94)</td>
<td>17864 (60.28)</td>
<td>-</td>
<td>7502 (25.31)</td>
<td>11000 (37.12)</td>
<td>20 (6.54)</td>
</tr>
<tr>
<td>Radhapuram</td>
<td>644.6</td>
<td>85467</td>
<td>4574 (5.35)</td>
<td>27917 (32.66)</td>
<td>-</td>
<td>50029 (58.54)</td>
<td>6000 (7.02)</td>
<td>12 (3.92)</td>
</tr>
<tr>
<td>Sankaran Kovil</td>
<td>754.9</td>
<td>107981</td>
<td>1778 (1.64)</td>
<td>78339 (72.54)</td>
<td>201 (0.19)</td>
<td>3728 (3.45)</td>
<td>6300 (5.83)</td>
<td>86 (28.10)</td>
</tr>
<tr>
<td>Shencottai</td>
<td>1200.6</td>
<td>12927</td>
<td>2204 (17.04)</td>
<td>9564 (73.75)</td>
<td>-</td>
<td>488 (3.78)</td>
<td>5000 (38.67)</td>
<td>19 (6.21)</td>
</tr>
<tr>
<td>Sivagiri</td>
<td>969.9</td>
<td>37695</td>
<td>4040 (10.72)</td>
<td>27623 (73.28)</td>
<td>-</td>
<td>857 (2.27)</td>
<td>8500 (22.54)</td>
<td>14 (4.58)</td>
</tr>
<tr>
<td>Tenkasi</td>
<td>1175.4</td>
<td>89153</td>
<td>1867 (2.09)</td>
<td>78079 (87.58)</td>
<td>-</td>
<td>1200 (1.35)</td>
<td>16000 (17.94)</td>
<td>54 (17.64)</td>
</tr>
<tr>
<td>Tirunelveli</td>
<td>795.9</td>
<td>55053</td>
<td>6319 (11.48)</td>
<td>26831 (48.73)</td>
<td>400 (0.72)</td>
<td>18638 (33.85)</td>
<td>9200 (16.71)</td>
<td>27 (8.8)</td>
</tr>
</tbody>
</table>

Note: Net Geographical Area = Total Geographical Area – Area Under Forest
Source: Records of Assistant Director of Agriculture, Tirunelveli
The table I-1 reveals that the mean annual rainfall in Radhapuram taluk is the lowest among the nine taluks (644.6 mm) and it is also lower than the average mean rainfall of the district (888.7 mm).

About 58.54% of the net geographical area of the taluk contains extremely poor quality of the soil. This is the highest among all the taluks in the district. The percentage of area under average quality soil to the net geographical area constitutes 32.66%. Thus, almost 91% of the soil lacks fertility in Radhapuram taluk. This has been shown in Figure I-1.
In this district, Radhapuram taluk comes next only to Sankarankovil when percentage of area under rice cultivation to the net geographical area of the taluk is considered.
Since the average rainfall of Radhapuram taluk is poor, the area under canal irrigation is too meagre. There is no scope for canal irrigation. Only tanks, open wells and borewells are the sources of irrigation here. The wells often become dry due to the insufficient rainfall. So, the irrigation potentiality of the taluk is very poor as shown in Figure I-2.

Figure I-2

Sources of Irrigation – Tirunelveli District

Source: Soil Atlas – Tirunelveli District (Department of Agriculture, Tamil Nadu), P.29.
The percentage of agro industries located in the Radhapuram taluk to the total number of agro industries in the district is only 3.92 and it is the lowest among all the taluks. There is no agro industries in this taluk except rice mills.

Moreover, no part of Tirunelveli district comes under coastal area except Radhapuram. So, the weather and quality of the water are also not so conducive for agricultural operations. Besides, it has been identified as a drought prone area in the district.

Even with all these limiting factors, paddy is cultivated in this taluk in 6000 hectares and paddy is the prominent crop in this taluk as shown in Figure I-3.
So, it is intended to identify the reasons for paddy cultivation and analyse the size-productivity relationship in this area.

Source: Soil Atlas – Tirunelveli District (Department of Agriculture, Tamil Nadu), P.25.
Statement of the Problem

This study is the first attempt to study the land size – productivity relationship in a backward area since here the agriculture encounters many peculiar problems which are specific to this area alone. The problems relate to the quantity and quality of agricultural inputs.

Land, the basic factor for agricultural production has different types of soil possessing inherent quality variations which hinder the enhancement of agricultural output beyond certain level even by the judicial application of other inputs. The quality of the soil here decreases because of its perennial use.

Moreover, the size of holdings decreases continuously because of sub-division and fragmentation. The water holding capacity of the agricultural fields here is adversely affected because of the drainage of soil.

Besides, there is a shortage of farm labour because of the emergence of non-farm employment opportunities. Their demand for higher wages increases the cost and adversely affect the profit.

The capital requirements of the farmers are not fully satisfied by the co-operative and commercial banks. The loans obtained from local vendors are burdensome because of higher interest rate. The hike in the prices of petroleum products often boosts up the hiring charges of capital equipments.
There is also a tendency of depletion of ground water and the quality of available water is also deteriorating because of the seepage of sea water.

The available infra-structure is also not so conducive for agricultural growth.

The farmers lack technical education.

The government policies and programmes framed for the betterment of agricultural sector become in-effective here because of the defective implementation.

In spite of all these limitations pertaining to this area, the farmers carry on their agricultural operations. Therefore, identifying the factors which influence farm efficiency has become necessary. Hence this study is an attempt to know the farm size-productivity relationship in a backward area.

In the study area, the agricultural production is being done under different tenurial systems such as own farms, tenant farms, own holdings and tenant holdings. In order to ascertain tenurial efficiency, this study deals with the farmers' treatment of their own lands and leased-in lands.

The urge for analysing the ways and means to enhance farm productivity requires an examination of resource use efficiency which includes technical and allocative efficiencies under the four tenurial systems.
The nature of returns to scale also decides the farm size-productivity relationship and capitalist nature of agriculture. So an attempt is made to understand the nature of returns to scale in the agricultural operations in the study area.

Since modern agriculture is characterised by the application of improved farm inputs and farm machineries, the relevance of capitalist relations in the agricultural field has also come under the purview of this study.

The above facts provide an opportunity for raising the following research questions which need more examination.

1. Whether the land size-productivity relationship is positive or negative in the study area? What are the causes for such relationship?
2. What are the factors that determine farm productivity? Do farmers' demographic factors influence farm productivity?
3. Whether the available infra-structural facilities are adequate to enhance agricultural productivity?
4. Whether the farm inputs are efficiently allocated and used? What is the level of technical efficiency?
5. Which type of returns to scale operates?
6. Are there any variations in land size - productivity relationship among the tenurial farms?
7. Are there differences in the treatment between peasant and tenant farms?

8. Whether the labour market is free?

9. Whether the agriculture has been commercialised, commoditised and monetized?

10. What is the nature of capitalist relations in agriculture in the study area?

Scope of the study

This is a micro level study which considers the local constraints and agricultural productivity. Bringing out the relationship between farm size and productivity of paddy crop in an agriculturally backward area is the subject matter of this study.

Further, this study aims at identifying the factors which influence agricultural productivity. Evaluation of relative efficiency of peasant farms and tenant farms also forms a part of this study.

The major variables, agricultural output, human labour input, biochemical input, flow of capital, total input and farm size and the facts agricultural productivity, profitability, farm business income and their relationship with farm size, resource use efficiency, nature of returns to scale and prevalence of capitalist relations in agriculture have also come under the purview of this study.
Objectives

The general objective of this study is to know farm size - productivity relationship in the cultivation of paddy in a backward area.

The specific objectives are;

1. To evaluate the relative efficiencies of small and large farms and also the peasant and tenant farms.
2. To bring out the nature of relationship between farm size and productivity in terms of returns to scale.
3. To analyse the link between productivity and profitability.
4. To know the contributions of demographic factors for enhancing agricultural productivity.
5. To find out the technical efficiency of farms and the extent of reallocation of resources.
6. To know the influence of non-quantifiable factors on agricultural productivity.
7. To examine the differential treatments between (i) own farms and tenant farms; and (ii) own holdings and tenant holdings.
8. To ascertain the capitalist relations in agricultural production.

Hypotheses

On the basis of the literature reviewed and the preliminary informations collected regarding the farming activities in the study area, the following hypotheses have been framed.
1. An inverse relationship exists between farm size and productivity in the production of paddy.

2. Extension contact has positive influence on farm productivity.

3. The farmers' demographic factors such as age, education, farming experience and family size affect farm's productivity positively.

4. Constant returns to scale is in operation in the agricultural production process.

5. The peasant farms are more efficient than tenant farms.

6. Capitalist relations prevail in the agricultural production process.

Area of the Study and Reference Period

This is a micro level study conducted in Radhapuram taluk which is identified as drought prone area. This is a cross section study covering the period from October 2010 to March 2011 since paddy is cultivated during these months.

Methodology

A) Nature and Sources of Data

Both primary and secondary data have been used. Direct personal enquiry method was employed and questionnaire was used to collect primary data. Records in Taluk office concerned village administrative offices and various agricultural offices in the district are the sources of secondary data.

B) Sample Design

Radhapuram taluk consists of 46 villages. Ten types of soil series are available in this taluk. Only in 10 villages the soil condition is suitable for
cultivation and paddy is cultivated there. Therefore, sample farmers were selected from the ten villages.

In these 10 villages, a total of 2995 farmers cultivate paddy. Of these, 240 farmers who constitute 8 per cent of the total farmers were selected as samples by random sampling method. The number of samples in each village was decided on the basis of the number of farmers in each village. The number of samples selected in each village is presented in Table I-2.

Table I-2
Selection of Sample

<table>
<thead>
<tr>
<th>Sl.No.</th>
<th>Sample Villages</th>
<th>No. of Cultivators</th>
<th>No. of Sample Farms</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Anaikulam</td>
<td>517</td>
<td>42</td>
</tr>
<tr>
<td>2.</td>
<td>Kannanallur</td>
<td>486</td>
<td>39</td>
</tr>
<tr>
<td>3.</td>
<td>Kasthurirengapuram</td>
<td>368</td>
<td>29</td>
</tr>
<tr>
<td>4.</td>
<td>Kottaikarungulam</td>
<td>596</td>
<td>48</td>
</tr>
<tr>
<td>5.</td>
<td>Kovankulam</td>
<td>102</td>
<td>8</td>
</tr>
<tr>
<td>6.</td>
<td>Samugarengapuram</td>
<td>523</td>
<td>42</td>
</tr>
<tr>
<td>7.</td>
<td>Soundrapandiapuram</td>
<td>101</td>
<td>8</td>
</tr>
<tr>
<td>8.</td>
<td>Thendayarkulam</td>
<td>110</td>
<td>9</td>
</tr>
<tr>
<td>9.</td>
<td>Urmankulam</td>
<td>90</td>
<td>7</td>
</tr>
<tr>
<td>10.</td>
<td>Vijayapathi</td>
<td>102</td>
<td>8</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>2995</td>
<td>240</td>
</tr>
</tbody>
</table>

Source: Taluk Office Records.

The taluk office records exhibit the total number of farmers in each village. But they do not show the names of farmers. But the 'Adengal Report' in the village Administrative Office contains the list of farmers who cultivate paddy and the area under their cultivation. Hence, this record was used to select the respondent farmers.
Among the selected 240 sample farmers, 45 farmers cultivate their own farms and also leased-in farms. These own and leased-in farms are treated as separate holdings. The own part they cultivate is termed as own holdings and the leased-in part they handle is termed as tenant holdings. Thus the total number of sample farmers has been worked out as \((240 + 45 = 285)\).

The number of sample farmers classified on the basis of the type of tenure is depicted in Table 1-3.

Table 1-3

<table>
<thead>
<tr>
<th>SI.No.</th>
<th>Sample Villages</th>
<th>Number of Sample</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Own Farms</td>
<td>130</td>
</tr>
<tr>
<td>2.</td>
<td>Tenant Farms</td>
<td>65</td>
</tr>
<tr>
<td>3.</td>
<td>Own Holdings</td>
<td>45</td>
</tr>
<tr>
<td>4.</td>
<td>Tenant Holdings</td>
<td>45</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>285</td>
</tr>
</tbody>
</table>

Source: Field survey.

C) Data Analysis

The following techniques have been used to analyse the data.

1. Least square method has been employed to bring out the relationship between farm size and productivity.

2. Multiple regression analysis has been used for identifying the determinants of farm efficiency.

3. The Cobb-Douglas Production Function has been employed to examine the nature of returns to scale.
4. Simple averages have been used for comparing the relative efficiency of different farm tenures and the treatment of peasant and tenant farms.

5. Ratios have been used to ascertain the intensity of labour use, profit to production, allocative efficiency and the extent of capitalist relations in agricultural production.

**Limitations of the Study**

The study is based on the primary data collected from the farmers for the period of October 2010 to March 2011. The farmers do not keep records regarding the volume of inputs used, output, etc. They revealed the facts only from their memory. Any lapse in their memory may affect the accuracy of the data. But enormous care was taken to collect the needed data. Since Radhapuram Taluk differs in many aspects from other taluks of Tirunelveli, the conclusions arrived at are not applicable for the district as a whole. So, it lacks generalisation.

**Chapter Scheme**

This study contains eight chapters.

First chapter is introductory. It contains research gap, rationale for selecting the study area, statement of the problem, scope of the study, objectives, hypotheses, area of study, nature and sources of data, methodology, limitations of the study and chapter scheme.

Second chapter elaborates the role of agriculture in Indian economy. It presents the share of agriculture in India's GDP, imports and
exports. The distribution of operational holdings of different sizes, the land reform measures in India and the government measures for the development of cultivation of rice have also been discussed.

The third chapter contains the review of related literature.

The fourth chapter examines the farm size-productivity relationship and analyses the causes for positive relationship.

The fifth chapter evaluates the resource use efficiency in the study area. The influence of farmer's demographic factors on farm productivity, how best the available resources are used and the nature of returns to scale prevailing have also been analysed.

The sixth chapter makes a comparison between the treatment of (i) own farms and tenant farms and (ii) own holdings and tenant holdings.

The seventh chapter brings out the prevalence of capitalist relations in agriculture. It analyses the extent of surplus and reproduction, commercialisation, monetisation and the nature of labour market in the study area.

The last chapter presents the summary of conclusions and suggestions.
References


