AN INQUIRY INTO THE PATTERN OF EMPLOYMENT AND INCOME OF THE DRY-LAND FARMING HOUSEHOLDS OF ERODE DISTRICT TO FORMULATE VIABLE OFF-FARM AND NON-FARM PROJECTS

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TAMIL NADU AGRICULTURAL UNIVERSITY

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CERTIFICATE

This is to certify that the thesis entitled "**An inquiry into the pattern of employment and income of the dry-land farming households of Erode district to formulate viable off-farm and non-farm projects"** submitted in part fulfillment of the requirements for the degree of **MASTER OF SCIENCE (AGRICULTURE) IN AGRICULTURAL ECONOMICS**, to the Tamil Nadu Agricultural University, Coimbatore is a record of *bonafide* research work carried out by **Ms. C. JEEVAPRIYA** under my supervision and guidance and that no part of this thesis has been submitted for the award of any other degree, diploma, fellowship of other similar titles and that the work has not been published in part of full in any scientific or popular journal or magazine.

Place: Madurai
Date:

Dr. A. DANIEL VISWASAM SAMUEL
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Date :

EXTERNAL EXAMINER

DEDICATED TO MY LOVABLE FAMILY AND MY BELOVED CHAIRMAN

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(JEEVAPRIYA.C)

Abstract

ABSTRACT

AN INQUIRY INTO THE PATTERN OF EMPLOYMENT AND INCOME OF THE DRY-LAND FARMING HOUSEHOLDS OF ERODE DISTRICT TO FORMULATE VIABLE OFF-FARM AND NON-FARM PROJECTS

By

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Land as opposed to the sea or another body of water is characterized as “dry land”. Dry lands, besides being water deficient, are *per se* characterized by high evaporation rates, exceptionally high day temperature during summer, low humidity and high run off and soil erosion. The soils of such areas are often found to be saline and low in fertility. In dry land areas, the variation in amount and distribution of rainfall influence not only crop production but also *si - ne qua non* the socio-economic condition of farmers. Dry land area receives the annual rainfall of less than 750 mm. Dry land area covers about 40 per cent of the world’s area and around 35 per cent of the populations live in the dry land area. The spread of dry land area in the developing countries is around 72 per cent in total area. Thus, the majority of the dry land people live in the developing countries than industrial countries.

In India, 68 per cent of the total net sown area comes under dry land cultivation, spread over 177 districts. The farmers living in dry land areas depend on rainfall for their agricultural production. The income of farmers of from crop cultivation in dry land regions is still very low. So farmers in these areas moving towards to off-farm employment and non-farm activities for their income generation.

In the view *mutais mutandis* to formulate viable projects that can generate employment and income to the dry land farmers, the present study is taken up in Erode district with the specific objectives. i) to study the pattern of employment and income from the present cropping system; ii) to identify the scope and potentials for off-farm and non-farm project for the dry land farming households; iii) to estimate the investment, cost, returns and the anticipitated employment generated from the projects; iv) to evaluate the financial feasibility, stability and the efficiency of the formulated projects; v) to device a suitable repayment plan for the implementation of the project; vi) to identify the constraints in taking up off-farm and non-farm employment.

Erode district was purposively selected for the present study *a fortiori* it is one of the low rainfall districts of Tamil Nadu receiving annual average rainfall of 600 to 700 mm which mainly occurs during northeast monsoon season. Dry lands *ipso facto* mostly concentrated in the central and southern parts of the district. Perundurai and Chennimalai blocks of Erode district is categorized under dry land areas. Six villages were selected at random from the two blocks selected purposively for the study. From each selected village, ten on farm farmers were selected randomly to make a sample size of 60. The off-farm farmers were selected randomly at the rate of five per village, constituting 30 and another 30 representing non-farm farmers were selected randomly from the three villages Mugasipidariyur, Voipadi and Ellaigramam at the rate of ten per village considering its predominancy. The collected data were analyzed by adopting appropriate tools and indices. The following are findings and policy implications emerged from the study.

The total cost of production of dry land crops was Rs.42274.73 per ha. Gross income from dry land crop cultivation was Rs.50220.00 per ha. and net income observed was Rs.7945.27 per ha.

The multiple linear regression function was fitted to data. The independent variables like area of cultivation, annual Income from crop, duration of crop in days per year, days of off-farm employment per year, income from off-farm employment per year, days of non-farm employment per year and income from non-farm employment per year were taken into consideration for running the function to scan the influence of variables over the number of days of employment per year. The

results of regression analysis showed that the co-efficient of multiple determinations (R^2) was 0.91 revealing the model was a good fit and proved that about 91 per cent of the number of days employment per year is influenced by the explanatory variables such as, the duration of crop in days per year, days of off-farm and non-farm employment per year and annual income from crop included in the model.

The total cost of operation of hiring out tractor was worked out to be Rs.656780. An average amount of Rs.897635 was obtained as gross return, after deducting the annual total cost from gross return the net return would be Rs.240855. The total establishment cost of power loom unit was carried out to Rs.2120517. The annual processing unit expenditure is worked out to be Rs.1956690. The profit of the unit before tax was worked out to be Rs.822301.70 per annum. The income gained from off-farm and non-farm employment was quite more.

The positive value of NPV, BCR of more than one and IRR of more than the opportunity cost of capital revealed the financial feasibility of starting both off-farm and non-farm project in the study area. For the non-farm project the results of BEA was 4.23 tonnes annually with a high safety margin of 68.61 per cent. The profit / volume ratio was 43 per cent and the earnings to sales ratio was 0.29. The turnover ratio was 1.31 per cent and the gross cost, operating cost and over head cost ratios were 0.70, 0.84 and 0.14 respectively. Hence, the unit is financially efficient in turning the capital. Thus results of amortized repayment plan indicated that the total loan of Rs.715000, to start off-farm project has been repaid after six years of period at decreasing trend with the interest rate of thirteen per cent per annum and also the total loan of Rs.1570517, to start non-farm project has been repaid after seven years of period at decreasing trend with the interest rate of 12.5 per cent per annum.

The most important constraints identified by the sample farmers while taking off-farm and non-farm employment was availability of time, number of availability of days in a year during off season and availability of family labour for non-farm employment.

Some of the policy implications drawn from the study were off-farm and non-farm employment project was found to be more profitable. Hence efforts should be taken by Government to bring more farmers in doing both off-farm and

non-farm employment, and also encourage them to gain additional income in the monsoon failure season. These projects are financially viable hence the financial institutions should lend adequate credit for this venture. An organized marketing system with good facilities is needed among the non-farm farmers to market their products. Presently most farmers do sell in the nearby pockets of the district; hence there is an urgent need to expand the market outside the district.

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Introduction

CHAPTER I

INTRODUCTION

Dry land is characterized by scarcity of water, which constrains two major interlinked services - primary production and nutrient cycling. Dry lands, besides being water deficient, *de facto* are characterized by high evaporation rates, exceptionally high day temperature during summer, low humidity and high run off and soil erosion. The soils of such areas are often found to be saline and low in fertility.

As water is the most important factor of crop production, inadequacy and uncertainty of rainfall often cause partial or complete failure of the crops which leads to period of scarcities and famines. Thus the life of both human being and cattle in such areas becomes difficult and insecure.

As a major proportion of the agricultural land in the world is dry arid and semi-arid, improving the agriculture sector and the social indicators in the dry land areas is necessary to achieve food security and also for the equity (Jodha, 1989; Singh, 1989; Rao, 1991; Ninan and Chandrashekar, 1993).

However, crop cultivation in dry land areas faces constraint in development as it is highly prone to the distress situation of drought. Different economic policies implemented for the development of dry land agriculture, did not give impressive results (Ramakrishna and Tata Rao, 2008). The farmers in the dry land areas are poor, and thus they extract little from the different macro-economic policies (Harriss Barbara, 1984; World Bank Report, 2006).

The annual rainfall in the semi-arid and arid regions ranges between less than 350 mm to 800 mm. Within a season also, rainfall varies significantly over a short duration. Moisture availability falls short of its demand for about eight months in a year in these seasonally dry areas. Thus in these areas, due to the absence of irrigation or moisture conservation, the period available for crop growth is limited to roughly 60 to 180 days a year.

In dry land areas, the variation in amount and distribution of rainfall influence not only crop production but also the socio-economic condition of farmers.

Dry land areas may be characterized by the following features: 1. Uncertain, ill-distributed and limited annual rainfall; 2. Occurrence of extensive climatic hazards like drought, flood etc.; 3. Undulating soil surface; 4. Occurrence of extensive and large holdings**;** 5. Practice of extensive agriculture i.e. prevalence of mono cropping etc.; 6. Relatively large size of fields; 7. Similarity in types of crops raised by almost all the farmers of a particular region; 8. Very low crop yield; 9. Poor market facility for the produce; 10. Poor economy of the farmers; and 11. Poor health of cattle as well as farmers.

1.1. Dry Land Area: An International Scenario

According to the UNDP terminology, four dry land subtypes are recognized: dry sub-humid, semi-arid, arid and hyper-arid. This classification is based on the increasing level of aridity or moisture deficit. Dry land area covers about 40 per cent of the world's area and around 35 per cent of the populations live in the dry land area (CIESIN, 2004). A total of 25 per cent of the world's cultivable land comes under dry land agriculture (WMO - UNEP Report, 1996).

The spread of dry land area in the developing and the industrial countries is not uniform. It covers around 72 per cent of the area in developing countries and 28 per cent of the area in industrial countries (Safriel Uriel and Zafar Adeel, 2005). Thus, the majority of the dry land people live in the developing countries.

Approximately 54 million sq km or 40 per cent of the land can be classified as dry land. The extent of dry land within each region ranges approximately from 1.3 to 18 million sq km. Region-wise, Asia and Africa have the largest dry land area i.e. 13 and nearly 12 million sq km, respectively (UNDP, 1997). Asia contains substantial dry land area, with 39 per cent of its total land mass being mostly arid and semi-arid, found in Central Asia and Western China. The hyper-arid region, which is excluded from the dry lands, accounts for 9.9 per cent of the global land area.

1.2. Dry Land Area: An Indian Scenario

In India, 68 per cent of the total net sown area comes under dry land cultivation, spread over 177 districts. In the country, 35 per cent of the area receives rainfall between 750 mm and 1100 mm, and is drought prone. Most of drought prone areas lie in the arid (19.6 per cent), semi-arid (37 per cent) and sub-humid (21 per cent) areas of the country that occupy 77.6 per cent of its total land area of 329 million hectares.

Around 33 per cent of the area receives less than 750 mm rainfall and is chronically drought prone, while 16 per cent of the area receives less than 500 mm rainfall (large area of Peninsular and Rajasthan). On an average, rainfall is erratic in four out of every ten years (Ministry of Agriculture / Drought Management Division, 2008).

According to the rainfall zones, around 16 per cent of the net sown area comes under the arid region with very low rainfall. The highest percentage of net sown area (35 per cent) comes under the dry sub-humid zone. Only 32 per cent of the net sown area comes under the high rainfall zone (Ramakrishna, 1997). There is sub - humid *per se* moist to dry in Harayana, Uttar Pradesh, Bihar, West Bengal, Orissa, Madhya Pradesh, Vidarbha and northern parts of Andhra Pradesh, Punjab and from Chennai to Nagapattanam of Tamil Nadu state (Rao *et al.*1999).

India has about 108 million hectares of rainfed area which constitutes nearly 75 per cent of the total 143 million hectares of arable land. In such areas crop production becomes relatively difficult as it mainly depends upon intensity and frequency of rainfall. The crop production, therefore, in such areas is called rainfed farming as there is no facility to give any irrigation, and even protective or life saving irrigation is not possible. These areas get an annual rainfall between 400 mm to 1000 mm which is unevenly distributed, highly uncertain and erratic. In certain areas the total annual rainfall does not exceed 500mm. The crop production, depending upon rain is technically called dry land farming and those areas are known as dry lands.

India has about 47 million hectares of dry lands out of 108 million hectares of total rainfed area. Dry lands contribute 42 per cent of the total food grain production of the country. These areas produce 75 per cent of pulses and more than 90 per cent of sorghum, millet, groundnut and pulses from arid and semi-arid regions. Thus, dry lands and rainfed farming will continue to play a dominant role in agricultural production.

1.3. Rainfall and Cropping Pattern

Rainfall in dry land areas is inadequate to meet the water needs of the crop even during the main season, namely Kharif. As a result, it leads not only to lower yield but also leads to higher fluctuation in yield. This in turn *nitty - gritty* leads to uncertainty in income.

The dry land regions are relatively backward and the green revolution has bypassed the millions living in the dry lands, surviving on one rainfed crop a year, which is either bound to fail or is not taken into consideration at all if the monsoon is poor, erratic, delayed or absent (ICAR, 1998).

Dry land districts in India are generally dominated by low value and low yield crops such as millets and pulses. The farmers in the dry land areas generally cultivate multiple crops and do not specialize in a particular crop due to the high risk involved in the cropping pattern (Mohanti and Sakti Padhi, 1995; Pathy Suguna, 2003).

The dry land areas of the country contribute to about 42 per cent of the total food grain production. Most of the coarse grains like sorghum, pearl millet, finger millet and other millets are produced from dry lands (Rao, 2004). According to Singh *et al*. (2000), the rainfed area covers 218 districts in the states of Punjab, Harayana, Rajasthan, Uttar Pradesh, Madhya Pradesh, Chhattisgarh, Gujarat, Maharashtra, Andhra Pradesh, Karnataka and Tamil Nadu. The diversification of crop in the dry land areas again depends upon factors such as the size of operational holding (Pathy Suguna, 2003) and wealth (Arrow, 1970) of the farmer. Besides, farmers dependence is very high on livestock as an alternative source of income, apart from arable cropping.

1.4. Landholdings

The dry land areas in India are mainly classified *de facto* as the backward agriculture where the agents are mainly small and marginal farmers (Ffolliott *et al.* 2002). The average landholding in dry land areas is around 0.15 ha, which is *si - ne qua non* uneconomical for farming. Rainfed farmers are economically weak with little ability to withstand risk. Out of the 97 million farm holdings, 76 per cent are small (<2 ha) and marginal, cultivating only 29 per cent of the total arable land.The holdings are unconsolidated and scattered (Sharma and Singh, 2006).

1.5. Risk Involved in the Dry Land Agriculture in India

The agents in the dry land areas prefer to cultivate the traditional varieties of crop rather than the modern, as they involve lesser risk. However, traditional varieties generate lesser profit compared to the modern varieties. This is one of the factors for increasing the inequality among the coastal and dry land regions (Kshirsagar *et al.* 2002).

Lesser gain from the agricultural sector in the dry land areas forces the agents to diversify their occupation, concomitantly toward off-farm and non-farm sectors.

1.6. Occupational Diversification

The farmers generally try to engage themselves in multiple activities that can provide them flexibility and strength to face risks. When the farmers have a secondary occupation they can easily face risk situations. The most common subsidiary activities observed in rainfed areas are dairy, poultry, sheep rearing and sericulture, along with crop cultivation. The farmers also engage themselves in wage labour and non-farm activities (Subbaiah, 2004). In terms of the secondary occupation in the village, the majority of peasant households engaged in wage labour for some part of the year. However, these activities are influenced by the social status of the households. According to Agarwal (1990), variation in the employment opportunity and diversification of income sources requires close family co-operation. For example, livestock and poultry are typically looked after by women and children.

1.7. About Erode

In general, Erode district is characterized with a scanty rainfall and a dry climate throughout except during the monsoon season. The district receives annual average rainfall of 600 to 700 mm which mainly occurs during northeast monsoon season. Therefore, successful crop production depends heavily on the success / failure of monsoon thus making agricultural production riskier in many parts (dry land areas) of the district.

1.8. Occupational Classification of Population

Among the total workforce in the district, more than 90 per cent are main workers comprising of cultivators, accounting for about 20 per cent, agricultural labour constituting about 29 per cent and other workers accounting for about 40 per cent. Marginal workers account for about eight per cent of the total working population in the district and non-workers account for about 44 per cent of the total population in the district.

1.9. Land Use Pattern and Land holdings

The total geographical area is 8.16 lakh hectares. The current fallows, however, accounted for more than 10 per cent of the total area, while other fallows constitute about 13 to 14 per cent of the total geographical area of the district.

The net sown area of the district was about three lakh hectares constituting about 37 per cent of the geographical area of the district. Among the unirrigated crops (rainfed) fodder crops account for about 45 per cent of net sown area followed by groundnut (25 per cent of net sown area) and pulses (13 per cent).

1.10. On-Farm Income

The ‘farm income’ was estimated as the value of main product and by products net of the cost on account of seeds, fertilizers, pesticides, irrigation charges, payment to hired labour, draft and machine power and farm employment including employment generated from crop cultivation by the family members of farm households.

1.11. Off-Farm Income

Income and employment generated by the family members as agriculture labourers in other farmers fields, was taken as ‘off-farm’ income and employment. Off-farm activities play an important role in sustainable development and poverty reduction, especially in rural areas.

1.12. Non-Farm Income

The income and employment generated from non-agricultural activities like services, business, non-agricultural labour, livestock enterprise, carpenters and painters, etc., were considered as 'non-farm' income and employment, respectively. The share of rural household income earned from non-farm activities has been growing substantially.

1.13. The Key Issues

The present study has been taken up to analyze the pattern of employment and income from the present setting and to identify the scope and potentials for off-farm and non-farm employment opportunities available in the study area.

Since Erode district is one of the low rainfall districts of Tamil Nadu receiving annual average rainfall of 600 to 700 mm which mainly occurs during northeast monsoon season. Dry lands, mostly concentrated in the central and southern parts of the district offer potential for rainfed agriculture with a strong focus on livestock and poultry production. Chennimalai and Perundurai blocks of Erode district is categorized under dry land areas.

The farmers living in dry land areas depend on rainfall for their agricultural production. The income of farmers given crop cultivation in dry land regions is still very low. So farmers in these areas moving towards to off-farm employment such as, hiring out farm machinery, working as agricultural laborers in field, rent from building, rent from leased out land etc., and non-farm activities such as, working as non-agricultural labourers, running powerloom or handloom business, other business and services etc., for their income generation.

1.14. Objectives

Considering above facts, the present study is taken up to formulate viable projects that can generate employment to the dry land farmers.

The specific objectives of the study are as follows,

1. To study the pattern of employment and income from the existing cropping pattern.

2. To identify the scope and potentials for off-farm and non-farm projects for the dry land farming households.
3. To estimate the investment, cost, returns and the anticipitated employment generated from the projects.
4. To evaluate the financial feasibility, stability and the efficiency of the formulated projects.
5. To device a suitable repayment plan for the implementation of the project.
6. To identify the constraints in taking up off-farm and non-farm employment.

1.15. Hypotheses

1. There is potential of off-farm and non-farm employment in dry-tract.
2. Off-farm and non-farm employment brings additional income.
3. The off-farm and non-farm projects found to be suitable in the study area.
4. Repayments can be made with no over dues.

1.16. Scope of the Study

At present there are no studies relating to employment and income pattern from cropping of dry land farmers in the study area. The study would throw light on employment and income pattern from cropping of dry land farming household in Chennimalai and Perundurai blocks of Erode district, Tamil Nadu. The study would also provide information on-farm, off-farm and non-farm employment and income pattern of dry land farmers. The results of the present study may indicate certain areas for policy considerations.

1.17. Limitations of the Study

The study is based on primary data collected through personal interview from the sample respondents. The data were collected in person and the objectives of the study were explained in detail to the respondent dry land farmers. As the farmers did not maintain any records, they have provided the data from their memory. Maximum care was taken to reduce the recall bias by putting cross check questions where ever necessary. The results of this study should, therefore, be considered and generalized with the above limitations in view.

1.18. Organization of the Study

Chapter I: Introduction - Describes the importance of the topic, objectives, scope and limitations of the study.

Chapter II: Concepts and Review - A brief review and definition of concepts, economic models and results of the related studies are presented.

Chapter III: Design of the study - Explains the sampling design, data collection methodology and tools of analysis used in the study.

Chapter IV: Description of the study area - A brief account of the agro-climatic conditions, land use and other information relevant to the present study are given.

Chapter V: Results and Discussion - A detailed discussion of the results of the study is made to draw specific inferences.

Chapter VI: Summary and Conclusions - A brief summary of work done, the salient findings, and their implications for policy are presented.

Concepts and Review

CHAPTER II

CONCEPTS AND REVIEW

A review of concepts used in earlier studies relevant to the study being carried out is an integral part of any scientific study. This chapter briefly reviews the concepts, research methodologies, analytical tools and findings of the past studies, which are relevant to the present study.

The concepts and review are presented under the following headings for better perception and clarity.

2.1. Costs

Mihal *et al.* (1974) defined fixed cost as one, independent of level of production.

Johl and Kapur (1977) categorized the costs as (i) fixed costs and (ii) variable cost. Fixed costs are those which do not change in magnitude as the amount of output of the production process changes and are incurred even when production is not undertaken. Variable costs are the costs of using the variable inputs. These costs vary with the level of production.

According to Ahuja (1997), fixed costs are those which are incurred in hiring the fixed factors of production whose amount would not be altered in the short run. Variable costs are those costs, which are incurred on the employment of variable factors of production whose amount could be altered in the short run.

Samuelson and Nordhans (1998) defined "fixed cost" represents the total dollar expense that goes on even when a zero output is produced. It is often called "over head cost" and it induced contractual commitments for mental, maintenance, depreciation, overhead salaries and wages, etc. "Variable cost" represents all items of total cost except for fixed cost. It included raw materials, wages, fuel, etc.

Dewett and Varma (2003) stated that the cost of production of a commodity is composed of two types of costs: variable costs and fixed costs, also called prime and supplementary costs respectively. Prime or variable costs included the money cost of the raw material used in making a commodity, the wages of the labour directly spent on it, and the extra wear and tear of the machine that makes it. The supplementary or fixed costs do not vary with the volume of production. Whatever the quantity of goods produced, big or small, charges on account of rent, taxes, interest, salaries, etc., must be paid.

Rohit Single *et al.* (2006) referred to variable costs as the cost incurred on seeds, fertilizers, FYM, plant protection chemicals, electricity / diesel charges for irrigation, human labour, animal labour, machinery hours and interest on working capital. The fixed costs constitute interest on fixed capital, depreciation, land rent and repair charges.

Nalini Rajan Kumar *et al.* (2008) estimated the total variable cost of potato cultivation was Rs.65077 per hectare and cost of production was Rs.25650 per quintal.

Singh and Anupama Toppo (2010) worked out cost of cultivation in tomato (kharif and rabi) which includes fixed and variable costs. Cost of cultivation for kharif and rabi tomato was Rs.26011 and Rs.23523 per hectare, respectively. They also

stated proportion of fixed and variable costs were 15 and 85 per cent in kharif tomato and 17 and 83 per cent in rabi tomato.

In the present study, fixed cost is the sum of land revenue, depreciation, rental value of land and interest on fixed capital. Variable cost includes cost on main field preparation, seed and sowing, manures and manuring, intercultivation, plant protection, harvesting and curing and, interest on working capital. And fixed cost and variable cost incurred in the formation of off-farm and non-farm projects was also calculated.

2.2. Returns

2.2.1. Gross Return

Pandey *et al.* (1972) defined gross income as the total of only agricultural and non-agricultural income.

Johl and Kapur (1977) defined that gross returns are equal to total production times the price. Returns to fixed farm resources are equal to gross returns minus variable costs. These are also known as returns over variable costs.

According to Mullen *et al.* (1980), gross income is the cash receipts from all sources of both on-farm and off-farm with the inclusion of imputed value of farm produced goods consumed on the farm.

Kahlon and Karan Singh (1982) defined that gross income is a measure of the size as well as of the volume of business. It is derived by adding together gross sales, home consumption of farm products, changes in inventory and purchases.

David Rajasekar (1999) defined gross income as the total value of products of crop and livestock, off-farm income from selling water, hiring out machinery, animals and working as labourers and non-farm income from services, shop keeping, trade and transport.

According to Suba Reddy *et al.* (2004), gross income is derived by sale of main product as well as by products from the enterprises taken up by the farmer in a

year. It included the value of home consumed products plus the value of products sold.

In the present study, gross income was calculated by multiplying the total output with price received by farmers. And gross income incurred in the formation of off-farm and non-farm projects was also calculated.

2.2.2. Net Return

Madappa (1970) estimated net income per acre of coffee by subtracting the average net expenditure from average gross income.

Johl and Kapur (1977) defined that net returns are equal to gross returns minus all costs (fixed and variable; cash and kind).

Singh and Ashokan (1981) defined the net income as the difference between gross farm income and the total farm expenses (excluding rent paid for leased in land) including overhead cost of depreciation and land revenue.

Julka and Soni (1988) defined net income as the value of crop and dairy output produced during the year plus income from sale of family labour, hiring out of machinery and renting out land minus all actual costs and depreciation for inputs.

Vashista (1993) also viewed in the same way and defined net farm income as income from crops, livestock, poultry, dairy etc., after deducting the costs involved.

David Rajasekar (1999) defined net farm income as gross farm income minus paid out costs in kind and cash (for all the enterprises involved in the farm), imputed value of family labour and farm produce consumed on farm.

Nalini Rajan Kumar *et al.* (2008) found the net return of potato was about Rs.48874 per hectare over variable cost in potato cultivation.

Singh and Anupama Toppo (2010) studied production and marketing of tomato in Kanke block of Ranchi district. They estimated the gross income from

kharif and rabi tomato and it was Rs.42974 and Rs.43826 per hectare, respectively. The net income was Rs.16963 in kharif tomato and Rs.20303 in rabi tomato.

In the present study, net income was defined as the difference between the gross income and total cost. The net income incurred in the formation of off-farm and non-farm projects was calculated.

2.3. Employment Pattern

Narongchai *et al.* (1983) studied Rural Off-farm Employment in Thailand. The results clearly showed that non-farm and off-farm employment was a major activity and a major source of income of the rural household in the project areas, especially in the poor farming regions. Apart from being a major source of income, the employment also served as an effective income stabilizer during the seasonal fluctuations. The study emphasized on the employment in village industry and in town industry. Finally rural economy was shown to have very much an integral part of the national economy. The promotion of rural income and employment, through both farm and non or off-farm activities will contribute towards the overall national development.

Edna and Reyes (1991) analyzed the nature and role of rural non-farm employment in Philippines development. It also traced the growth of non-farm activities in the Philippines and determined the extent of their contribution to the transformation of the rural sector. The study assessed the impact of non-farm employment on the rural economy in terms of changes in the structure of labour utilization, production/output and household income. The data from the census of agriculture and the integrated survey of households was used. The result showed that in terms of income, the share of non-agricultural sources was high at 57 per cent in 1988 compared to 49 per cent in 1977. The bulk of this income came from wages and salaries, about half of which came from entrepreneurial sources. The non-farm income in the village rose from 8.1 per cent to 36 per cent of total income in a span of 13 years. The increased commitment to non-farm work was also facilitated by the development of modern highway systems and transportation facilities. The Gini

coefficient in 1987 remained close to what it was in 1974, i.e., 0.467 to 0.478. The main reason for this was the significant contribution of non-farm sources of income.

Kashikar (1992) had undertaken a study during 1987-88 in the central part of Madhya Pradesh to evaluate the employment pattern and earning status of small farmers. Results showed that there was considerable scope and potential to utilize manpower in development works. The level of employment and earning status of small farmers was found to be poor. The agricultural sector, the non-agricultural sector and non-specific works contribute approximately 74 per cent, 16 per cent and 10 per cent respectively to the total income of small farmers in the area.

Satnam Kaur and Goyal (1996) found that men performed all operations involving the use of machinery and draught animals. But operations, which demanded direct manual labour were performed by women such as transplanting, weeding, winnowing and harvesting. Women were much disadvantaged in their access to employment due to more limited access to mass media, lower literacy level and less interaction with market place.

According to Jeemol Unni (1997), a flexible labour market with low real wage rates will generate more output and consequently employment. There is a positive relation between real wage and the level of employment.

Sharma and Saxena (1998) stated that if there is growth in labour productivity, the employment generation is adversely affected in the short run, as there is an inverse relationship between employment and labour productivity. In certain sectors of the economy due to any reason, decline in employment may be expected.

Francis Tuan *et al.* (2000) analyzed demographic characteristics of the rural labor force and the association between rural types of employment, place of work, and labor migration in China. Generalized Polytomous Logit model (GPL) was used to analyze the patterns of rural labor employment and gauge rural migration. The descriptive statistics highlight distinct differences of the three type of employment by age, educational level, size of the household, and size of land holdings. The GPL result showed the odds ratios and predicted probabilities of rural persons by types of the employment. The effects of land size followed by the education level and age group are the main factors affecting the estimated probabilities of rural employment

and hence, the trends and dynamics of rural labour migration to non-agricultural activities even part-time or full-time base.

Linxiu Zhang *et al.* (2001) described labor shifts in response to China's cycles of boom and bust and explores the farmer's decision to enter or exit the off-farm labour force. Own household data set was used to show the evidence that the agricultural sector has played an important stability-increasing role in the nation's development in the reform era. When layoffs increased and hiring slowed in the early 1990's, those who lost their jobs returned to the agricultural sector. Increased labor use in agriculture has reduced the income fluctuations that would have occured if there had been no on-farm work available.

Tongroj Onchan (2001) reported that the agriculture sector has played a central role in providing rural employment opportunities in the Asia and Pacific region. The factors such as, the small size of landholdings, insufficient capital and investment incentives, the inadequate farm infrastructure, limited markets, and stagnant prices of agricultural commodities have contributed to restricting the capacity for job creation in the agriculture sector. The development of various non-farm activities offers great potential for creating additional rural jobs and hence for stimulating further growth of rural economies. The establishment of rural-based industries created new job opportunities providing supplemental income. Diversified production and trade activities have also offered rural communities better employment prospects and accordingly more stable growth of their economies.

Hazel *et al.* (2002) studied determinants of non-farm labour participation rates among farmers in Australia. In this study bivariate probit model of non-farm employment participation rates was estimated and the data used from the Australian Bureau of Agricultural Resource Economics (ABARE) 1994-1995 surveys. The results indicated that the participation decision of the farm operator and spouse was likely to be jointly determined, that non-farm employment participation increased at a declining rate with age among farmers and that university education enhanced the participation rates particularly among spouses. Participation rates were also higher among spouses with lower other income and with no dependent children.

Prasada Rao Mecharla (2002) explained the factors which affect rural non-farm employment in two villages; using primary data from the Indian state of Andhra Pradesh, it analysed the reasons for the variations between an agriculturally developed village and one which is less developed. Logit model was used for analysis. This paper tested 'distress diversification' against 'agricultural growth linkages' as explanations of employment of the propensity of rural people to be involved in the RNFS. The result showed that the high shares in, and the growth of, 'modern' RNFE, and distress diversification for 'traditional' RNFE. It also demonstrated a strong, significant association between traditional RNFE and low literacy and modern RNFE and high literacy.

Amitabh Kundu *et al.* (2003) analysed the changing pattern of employment and unemployment in rural areas during the past three decades, focusing on the growth of non-farm employment and whether this can be explained in terms of Rural-Urban interdependencies and the development dynamics or their absence at the regional level. The data from National Sample Survey was used to overview the macro level employment situation with a special focus on non-farm employment. The pattern of interdependencies among the select indicators pertaining to non-farm employment and socio-economic development at the state level was also examined.

David Meredith (2003) examined an overview of contemporary trends in national employment and unemployment before providing a synopsis of the regional distribution of unemployment and how it has changed in recent years. Quarterly National Household Survey data (QNHS) was used and analyzed. This paper pointed out the significant and rapid economic change in Ireland and the impacts of these developments on farmers dependent on off-farm employment and reported that off-farm income also supports the economic viability of many farm households.

Tiago Wandschneider (2003) reported that a significant proportion of rural households and entrepreneurs not only lack many of the required assets to successfully engage in non-farm employment, but also operated in a relatively adverse environment, characterised by limited opportunities both within and outside the farm economy in Africa and South Asia. The study observed that the diversification into non-farm economic activities out of necessity i.e. distress-push is more common than

diversification as a response to remunerative wage employment and high return business opportunities i.e. demand-pull.

Avner Ahituv and Ayal Kimhi (2005) analyzed the simultaneous determination and evolution over time of two decisions made by self-employed farm operators: off-farm work and the level of farm activity. Panel data of Israeli farm households in 1981 and 1995 was used. Data was estimated jointly using a multinomial choice model of work activity and an endogenous switching regression of farm size that enables us to account for unobserved heterogeneity and correct for simultaneity bias. The results showed that changes in farm size are closely linked to the off-farm labour decisions.

Sidhu *et al.* (2005) studied income, employment and productivity growth in the farming sector of Punjab: some issues. The findings of the study showed that diversification of income and employment pattems has become an absolute necessity for further growth of the agriculture sector of Punjab; what is required is a right mix of state policy, private initiatives, infrastructural development, technical change, and innovative institutions for this to take place.

Norsida Man and Sami Ismaila Sadiya (2009) determined off-farm employment is an alternative strategy and has the potential to improve the income and well being of the paddy farmers in Kemasin Semerak Granary Areas of Malaysia. This study assessed the off-farm employment decision among 500 paddy farmers in Malaysia. The study determined the relationship between the determinants of off-farm employment and the off-farm participation decision using descriptive analysis and logit regression methods. The results revealed that the farmers' age, gender and number of dependants, as well as other income and the type of farm were the variables that influenced their likelihood to engage in off-farm employment. Evidently, the variables of farm size and level of education were insignificant in affecting off-farm participation.

Hung-Hao Chang and Steven (2009) studied off-farm employment and food consumption at home and away from home: Evidence from farm households in Taiwan. This study investigated the effects of off-farm employment on food

expenditures by the farm household. The data was obtained from a national household survey in Taiwan and estimated by Maximum Likelihood method.

Jennifer Cairns *et al.* (2010) analyzed the likelihood of migrants to the United States entering agricultural employment. Mexican Migration Project data was used. The result showed that migrants with higher levels of education and a greater command of English are less likely to work as agricultural labourers**.** Those that do enter agricultural occupation stay in the United States for shorter periods of time per trip than those who enter non-agricultural occupation.

Simrit Kaur *et al.* (2010) conducted an econometric analysis of the contribution of farm and non-farm employment towards welfare in terms of per capita expenditure. The focus was on household characteristics such as size, composition, education, land holding and community characteristics such as access to roads, power and financial services. Using a measure of normalised rainfall, the study also assessed how rainfall shocks influence welfare in farm and non-farm activities.

Anjani Kumar *et al.* (2011) studied rural employment diversification in India and across major states using NSSO data at household level for the period 1983 and 2009-10. Factors affecting rural employment diversification towards non-farm sector have also been studied. The share of fishery and forestry was negligible in providing employment to the rural workforce. The study has revealed that the increasing rural non-farm employment has positive and significant effect on reducing rural poverty at all-India level. A positive link between income and employment has also been observed in diversifying towards horticultural activities. A well designed area-specific programme should be evolved to help improve skill of rural workforce, which in turn would benefit in getting employment in the non-farm sector.

Himanshu *et al.* (2011) analysed the evolution of the rural non-farm sector in India and its contribution to the decline of poverty by using regression analysis.

Hild Marte Bjornsen and Ashok (2012) investigated the simultaneous relationship between farming efficiency and the off-farm labour supply decisions of both farm operators and their spouses. The Results of panel data revealed several interesting findings. First, farming efficiency (ratio of farm revenue to total variable

cost) has a positive and negative impact on hours of off-farm work by farm operators and spouses, respectively. Second, agricultural subsidy has a negative and positive effect on off-farm work hours of farm operators and spouses, respectively. Finally a dynamic relationship between off-farm labour supply and farming efficiency was found. Specifically, in the case of the farm operator, off-farm work increases farming efficiency in the initial period and then decreases it in the second period. And also a positive correlation, for both periods, between off-farm hours worked by spouses and farming efficiency was observed.

LaTravis Brazil and James (2012) examined the economic linkages between rural farm and rural non-farm sectors in Alabama and also this study highlighted the impact of agricultural growth on rural nonfarm employment. Cross-section county level data was used and the null hypothesis was formed and tested by using instrumental variables approach. The key findings suggested that growth of the rural agricultural employment sector positively influences growth in the non-agricultural employment sector. The average multiplier was estimated at 1.10 per cent, implying that one percent growth of the rural agricultural sector induces 1.10 per cent growth of the non-agricultural sector in Alabama. The results showed that although agriculture continues to play a central role in rural development, the promotion of complementary engines of rural growth is of paramount importance.

Sylvie Demurgery and Li Shi (2012) explored the rural labor market impact of migration in China using cross sectional data on rural households for the year 2007. A switching probit model is used to estimate the impact of belonging to a migrant sending household on the individual occupational choice categorized in four binary decisions: farm work, wage work, self-employment and housework. The results showed that individual occupational choice in rural China is responsive to migration, at both the individual and the family levels, but the impacts differ: individual migration experience favours subsequent local off-farm work, whereas at the family level, migration drives the left-behinds to farming rather than to off-farm activities. And also the result pointed out the interplay of various channels through which migration influences rural employment patterns.

In the present study, employment would imply a state of being engaged in productive activities and has been measured in man days.

2.4. Investment Pattern

Mishra (1961) defined the investment as investment on equipments, land reclamation, buildings, irrigational structure, orchard and livestock.

Bidyadhar Misra and Ajit Kumar (1965) defined the investment as the expenditure on purchase of land, equipments, livestock and construction of irrigation structure and farm house.

Singh and Bohil (1965) defined the investment as expenditure on bullock cart, minor implements such as chaff cutters, pump sets and the like and in few cases tractors and storage sheds.

Shastri (1965) meant by the term investment, the purchase of land, livestock, implements, machinery and equipments, construction and repair of farm house, bunding and other land improvements including land reclamation, development of irrigation resources and laying of orchard and plantation.

The All India Rural Credit Survey (1969) defined capital investment of enterprise as expenditure on machinery, equipments, buildings and other construction works and net investments represented the expenditure on items of capital nature made by an individual household during the year as well as change in its position of outstanding debt.

Desai (1969) measured that the level of investment either on durable or non durable capital in the progressive area was much larger than that of the backward area, the larger investment in the former was because the sample farmer were better-off and were more enterprising and enlightened. The investment in the progressive area was largely composed of investment in irrigation and to a lesser extent in modern farm equipment besides new inputs. In the backward area investment was largely in traditional forms of assets and inputs.

Ghosh (1969) classified the investment outlay into two groups i.e. (i) variable capital and (ii) fixed capital. The former included the expenditure on current

production inputs, such as seeds, fertilizer and manures, pesticides, water and hired labour. The latter included expenditure for the acquisition of lands, livestock, tools, equipments and machineries and also expenditure on construction of house and buildings and land improvement including irrigation works.

According to Kurian (1969), the investment was taken to denote as capital expenditure of rural household in agriculture leading to capital formation covering a number of items like reclamation of land, bunding and other land improvements, irrigation, agricultural implements and machinery, farm house, storage and ware house, etc.

Gyaneshwar Ojha (1969) classified investment at farm level into real farm investment, investment in durable consumer goods and other investments. Real farm investment includes those items which are directly related with growth of reproducible tangible wealth of the farm over time and covered items of investment on land improvement, irrigation, purchase of improved tools and implements, livestock, land and construction and major repair of farm houses.

According to Prasad (1969), there were two groups of factors responsible for investment pattern i.e. (i) internal factors defined as those on which the individual had control like cropping pattern, type of farming, the resources position and progressive nature of cultivators and (ii) external factors that created opportunities or necessary infrastructure, conducive to the individual for investing capital in agriculture for construction of irrigation projects, provision of cheap credits etc.

Rajagopalan and Krishnamoorthy (1969) defined the investment as the capital investment necessary for land resource development through reclamation, provision of irrigation structures, increasing soil fertility and for improving labour efficiency and managerial skill by formal, vocational and extension education.

According to Shah and Singh (1969), investment consisted of two ways i.e. (i) working expenditure in agriculture by way of labour, maintenance of animal, irrigation costs, costs of pesticides, maintenance charges of machinery and vehicle (ii) capital investment on durable capital goods as irrigation equipments like pump sets, tube wells, farm machine, tractor and power thresher.

According to Chauhan and Agarwal (1970), capital investment could be divided into two broad groups i.e. (i) agricultural investment comprised of investments on land, purchase of livestock including draught animals and milch animals (ii) investments on irrigation including digging and repairing of wells, installation of tube wells and development of other irrigation sources, investments on implements and transport, equipments, construction of farm house, cattle shed etc.

Bhati *et al.* (1972) defined agricultural investment as short term investment and long term investments. The former included inputs like high yielding variety seeds, fertilizer and chemicals, irrigation operations, working expenses for machinery and livestock. The latter included fixed capital assets like irrigation equipment, machinery, livestock etc.

According to Kaul and Mehta (1972), capital investment could be taken to include working capital as well as the inputted costs of fixed capital.

Raj *et al.* (1972) classified farm family investment into three categories, viz., (i) farm investment which included investment on land, irrigation structure, farm buildings, farm machinery and implements, livestock etc., (ii) non-farm investment which constituted purchase of residential plots, means of transport such as trucks, bus, car etc., (iii) household investment represented residential houses and consumer durables.

Puhazhendi (1973) defined farm investments as expenditure on assets or inputs for use in farm production. Assets included both circulating assets and fixed capital assets on farm.

According to Kuralanathan (1975), investment may also be defined as expenditure on new purchase of land and land improvement, permanent expenditure on household durable and non-durable, crop and livestock expenditure and consumption expenditure during the study period. The tool used for measuring investment was $I = g(Y)$ where, I is investment of the year in rupees and Y is net cash income of the year.

Satyanarayan and Pandey (1981) defined farm investment as an act of mobilising funds for adding capital to boost farm production. They included investment on land, irrigation structure, farm buildings, livestock, farm machinery and implements under farm investment.

Sharma *et al.* (1987) indicated that in the absence of irrigation facilities farmers directed their investment on livestock in order to supplement their earnings from crops. The three factors viz., size of land holding, irrigated area and annual income were observed to be positively correlated with level investment.

Gurpreet and Grewal (1988) observed that farm investment was influenced by many variables. They included value of assets, owned farm income, non-farm income, size of operated holding, availability of farm credit and the education level of decision maker in the family. The farm investment was found is be significantly influenced by farm size, availability of credit and education of the decision maker of the family.

Alka Srivatswa and Prasad (1989) revealed that investment on farm machines and implements occupied first place on both medium and large farms claiming 67 per cent and 56 per cent of total investments. He was also observed that medium farmers invested significant amount on land purchasing. But large farmers did not invest at all. Among miscellaneous investments important items was construction of irrigation structures.

Khanna (1990) studied on plan fund investment in agriculture found a positive relationship between the size of holding and investment. He firmed that credit availed by the farmers acquired better managerial ability to undertake various farming decision which resulted in increased income and therefore increased investment.

Kumaravelu (1991) indicated that farm investment included current year addition by land purchase, land improvement, digging of wells, deepening of wells, purchase of machinery tools and implements and livestock.

According to Dhawan and Yadav (1995), fixed investments in agriculture included reclamation of land, bunding and other land improvements, orchards and plantations, wells, other irrigation sources, agricultural implements, machinery and

transport equipments, farm houses, barns and animal sheds and other capital expenditure.

Elangbam Nixon Singh (2011) studied rural savings and its investment in Manipur - a case study of formal finance vis-à-vis Marups. The study analyzed the saving and its investment pattern in rural areas and also identified some of the important issues relating to the formal finance and Marups for the economic development of rural areas. To express in simple term the investment consisted of farm operating capital and fixed capital investment on farm and non-farm items.

In the present study, investment with regard to off-farm and non-farm employment was calculated.

2.5. Multiple Linear Regression Function

Bishop and Toussaint (1958) defined regression function as a mathematical relationship describing the way in which the quantity of particular produce would depend upon the quantities of inputs used.

Heady and Dilon (1961) defined production function as the relationship between the input of factor services and output of the product.

According to Khare (1961), linear function is a mathematical equation expressing a given output as a function of certain resources.

Bilas (1971) defined production function as a physical relationship between a firm's inputs of resources and its output of goods and services per unit of time.

Samuelson (1973) defined production function as the maximum amount capable of being produced by each and every set of specified inputs or factors of production and it was defined for given state of technical knowledge.

Prasad (1975) appraised the resource productivity and efficiency in the use of resources like human labour, seeds, manures and fertilizers, irrigation and intensity of cropping by carrying out a regression analysis. All the resources were found to have significant and positive impact on returns per hectare of farm.

Johl and Kapur (1977) defined linear functions as the technical and mathematical relationship describing the manner and extend to which a particular product depends upon the quantities of inputs or the services of inputs used.

Ferguson (1982) defined the production function as a schedule showing the maximum amount of output that can be produced from any specified set of inputs given the existing technology.

According to Koutsoyiannis (1994), production function is purely a technical relationship between factor inputs and output. It would describe the transformation of factor inputs into products at any particular time period.

Mathur and Vausht (1994) related tea exports, domestic production and consumption in the form of linear function.

Singh and Patel (1995) hypothesized export response function of seafood as a function of quantity, value and total production of seafood.

Srinivasa Gowda and Jalajakshi (1996) hypothesized that the major determinants of export demand for Indian shrimps were domestic production of shrimps, prices of Indian shrimps and GNP of the importing country.

Varadharaj (1997) studied an economic analysis of impact of tannery pollution on agricultural households in Dindigul block of Mannar Thirumalai district. Regression analysis was employed to establish the technical relationships between the yield and set of specified factors of production.

According to Samuelson and Nordhans (1998), production function would indicate the maximum amount of output capable of being produced by each and every set of specified input.

Brajesh Jha (2002) estimated export demand for unmanufactured tobacco for India with the variables demand for tobacco exports from the country, Indian export prices of tobacco, international prices of tobacco, amount of international trade in tobacco, exchange rate etc.

Bhosale *et al.* (2004) studied the determinants of export of grapes and identified that factors affecting the quantities of grape exported from India to different countries by a multiple linear type regression model and stated that the factors

influencing the export grapes from India, the export of grape was dependent on the balance of trade, i.e. net export earnings from export of grape.

Daniel Viswasam Samuel (2004) applied the export response function to study the factors affecting the export of fish in Tamil Nadu. The results indicated that total production of fish and unit value realizations were significant. These two variables formed the major determinants of fishery exports of Tamil Nadu. The multiple determination (R^2) of 0.879 implies that 88 per cent of the variation in the quantity export was explained by the variables included in the function.

Basavaraja *et al.* (2007) attempted the economic analysis of post harvest losses in food grains in Karnataka, India. Multiple linear regression function was carried out to examine the factors affecting post-harvest losses at farm level in food grains.

Thulasiram (2012) estimated linear regression function for finding the influence of factors on average price of fish in Cuddalore district. The result indicated that the co-efficient of multiple determinations (R^2) was 0.96 revealed that the fish price function model was a good fit.

In the present study, multiple linear regression was used to calculate no. of days of employment (on-farm, off-farm and non-farm employment) / year.

2.6. Financial Feasibility

Flink and Grunewald (1969) in United States of America, examined solvency of the firm in terms of whether its total assets equal or is greater than or less than the obligation of the firm to its creditors, the liquidity in terms of its ability to meet its current obligations and profitability in terms of its overall efficiency of the business over and above the amount put into business for transactional purpose.

Page *et al.* (1970) studied the financial position of agricultural co-operatives of the United States of America by using the magnitude of current ratio as a test of liquidity. The total liability to net worth ratio and fixed assets to net worth ratio were used to test the solvency position of co-operatives and net earnings to net worth in order to test profitability of the co-operatives.

Hopkin *et al.* (1973) stated the financial progress of a business firm could be evaluated with the help of liquidity, solvency and profitability ratios and optimal that, relatively low volume of transactions might be offset by high efficiency performance and *vice versa*.

Gupta and George (1976) evaluated the economic feasibility of investment in Nagpur Santra cultivation using Net Present Value (NPV), Internal Rate Return (IRR) and Benefit cost (BCR) analysis.

Ananth (1984) used financial ratios to analyzed the performance of Bangalore Grape Growers Marketing and Processing Co-operative Society, Bangalore. The study revealed that the society had a satisfactory financial structure. He indicated that the society could grow further by augmenting its infrastructural facilities, opening more retails selling outlets and providing better transport and storage facilities for the grapes procured from the farmers.

Rao (1985) studied the business performance of CAMPCO and observed that the cooperative institution had sound financial structure, earning reasonable profits. He found that major parts of the assets were maintained as liquid assets in consonance with need for trading activities.

Mohammed Ali (1992) analyzed the financial performance of fruit and vegetable processing units under Private and Public sector. He observed that the solvency position of the private sector was sound which was supported by lower solvency value, but for public sector it was high. The liquidity ratios, in general revealed that the private sector unit was in a better position than Public sector. The profitability ratios indicated more efficient utilization of assets as well as owned funds in case of Private sector unit. The turnover ratios were also low in case of Public sector unit compared to Private sector unit.

Rao (1993) conducted a study on the economics of investment in mango plantation in Ratnagiri district (M.S) and estimated that the plantation of Alphonso mango was profitable with per hectare net return of Rs.30000 at Rs.24926 cost of cultivation in addition to Rs.17469 cost of marketing. The investment in mango cultivation was found to be economically viable as the estimated project analysis

parameters favourable with 19.33 per cent of internal rate of return which was higher than prevailing interest rate, benefit cost ratio higher than one and 11 years payback period.

Srinivas *et al.* (1994) estimated the financial feasibility of cardamom cultivation in Andhra Pradesh using various discounted measures like Benefit cost analysis, NPV and IRR.

Reddy (1994) studied the financial performance of Mulkanoor Co-operative Rural Bank using liquidity, solvency, profitability and turn over ratios. The study revealed that the liquidity position of the bank was found to be sound as indicated by the current (2.09) and quick ratios (1.74). The solvency ratios showed that the Bank has been following the policy of low capital gearing with regard to long term debt (0.17) and high capital gearing with regard to total debt (1.56). The performance of the Bank in relation to its profitability (2.42 per cent) and turnover was not up to the expected level (2.58 per cent) in view of the size and volume of business.

Hosmani (1995) evaluated the performance and impact of Regional Rural Banks, case study of Malprabha Grameena Bank in Karnataka; it was found that the liquidity and solvency position of the Bank was sound. However, the profitability ratios were negative (43) due to higher turnover (3.11) compared to spread (2.96) ratio.

Vandana *et al.* (1995) revealed that acid lime cultivation in Guntur district of Andhra Pradesh was economically viable as NPV was highly positive at all discount rates used in the study. The profitability of crop could be increased if excess utilisations of fertilizers are reduced.

Dayanand *et al.* (1996) worked out the BC ratio to evaluate the financial viability of investment on ber cultivation. He found that ber cultivation was profitable with higher BCR of 4.52 depending upon the size of orchard. The NPV and IRR was found to be Rs.269114 and 50 per cent respectively.

Mitrannavar and Kulkarni (1998) studied the economic viability of investment in grape cultivation in Bijapur district of Karnataka using data collected from 80

sample grape growers for the year 1995-96. Financial feasibility measures like net present value, benefit cost ratio and the internal rate of return were found to be favourable with minimum pay-back period for all surveyed vineyards justified the investment in grape cultivation in the area.

Sekar and Ramasamy (1998) conducted a study to assess the financial feasibility of various soil conservation structures (contour bund, staggered trench, stone wall and waterway) to conserve soil in Nilgris district, Tamil Nadu, India. Three major issues were considered: (i) analysis of investment on soil conservation measures; (ii) determines of land value; and (iii) adoption analysis of soil conservation technologies. Four major crops were covered: potato, carrot, cabbage and tea. Net Present Value (Rs.1225365), Benefit Cost Ratio (1.42) and Internal Rate of Return (38.65 per cent) were calculated for the four soil conservation technologies.

Goyal (1999) worked out the BCR to evaluate the financial viability of investment on rose cultivation in Sonepat District of Haryana State. He found that rose cultivation was profitable with higher BCR of 8.48. The annual net return was worked out to Rs.44457 per hectare. The payback period was two years.

Kishor Goswami (2000) estimated capital worthiness of investment in Citronella cultivation. The estimated BCR and NPV indicated that citronella cultivation was economically viable at discount rates used in the study.

Talathi *et al.* (2001) in their study on economic feasibility of kokum plantation on the research farm coming under Konkan region of Maharashtra reported that investment in kokum plantation is economically viable since net present value (NPV) was positive, benefit cost ratio (BCR) was greater than one and internal rate of return (IRR) was also greater than the opportunity cost of capital with nine years payback period. Further, study indicated that, crop was equally remunerative when compared to other crops, and the cost incurred on the establishment of kokum orchard per hectare worked to Rs.56699.

Naik (2002) studied economic feasibility of mango plantation in south Konkan of Maharashtra for near sea shore orchards (Group A) and away from sea shore

orchards (Group B) and worked out project feasibility parameters at 8, 10 and 12 per cent discount rates. The NPV of group A orchards was found to be Rs.252770, Rs.150270 and Rs.86400 at the discount rates respectively. The respective figures for Group-B were Rs.156020, Rs.85580 and Rs.41740. All the NPV's were positive indicating viability of mango plantation in the study area. Further, the payback period (PBP) was 14, 15 and 16 years in Group-A and 15, 17 and 19 years in Group-B for the respective discounting rates. However, without discounting the payback period for both groups was observed to be 12 years. This indicated that mango plantation project required 12 years period for recumbent of investment. The value of IRR was 17.97 per cent in Group-A while 15.38 per cent in Group-B. In both the groups, these values were greater than prevailing rate of interest (13 per cent) on borrowings. The study indicate that Group A orchards had better comparative advantage when compared with Group B orchards.

Gobbi and Casasola (2003) examined the financial feasibility of investing in silvopastoral systems on 20 per cent for a conventional livestock farm in Esparza, Costa Rica. The findings from an ex-ante benefit cost analysis indicated that the investment was financially viable with an incremental net present value of US$1613 and an internal rate of return of 20 per cent, if only livestock production was considered. Investment feasibility was directly related to improvements in the productive and reproductive parameters of the livestock herd caused by the incorporation of silvopastoral systems.

Liao (2003) examined the economic feasibility which included methods such as payback period, rate of profitability, net present value, internal rate of return, benefit cost ratio and break - even analysis to evaluate the financial feasibility of an aquaculture venture.

Sundaravaradarajan and Ramanathan (2003) revealed that the BCR was high in case of new cashew plantations in Tamil Nadu, which indicated that replanting or new planting of improved cashew clones was financially feasible and economically viable. Also the IRR for old and new cashew plantations was 17.17 per cent and 34.36 per cent respectively which highlighted that the new plantations had vast potential when compared to the old plantation.

Hedge and Patil (2005) examined the costs and return as well as the feasibility of establishing mango scion blocks for mango production. The net present value, benefit cost ratio, internal rate of return and payback period was worked out to know the financial viability of the enterprise. Results showed that the returns per acre were marginally higher in Dharwad scion blocks (Rs.5404.29) than that of Bangalore scion blocks (Rs.5202.90) Returns increased from first year to third year in both districts. The net present value of Dharwad scion blocks (Rs.82777) was higher than that of Bangalore scion blocks (Rs.69958.05). Similarly the benefit cost ratio for Dharwad scion blocks was higher (2.13) than that of Bangalore (2.01). The payback period for Bangalore scion block was 7 years and 6.11 years for Dharwad scion blocks. Thus, it was concluded that investing on mango scion blocks is economically feasible and financially viable, irrespective of region of production.

Gondalia and Patel (2007) evaluated economic viability of investment on anola in Gujarat. The result of the study indicated that aonla cultivation was economically feasible at 10 per cent discount rate. The NPV is positive (Rs.652652) at 10 per cent discount rate and BCR was found to be higher than one (5.25) indicating the worthiness of investment.

Goswami and Challa (2007) concluded that the positive NPV, BCR of 2.41 and IRR of 14.40 per cent implied that the investments made in small holder rubber plantations in West Garo Hills District of Meghalaya were highly paying propositions.

Khem Chand and Jangid (2007) assessed the profitability & economic viability of henna cultivation in the Pali district of Rajasthan. Based on the factors like NPV, IRR and BCR henna cultivation practised by the farmers has been found to be a financially viable proposition. The financial viability parameters have been found to be more sensitive to changes in prices than cost.

Shekhawat (2007) studied a case study of an economic analysis of sub-surface drainage under Indira Gandhi Nahar Priyojna command area. The study was showed that water logging adversely affects crop yields. The BCR and the NPV have been found as 2.44 and Rs.34275/ha, respectively. The IRR has been found to be 25.88 per

cent. These indicators have well established the financial feasibility of the project in the IGNP area.

Varghese (2007) worked out NPV, BCR and IRR to evaluate the financial viability of investment made in cardamom cultivation of Kerala. He found that cardamom cultivation was profitable up to cost 'C'. It has also the positive NPV, higher BCR of 1.16 and IRR of 25 per cent.

Gangawar *et al*. (2008) worked out all the discounted measures to evaluate financial viability of investment on peach cultivation in North Indian Plains. He found that peach cultivation was profitable with BCR, NPV and IRR was 1.681, Rs.44807 with discount rates of 12 per cent and 22.20 per cent respectively.

Koulagi and Purohit (2009) estimated financial feasibility of lime cultivation in Karnataka district. It revealed that large orchards are showing highest NPV, moderate BCR and IRR. It indicates that the size of orchards has some features of economies of scale although not very prominent.

Sarukeswari (2011) studied an economic analysis of production and marketing of turmeric in Dindugul district. Various discounted measures like NPV, BCR and IRR were used to study the economic viability of investment in moringa cultivation. The result showed that the positive value of NPV and IRR, BCR of greater than one indicated that the investment in moringa cultivation in the study area was considered to be economically viable.

Thulasiram (2012) studied an inquiry into the marketing of fish to formulate viable fisheries with reference to retailing in Cuddalore district of TamilNadu. He worked out NPV, BCR and IRR and the profitability and financial ratios to evaluate the financial feasibility of investment in starting a fish processing industry. The NPV and BCR were worked out at the discount rate of twelve per cent. He found that positive value of NPV, BCR of greater than one and IRR of more than current bank rate revealed the financial feasibility of starting a fish processing unit in the study area. Profitability and financial ratios indicated huge return for a smaller proportion to investment.

In the present study, financial feasibility of investment in starting off-farm and non-farm employment was evaluated by using NPV, BCR and the IRR and the profitability and financial ratios were also worked out.

2.7. Constraint Analysis - Garrett's Ranking Method

Mohanram (1992) used Garrett ranking technique to rank the constraints faced by the mango and tomato processing industry in the north western region Tamil Nadu.

Sherine Mendez (1995), in her study on market potential assessment for hybrid vegetable seeds in the Nilgris, used Garrett's technique to rank the factors like expectations of farmers about hybrid seeds, reasons for cultivating hybrid cabbage and carrot problems faced by farmers and reasons for purchasing from particular source.

Sundaram (1997) used Garrett's ranking technique to analyze the reasons for purchase of castor from wholesalers by the processors and the constraints in the castor processing units in Kerala.

Subhadra *et al.* (2009) used Garrett's ranking method to assess the constraints associated with production and marketing of mixed farming in Palakkad and Thrissur districts of Kerala. Sample size was 300 farmer members apportioned equally among costal, plain, and high range regions of the selected districts. Fifteen problems were reported by farmers in the production of crop and milk together, of which four were common to both activities. Low productivity was an important problem having second rank in both. While most crucial problem to crop production was non availability of land, it was feed cost to milk production. Twelve problems were reported in total by farmers for marketing of crop and milk, of which three problems were general to both activities. These general problems had more or less same rank in both crop and milk marketing. Low price for the product was the most crucial in both cases. Equally important were transportation problem (cost or distance) and lack of marketing facilities.

Dhanabhakyam and Anitha (2011) conducted a study on stress management of working women in Coimbatore district. Garrett's ranking technique was used to

identify and rank the causes or impact of distress such as personnel problem, family problem, job and organizational problems.

Kumudha and Rizwana (2012) analyzed the problems in handloom industry like outdated technologies, lack of Unique Selling Proposition, unorganized production system, insufficient working capital, weak promotion strategies, competition from powerloom and mill sector etc. Henry Garrett ranking method was used for this study.

Mohanraj and Manivannan (2012) identified the problems faced by the poultry farm owners in production and marketing of poultry products in Namakkal district. Henry Garrett ranking method was employed and the results showed that lack of sufficient infrastructural facilities was ranked first with a score 54.60 Garrett points.

Mohanraj and Manivannan (2012a) studied present scenario of migrated workers and garment industry in Erode and Tirupur districts. The study found that the problems faced by the migrated workers in readymade garment industry by using Henry Garrett ranking technique. The result showed that partiality with local worker was ranked first with the score of 762.

Kumudha and Rizwana (2013) studied problems faced by handloom industry - a study with handloom weavers' co-operative societies in Erode district. The study was analyzed by Henry Garrett ranking technique and percentage analysis.

Myilswamy (2013) studied on consumer brand preference towards using d^{th} service providers in Coimbatore city. Garrett ranking techniques was used to rank the preference of the respondents on different aspects of the study, the percentage position of each rank thus obtained into scores by referring to the table given by Henry E. Garrett.

Sridharan and Saravanan (2013) explored the causes for the farmers to enter into contract farming system and evaluated the performance of vertically integrated broiler contract farming system on farmer's income in Coimbatore district. And also this study identified the problems in poultry farming and provides suggestions to overcome the same and improve their profits. In order to understand the various motivating factors, which propelled the farmers to undertake broiler farming, various

factors were considered and the Henry Garrett ranking method has been applied. From the result of Garrett ranking method that the “Additional income or assured income was ranked first with a score 75.10 Garrett points.

In the present study, to identify the constraints in taking up off-farm and nonfarm employment Henry Garrett ranking method is used.

Design of the study

CHAPTER III

DESIGN OF THE STUDY

Research study involves a sequential process of selection of study area, sampling, collection of data and use of appropriate tools of analysis and discussion of findings of the study. The details of choice of the study area, method of sampling, collection of data and tools of analysis used in this study are discussed in this chapter.

The general objective of this study was to analyze the employment and income pattern of dry land farmers and to identify the scope and potentials to formulate viable off-farm and non-farm employment projects in the study area.

3.1. Selection of the Study Area

The Erode district was purposively selected because it is characterized with a scanty rainfall and a dry climate throughout except during the monsoon season. District receives annual average rainfall of 600 to 700 mm which mainly occurs during northeast monsoon season. Limited availability of groundwater is a major constraint for agricultural development in this district. Therefore, successful crop production depends heavily on the success / failure of monsoon thus making agricultural production riskier in many parts (dry land areas) of the district. Most of the farmers in dry areas such as Chennimalai and Perundurai blocks of the district were additionally moving to off-farm and non-farm activities for their income source. Hence for the present study, the criteria of selection was based on the factors mentioned above.

3.2. Distribution of Samples

Two - stage random sampling technique was followed. In the first stage, four villages namely Ekkattampalayam, Mugasipidariyur, Voipadi and Ellaigramam were selected randomly from Chennimalai block and two villages *viz*., Moongilpalayam and Ponmudi were selected randomly from Perundurai block. Altogether six villages were selected for the study. The distribution of sample farmers in the selected villages is presented in the Table 3.1. From each selected village, ten on farm farmers were selected randomly. Thus the sample size arrived for representing on-farm farmers

were 60. The off-farm farmers were selected randomly at the rate of five per village, constituting 30 and another 30 representing non-farm farmers were selected randomly from the three villages Mugasipidariyur, Voipadi and Ellaigramam at the rate of ten per village considering its predominance in these villages. Thus the total sample of 120 included 60 on-farm farmers, 30 off-farm farmers and 30 non-farm farmers. The location of Erode district in Tamil Nadu and the location of Chennimalai and Perundurai blocks in Erode district are presented in Figure 3.1. and Figure 3.2. respectively. The distribution of selected sample villages in Chennimalai and Perundurai blocks are depicted in Figure 3.3. and Figure 3.4. respectively.

Table 3.1. Distribution of Sample Farmers in the Selected Villages

S.No.	Blocks	Villages	Number of Samples		
			On-farm	Off- farm	Non-farm
1.	Chennimalai	Ekkattampalayam	10	5	--
		Mugasipidariyur	10	5	10
		Voipadi	10	5	10
		Ellaigramam	10	5	10
2.	Perundurai	Moongilpalayam	10	5	--
		Ponmudi	10	5	--
		Total Samples	**60**	**30**	**30**

3.3. Sources of Data

3.3.1. Secondary Data

The general information related to the district such as total population, land utilization pattern, cropping pattern, agro climatic conditions, rainfall and irrigation sources were collected from the official records made available in the Statistical Office of Erode District, Office of Joint Director of Agriculture, Erode district, Government publications and other published materials.

3.3.2. Primary Data

A well structured and pre-tested interview schedule was used to collect primary data. To study the employment and income pattern of dry land farmers of the study area three sets of questionnaire schedules were prepared. Based on the survey, the primary data required for the study were collected from the sample of on-farm, off-farm and non-farm employment farmers by the personal interview method, using

FIGURE 3.1. LOCATION OF ERODE DISTRICT IN TAMILNADU

&

FIGURE 3.2. LOCATION OF CHENNIMALAI AND PERUNDURAI BLOCKS IN ERODE DISTRICT

FIGURE 3.1.

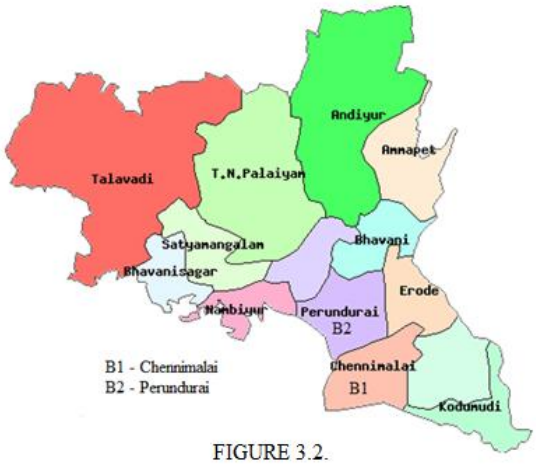


FIGURE 3.2.

FIGURE 3.3. DISTRIBUTION OF SELECTED SAMPLE VILLAGES IN CHENNIMALAI BLOCK

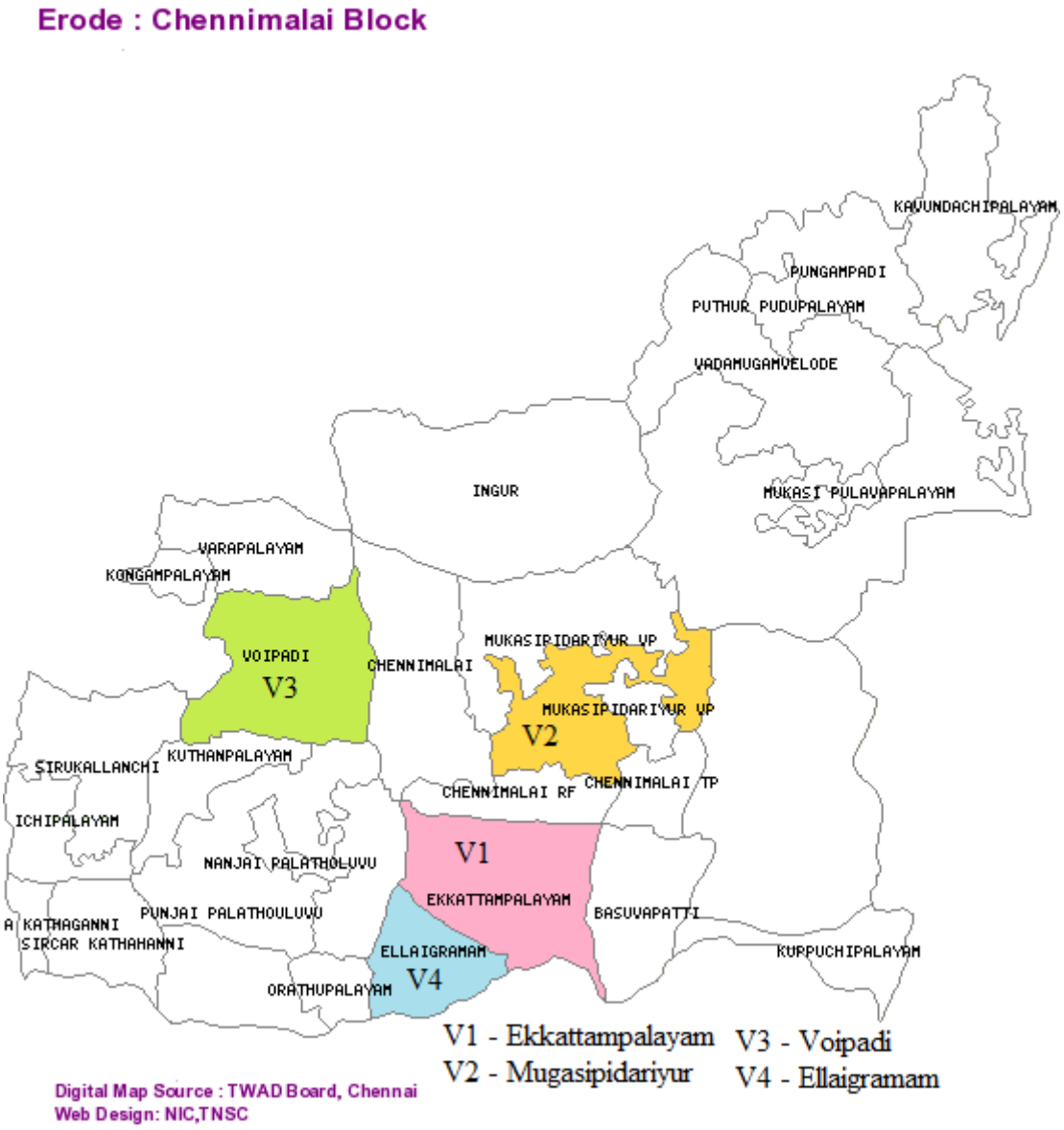
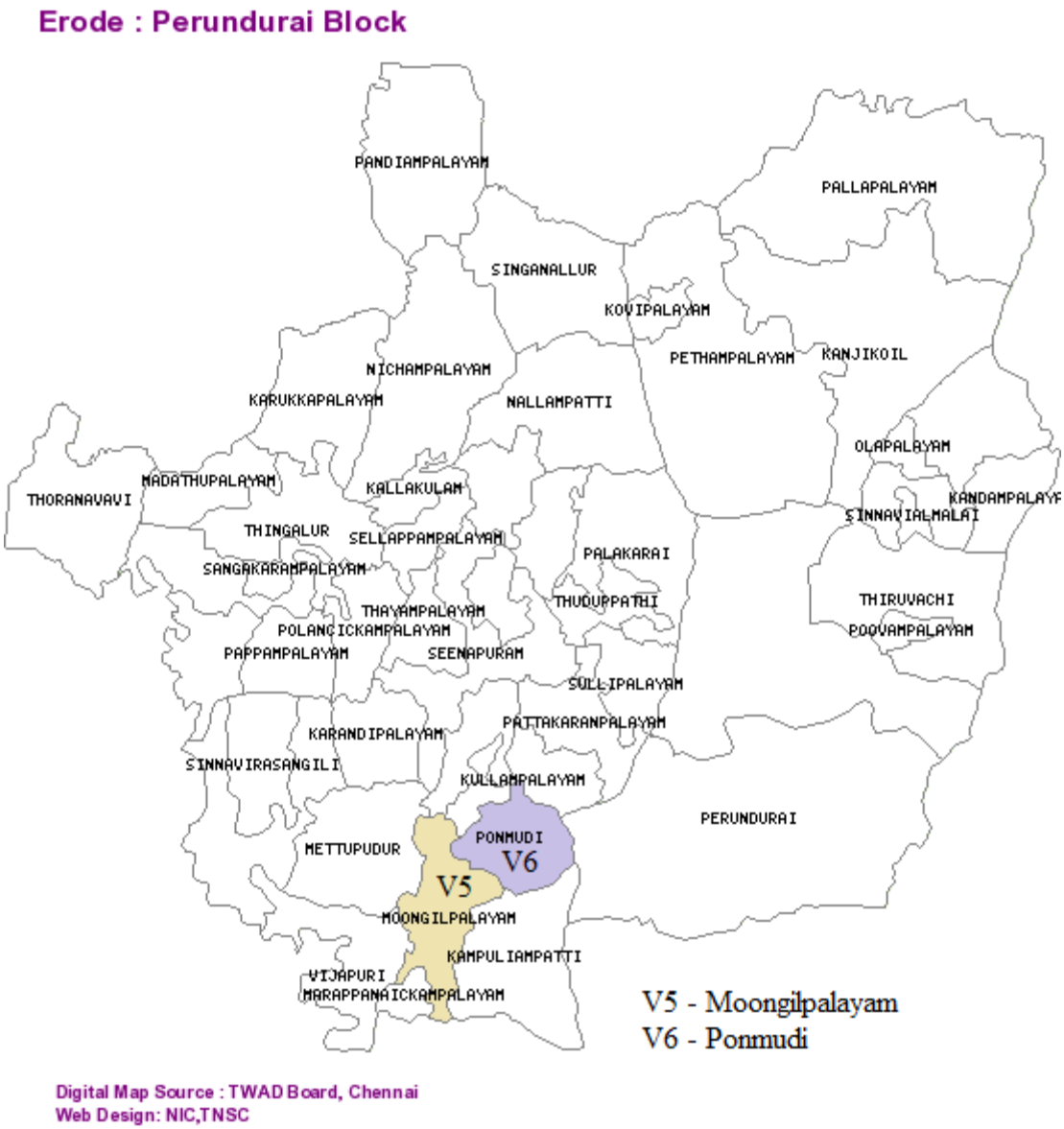


FIGURE 3.4. DISTRIBUTION OF SELECTED SAMPLE VILLAGES IN PERUNDURAI BLOCK



pre-tested and finalized structured schedule. In order to get better co-operation and reliable data from the farmer, the purpose of the study was clearly explained to them prior to the interview. The cross sectional data collected encompasses the following aspects, general information including respondents, age, education level, size of family, type, occupation, asset position etc.

Detailed information regarding duration, days and month per year spent on-farm, off-farm and non-farm activities and also income obtained from on-farm, off-farm and non-farm activities, expenditures involved were collected. In addition, information on problems faced by farmers in order to take off-farm and non-farm activities was also ascertained.

3.4. Period of Study

The primary data were collected from the sample respondents during the month of January to February 2013 and the data pertain to the agricultural year 2011-2012.

3.5. Units of Measurement

3.5.1. Land

All sample farmers were owner operated. To include the share of land in the total cost of production, the prevailing market rate of rent paid by neighbouring farmers in the respective villages were considered to impute the rental value of owned land.

3.5.2. Interest on Owned Fixed Capital (Other than the Land Value)

Twelve per cent simple interest rate has been imputed which the interest is charged for investment loans sanctioned by commercial banks in the study area.

3.5.3. Depreciation of Fixed Assets (Other than Land)

For fixed assets such as farm implements, farm buildings, work and milch animals, depreciation were calculated following the straight line method and taken into account. It was calculated as five per cent for buildings and for machineries it was ten per cent.

3.5.4. Land Revenue

Cess and other charges and surcharges actually paid by the farmers were taken into account.

3.5.5. Human Labour

In the present study, the actual wages paid to hired labour and family labour were valued at market wages rates paid by farmers in the respective villages. Wages paid to men and women labour formed the basis for standardization of labour into man day units. Eight hours of work put forth by a male labour was reckoned as a one man day.

3.5.6. Machine Power

Actual hired machinery charges were taken into account and that for owned machinery use, the market hire charges in the respective villages were considered for imputation.

3.5.7. Seeds and Manures

For all the purchased inputs, the actual cost incurred and the farm produced seeds and manures were valued at the prevailing market price for the respective inputs.

3.5.8. Interest on Working Capital

Components included in the working capital were cost of human labour, machine labor, manures and weeding. Interest on working capital was computed at the rate of seven per cent per annum which was charged by Commercial bank for short-term loans.

3.5.9. Gross Income

The values of both main products and by products from all farm enterprises were taken into account in estimating the gross return. Farm gate or wholesale prices were considered in valuing the farm products.

3.5.10. Gross Margin

It was obtained by deducting the total variable cost from the gross income.

3.5.11. Net Income

It was estimated by deducting total cost from gross income.

3.6. Costs and Returns

3.6.1. Costs

To estimate the cost of cultivation of different dry land crops, cost approach was used. The total cost was classified as fixed and variable costs. Fixed cost includes land revenue, depreciation on farm buildings, tools and implements and rental value of owned land. The variable cost includes cost on ploughing, seeds, manures, after cultivation practices, human labour and interest on working capital.

3.6.2. Returns

Gross return was obtained by adding both main and by products. Net income was estimated as the difference between the gross return and total cost of cultivation.

3.7. Tools of Analysis

3.7.1. Conventional Analysis

Simple percentage and average analysis were carried out where ever necessary in this study.

3.7.2. Descriptive Statistics

Average and percentage analyses were used to examine the characteristics of sample farm households such as age, educational status, size of operational holdings, different cost components, cost of production and returns from different dry land area cropping system.

3.7.3. Standard Man Days - Employment Pattern

To study the employment pattern of dry land area farmers working hours per day for each person was recorded in various activities and converted into standard man days by taking eight hours as working hours per day.

3.7.4. Linear Regression

Linear regression is a method of estimating the conditional expected value of one variable y given the values of some other variable or variables x.

A linear regression line has a formula of Y = a + bX, where X is the explanatory variable and Y is the dependent variable. The slope of the line is ‘b’ and ‘a’ is the intercept (the value of Y when X = 0)

Linear Function $Y = a+bX_1+bX_2+bX_3+bX_4+bX_5+bX_6+bX_7+u$

Where,

Y = No. of days of employment / year

a = Intercept

X_1 = Area of cultivation

X_2 = Annual Income from crop

X_3 = Duration of crop in days / year

X_4 = Days of off-farm employment / year

X_5 = Income from off-farm employment / year

X_6 = Days of Non-farm employment / year

X_7 = Income from Non-farm employment / year

u = Error term

3.7.5. Financial Feasibility

In the present study, financial feasibility of formulated off-farm and non-farm employment was measured using discounted measures such as NPV, BCR and IRR. They are discussed below.

3.7.5.1. Net Present Worth (NPW) or Net Present Value (NPV)

Net Present Worth is often referred as net present value. The present worth of the net benefits of a project is obtained by deducting costs from the benefits and the resulting net benefits are discounted at the opportunity cost of capital for each year. The sum of the net benefits during the life period of the project gives the net present worth. If the NPW is positive, then it is construed that the project is economically feasible. If the NPW is zero, it means that the cost of the project has been fully recovered at the rate of discounting. Mathematically, it can be represented as:

$$NPW = \sum_{t=1}^{N} \frac{B_t}{(1+i)^t} - \sum_{t=1}^{N} \frac{C_t}{(1+i)^t}$$

Where, B_t = Benefits in each year

C_t = Costs in each year

N = Number of years

i = Discount rate

3.7.5.2. Benefit Cost Ratio (BCR)

It is widely used as measure of social benefit. It is the ratio between the present worth of benefit and present worth of costs. In order to compute the benefit - cost ratio, the opportunity cost of capital may be used as a discounting rate. The salvage value of the asset (at the end of its life time), if any, should be treated as a benefit in the last year of the project. The ratio is computed not by discounting the gross costs and gross benefits over the life time of the project; but by discounting costs and benefits each year. If the BC ratio is greater than one, the project is worthy of investing. Mathematically, it can be represented as,

$$BCR = \sum_{t=1}^{N} \frac{B_t}{(1+i)^t} \Big/ \sum_{t=1}^{N} \frac{C_t}{(1+i)^t}$$

Where, B_t = Benefits in each year

C_t = Costs in each year

N = Number of years

i = Discount rate

3.7.5.3. Internal Rate of Return (IRR)

The internal rate of return is defined as that rate of discount which makes the present worth of benefits and costs equal or just makes the net present worth of the cash flow equal to zero. This measure is popularly used in economic and financial analysis. All projects having an internal rate of return above the opportunity cost of capital are selected for making investment. It is a measure of the earning capacity of a project. The internal rate of return can be mathematically presented as,

$$IRR = \sum_{t=1}^{N} \frac{B_t}{(1+i)^t} - \sum_{t=1}^{N} \frac{C_t}{(1+i)^t} = 0 \quad i.e \quad NPW = 0.$$

which could be calculated by using,

$$IRR = \begin{bmatrix} Lower\ discount\ rate \\ at\ which\ NPW\ is\ positive \end{bmatrix} + \left\{ \begin{bmatrix} Difference\ between\ the \\ Lower\ and\ higher \\ discount\ rate \end{bmatrix} \times \begin{bmatrix} \dfrac{\text{Present worth of net benefits at lower discount rate}}{\text{Absolute difference between Present worth of net benefits at Lower and higher discount rate (signs ignored)}} \end{bmatrix} \right\}$$

Where,

IRR = Internal Rate of Return; LDR = Lower Discount Rate;
HDR = Higher Discount Rate

The IRR is calculated generally on a trial and error basis, using alternative rates of discount, till the NPW of the project reaches zero. To start with, the cash flow is to be discounted by opportunity cost of capital. If this net present worth of the cash flow is found to be positive, then, the cash flow has to be further discounted by raising the discount rate, till the net present worth of cash flow becomes negative. Practically, it is very difficult to compute the real IRR and hence interpolation method is used to estimate the true value of IRR.

The investment is considered viable if the calculated IRR is greater than that of the bank interest rate (opportunity cost of capital).

3.7.6. Amortized Decreasing Repayment Plan

In this repayment plan, the principal component remains constant over the entire repayment period, while the interest part decreases continuously. With the principal amount remaining fixed and interest amount decreasing, the annual installment amount decreases over the years.

1^{st} year = Total loan amount x Interest rate / 100

From 2^{nd} year = Outstanding amount x Interest rate / 100

3.7.7. Break - Even Point and Safety Margin Analysis

The break even analysis represents the level of units of output to even the cost when there is neither any profit nor loss.

The excess of production over the break - even point is called margin or safety. It indicates the strength of the enterprise. The high margin of safety indicated that the enterprise will make profit even if there is a fall in the output.

Algebraically, break - even point can be estimated by using the formula,

(i) $$\text{Break- Even Point} = \frac{FC}{P - VC}$$

Where,

FC = Fixed costs in rupees

P = Price

VC = variable cost

(ii) Break - Even Point of quantity = $\frac{\text{Total fixed cost}}{\text{Selling price per unit – variable cost per unit}}$

(iii) Units for a desired profit at ten percent = $\frac{\text{Total fixed cost + desired profit}}{\text{Selling price / unit – variable cost / unit}}$

(iv) Cost Break - Even Point of quantity = $\frac{\text{Total cash fixed cost}}{\text{Selling price / unit - cash variable cost/ unit}}$

(v) Safety margin = Total sales - sales at Break Even Point (BEP)

3.7.8. Profitability and Financial Efficiency Ratios

3.7.8.1. Profit Volume (P/V) Analysis

The (P/V) Analysis is important for studying the profitability of operations of a business. The analysis is done by P/V ratio which establishes the relationship between the contribution and the sale value. The ratio can be shown in the form of percentage also.

$$\text{P/V ratio} = \frac{\text{Contribution (c)}}{\text{Sales (s)}}$$

Where, C = S - V.C (Variable Cost)

3.7.8.2. The Earnings to Sales Ratio

$$= \frac{\text{Net income}}{\text{Sales (s)}}$$

The ratio measures profit margin to sales. Higher the ratio, the more profitable the firm is.

3.7.8.3. Turnover Ratio

$$= \frac{\text{Gross income}}{\text{Total business assets}}$$

It measures the gross business income generated per rupee of business assets.

3.7.8.4. Expense Structure Ratio

$$= \frac{\text{Fixed cash expenses}}{\text{Total cash expenses}}$$

It measures the fraction of fixed cost to total cost.

3.7.8.5. Gross Ratio

$$= \frac{\text{Total expenses}}{\text{Gross income}}$$

It measures the amount of the total expenses per rupee of gross income.

3.7.8.6. Operating Cost Ratio

$$= \frac{\text{Working expenditure}}{\text{Total expenditure}}$$

This ratio indicates the share of working expenditure to total expenditure.

3.7.8.7. Over Head Cost Ratio

$$= \frac{\text{Gross income}}{\text{Total business assets}}$$

It is computed by dividing total fixed cost by gross income to estimate the over head per rupee of gross income.

3.7.9. Henry Garett's Scoring Technique

Henry Garett suggested a scoring technique procedure for converting the ranks in to scores when the number of items ranked from respondent to respondent. To rank the constraints faced by the farmers in taking up off-farm and non-farm employment Henry Garett's ranking scoring technique was used. The ranks assigned by the respondents were converted into percent position by using the formula.

$$\text{Percentage position} = \frac{100\ (R_{ij} - 0.5)}{N_j}$$

Where**,**

R_{ij} = Rank given for i^{th} factor by j^{th} individual

N_j = Number of factors ranked by j^{th} individual

By referring to Garett's table, the percentage positions estimate was converted in to scores and then for each factor the scores of various respondents were added and mean value was arrived at. These means were arranged in descending order. The problem having the highest mean value was considered to be the most important and was given the highest rank and vice versa.

Description of the study area

CHAPTER IV

DESCRIPTION OF THE STUDY AREA

A profile of the study region in terms of agro-climatic conditions, topography and other socio-economic characteristics of a region are important for understanding the problems of agricultural development in that region. The present study mainly focuses on assessing the employment and income pattern of dry land farmers in Erode district. The basic information of the study area regarding location, climatic condition, soil type, irrigation facilities, cropping pattern, infrastructural facilities of the study area are reported in this section.

4.1. Geographical Location

Erode district lies on the extreme north of Tamil Nadu. It is bounded mostly by Karnataka State and also River Palar covers pretty long distance. To the East lies Namakkal and Karur districts. Dindigal district is its immediate neighbour to the South and on the West; it has Coimbatore and Nilgiri districts, as its boundaries. Thus Erode district is essentially a land-locked area having no sea-cost of its own. Erode district is situated at between 10° 36’ and 11° 58’ North Latitude and between 76° 49’ and 77° 58’ East Longitude.

The region can be portrayed as a long undulating plain gently sloping towards the river Cauvery in the south-east. The two major tributaries of river Cauvery *viz*., Bhavani and Noyyal drain the long stretch of mountains in the north. A part of the eastern boundary of the district is formed by river Cauvery, entering the district from Salem and flowing in a southerly direction.

The district comprises of two revenue divisions namely, Erode and Gobichettipalayam and six taluks namely, Anthiyur, Bhavani, Erode, Gobichettipalayam, Perundurai, Satyamangalam. Erode district consists of the municipal corporation of Erode and four other municipalities as listed below:

- Selection Grade: Gobichettipalayam
- Grade I: Sathyamangalam
- Grade II: Bhavani, Punjai Puliampatti

The district is divided in to six taluks and fourteen blocks as shown in Table 4.1.

Table 4.1. Geographical Location of Erode district

S. No.	Taluks	Blocks
1.	Erode	1.Erode 2.Modakurichi 3.Kodumudi
2.	Perundurai	1.Perundurai 2.Chennimalai
3.	Gobichettipalayam	1. Gobichettipalayam 2. Nambiyur 3.T.N.Palayam
4.	Bhavani	1. Bhavani 2.Ammapet
5.	Sathyamangalam	1. Sathyamangalam 2. Bhavanisagar 3. Thalavadi
6.	Anthiyur	1. Anthiyur

(**Source:** Statistical Hand Book, Assistant Directorate of Economics and Statistics, Erode, 2011-12)

4.2. Soil Type

The soils of the district are mostly red sand and gravel with moderate amounts of red-loam and occasional black-loam tracts. Vast stretches of the upland regions are mostly gravelly.

Red-loam occurs mostly in land under Kalingarayan channel and in the beds of tanks in Erode taluk and to some lesser extent in the valleys in Perundurai taluk. It also occurs in the hilly tracts of Bhavani taluk.

Soils of Bhavani, Erode and Perundurai taluks are chiefly gravel, stony and red sandy. Soils of Gobichettipalayam and Sathyamangalam taluks are mostly of the red sandy type. Red-loam is prevalent mostly in Gobichettipalayam and Perundurai taluks.

4.3. Demographic Features

The demographic details of Erode are presented in Table 4.2. According to 2011 census, population of Erode district was 2259608. The Male population was higher with 50.19 per cent than that of the female population with 49.81 per cent. 48.79 per cent of the population were living in rural areas and 51.21 per cent of the populations were living in urban areas of Erode district.

Table 4.2. Demographic Classification in Erode District (Census 2011)

S. No.	Particulars	Population (in Nos.)	Percentage
1.	Male	1134191	50.19
2.	Female	1125417	49.81
	Total	**2259608**	**100.00**
3.	Rural	1102415	48.79
4.	Urban	1157193	51.21
5.	No. of literates		
	(i) Male	841728	55.51
	(ii) Female	674652	44.49
	Total	**1516380**	**67.11**
6.	Density / sq.km	397	

(**Source:** Statistical Handbook, Assistant Director of Statistics, Erode, 2011-12)

The overall literacy rate in the district was 67.11 per cent. Of the males, 55.51 per cent were literates, whereas the female literacy rate was less with 44.49 per cent. Density per square kilometer of the district was 397.

4.4. Occupational Structure

Table 4.3. shows the occupational pattern in Erode district.

Table 4.3. Occupational structure in Erode district

S. No.	Particulars	Numbers	Percentage
1.	Cultivators	280072	21.25
2.	Agricultural labourers	411010	31.18
3.	Non-agricultural labourers	68201	5.17
4.	Government and industry	558708	42.39
	Total	**1317991**	**100.00**

(**Source:** Statistical Hand Book, Assistant Directorate of Economics and Statistics, Erode, 2011-12)

From Table 4.3, it could be inferred that in Erode district 42.39 per cent of the working population was employed in government and industry. The agricultural laborers were comparatively with 31.18 per cent. The percentage of cultivators was very less at 21.25 per cent of the total working population; where as non-agricultural laborers were less at 5.17 per cent when compared to agricultural laborers.

4.5. Climatic Conditions

The temperature in Erode district ranges from 18.9° C to 37.3° C. The season-wise rainfall details in Erode district are given below in Table 4.4. The normal rainfall in Erode district is 725.92 mm. During 2010-2011, Erode district received the highest amount of rainfall (495.4) during the North East Monsoon (Oct-Dec). The South West Monsoon (June-Sep) supplied 305.3 mm of rainfall. It received very less rainfall during winter (Jan-Feb) and summer (Mar-May) seasons.

Table 4.4. Season-Wise Rainfall (in mm) in Erode District

S.No.	Year	South West	North East	Winter	Summer	Total
1.	1997-98	176.70	478.60	-	65.40	720.70
2.	1998-99	289.70	323.70	-	151.60	765.00
3.	1999-00	99.80	493.80	39.70	81.90	715.20
4.	2000-01	308.60	223.54	17.40	117.70	667.24
5.	2001-02	318.69	216.59	32.80	50.04	618.12
6.	2002-03	264.05	198.54	12.46	79.40	554.45
7.	2003-04	358.69	421.36	7.50	101.05	888.60
8.	2004-05	150.40	342.20	6.50	80.50	579.60
9.	2005-06	160.30	294.10	10.20	78.30	542.90
10.	2006-07	174.50	386.20	0.60	66.40	627.70
11.	2007-08	203.90	446.70	27.00	215.90	893.50
12.	2008-09	204.30	448.70	21.00	213.40	887.70
13.	2009-10	209.30	324.50	0.70	153.30	710.60
14.	2010-11	305.3	495.4	9.9	59.6	1037.8
15.	2011-12	229.8	314.6	16.1	142.4	702.9
	Normal Rainfall	**230.27**	**360.57**	**13.46**	**110.46**	**725.92**

(**Source:** Statistical Hand Book, Assistant Directorate of Economics and Statistics, Erode 2011-12)

4.6. Source of Irrigation

It could be seen from the Table 4.5 that the main source of irrigation is open wells with 94.29 per cent followed by tube wells with 5.15 per cent. Tanks and canals accounts to 0.54 per cent and 0.02 per cent respectively in Erode district.

Table 4.5. Source of Irrigation in Erode District

S. No.	Particulars	Sources (in nos.)	Percentage
1.	Canals	25	0.02
2.	Tanks	847	0.54
3.	Tube wells	8153	5.15
4.	Wells	149256	94.29
5.	Reservoirs	3	0.00
	Total	**158284**	**100.00**

(**Source:** Statistical Hand Book, Assistant Directorate of Economics and Statistics, Erode 2011-12)

4.6.1. Area Irrigated

A scan over source wise area irrigated (Table 4.6) implies that the major area is irrigated by canals with 53.13 per cent to total irrigated area followed by dug cum bore wells with 34.55 per cent to the total area. The tube wells came next with 11.01 per cent to total area and tanks formed last with 0.18 per cent to the total area.

Table 4.6. Area Irrigated in Erode District

S. No.	Particulars	Area (in ha.)	Percentage
1.	Canals	88254	53.13
2.	Tanks	295	0.18
3.	Tube wells	18290	11.01
4.	Wells	57410	34.55
5.	Other sources	1875	1.13
	Total Irrigated Area	**166124**	**100.00**

(**Source:** Statistical Hand Book, Assistant Directorate of Economics and Statistics, Erode 2011-12)

4.7. Land Utilization Pattern

The land utilization pattern gives an idea of the land allocation among various activities in a particular location. From this, one can easily calculate the economic status of the area. The following Table 4.7 gives the land utilization pattern of the Erode district.

The total geographical area of the district is 572264 ha. Of this, Forests have accounted for highest proportion with 39.76 per cent of the total area, 199389 ha have been brought under cultivation as net area sown. This has accounted for 34.84 per cent of the total area of the district. Current fallows formed next with 11.24 per cent to total area in the district and followed by non-agricultural uses with 9.26 per cent of the total area in the district. Other land use categories have accounted for less proportion in the district. Gross cropped area formed with 39.28 per cent of the total area sown in the district. Cropping intensity is 112.73 per cent.

Table 4.7. Land Utilization of Erode District

S. No.	Particulars	Area (in ha.)	Percentage
I	Total Geographical Area	572264	100.00
1.	Forest	227511	39.76
2.	Barren and uncultivable	6270	1.10
3.	Land put to non –agricultural use	53004	9.26
4.	Cultivable waste	1707	0.30
5.	Permanent pastures and other grazing land	101	0.02
6.	Land under Miscellaneous tree crops and Groves not included in	913	0.16
7.	Current fallows	64311	11.24
8.	Other fallows land	19057	3.33
9.	Net area sown	199389	34.84
II	Area sown more than once	25397	4.44
III	Gross cropped area	224786	39.28
IV	Cropping Intensity (in per cent)	112.73	

(**Source:** ‘G’ Return statistics of the Erode district 2011-12)

4.8. Cropping Season

Generally, in Erode district, the cropping season starts from June-July, depending on the onset of monsoon. The cropping seasons for major crops are furnished in Table 4.8.

Table 4.8. Cropping Season for Major Crops in Erode District

S. No.	Main Crop	Sowing Period Season	Harvesting Period Season
1.	Banana	June - Aug, Nov - Jan	Feb - Mar, Oct - Dec
2.	Bengal gram	Nov - Dec	Nov – Jan
3.	Black gram	June - July	Sep – Oct
4.	Cotton	Dec - Jan	June – July
5.	Cowpea	Feb - Apr	Apr – may
6.	Cumbu	Apr – May	June – July
7.	Gingelly	Feb - Mar (Mid), Apr - May	Apr - May, June - July
8.	Green gram	June – July	Sep – Oct
9.	Groundnut	Apr - May, Nov – Dec	July - Aug, Apr - May
10.	Maize	Feb – May	May – Aug
11.	Paddy	Apr - July (Kharif)	July – Oct
12.	Paddy	Aug - Nov (Samba)	Dec – Mar
13.	Paddy	Dec - Mar (Navarai)	Apr – May
14.	Ragi	June – Dec	Apr – July
15.	Soyabean	Feb - Mar, Apr – May	Apr - May, June - July
16.	Sugarcane	Apr - May (Late)	July – Aug
16.1.	Sugarcane	Dec - Jan (Early)	Nov – Dec
16.2.	Sugarcane	Feb - Mar (Mid)	Jan – Feb
16.3.	Sugarcane	June - July (Special Season)	June – July
17.	Sunflower	Dec - Jan, Apr – May	Feb - Mar, June - July
18.	Tomato	July - Aug, Feb – Mar	Nov - Dec, Apr - May
19.	Turmeric	May – June	Jan – Feb

(**Source:** Assistant Director of Statistics, Erode 2011-12)

Most of the traditional crops were photosensitive and thus, the sowing time is the most important factor affecting the crop productivity. The traditional crops were sown during Aadi pattam (July-August) and commercial crops were sown in

Thai pattam (January-February). Turmeric and cotton planting were taken up during May-June and December-January respectively.

4.9. Cropping Pattern

Major crops grown in the district are paddy, sugarcane, banana, groundnut and millets. Now, cultivation of fodder crops is becoming popular in Erode district. Important crops raised during 2012 are given Table 4.9.

Table 4.9. Area under Important Crops in Erode During 2012

S. No.	Particulars	Gross Cropped Area (in ha.)	Percentage
A	**Cereals and millets**	**58892**	**26.20**
1.	Paddy	38114	16.96
2.	Cholam	27	0.01
3.	Maize	13781	6.13
4.	Bajra	222	0.10
5.	Ragi	6726	2.99
6.	Other minor millets	22	0.01
B	**Pulses**	**5136**	**2.28**
7.	Bengal gram	1	0.00
8.	Green gram	695	0.31
9.	Red gram	1024	0.46
10.	Black gram	929	0.46
11.	Horse gram	880	0.41
12.	Other Pulses	1607	0.79
	Total food grains	**64028**	**28.48**
C	**Oilseeds**	**43429**	**19.32**
13.	Groundnut	19392	8.63
14.	Gingelly	12923	5.75
15.	Coconut	10474	4.66
16.	Others	640	0.28
D.	**Cotton**	**1421**	**0.63**
E.	**Sugarcane**	**34596**	**15.39**
F.	**Horticultural crops**	**31608**	**14.06**
17.	Banana	10986	4.89
18.	Onion	2568	1.14
19.	Turmeric	8771	3.90
20.	Tapioca	9283	4.13
G.	**Others**	49704	**22.11**
	Gross cropped area	**224786**	**100.00**

(**Source:** Statistical Hand Book, 2011-12)

It could be observed from the table that the total food crops accounted for 28.48 per cent of the gross cropped area in this district and of which cereals and millets were the main crops accounting for 26.20 per cent. Other crops accounted for 22.11 per cent followed by oilseeds accounted for 19.32 per cent to the total area, sugarcane with 15.39 per cent. Horticultural crops formed 14.06 per cent of total area. Cotton occupied least with 0.63 per cent of total area.

4.10. Area of Operational Holdings

The following Table 4.10 shows the area of operational holdings in Erode district.

Table 4.10. Distribution of Operational Holdings in Erode District

S. No.	Size of Holding (ha.)	Type	No. of Holdings (in thousands)	Percentage
1.	Below one hectare	Marginal	184.03	52.98
2.	1.10 - 2.00 hectare	Small	83.4	24.41
3.	2.10 - 4.00 hectare	Semi-medium	51.3	15.03
4.	4.10 -10.00 hectare	Medium	18.5	5.41
5.	Above 10 hectare	Large	4.5	1.32
	Total		**341.73**	**100.00**

(**Source:** Statistical Hand Book, Erode, 2011-12)

From Table 4.10 it could be observed that there are 3.42 lakhs farm households in Erode district. Marginal size of operational holdings were highest with 52.98 per cent and small size of operational holdings formed next with 24.41 per cent and followed by semi-medium size of operational holdings with 15.03 per cent in this category. Both medium and large sized operational holdings were least with 5.41 per cent and 1.32 per cent respectively.

4.11. Livestock

Animal husbandry and agriculture are the twin occupations, which from time immemorial have played a significant role in improving the rural economy. Livestock rearing is a viable proposition both as full-time and part-time occupation and it provides assured income and ensures better utilization of human resources. It is a major source of self-employment to a substantial number of rural populations, many of whom are women, who play a major role in the care and management of livestock.

Table 4.11. Status of Livestock in Erode District

S. No.	Animals	Numbers	Percentage
1.	Cattle	398572	23.49
2.	Buffaloes	230004	13.55
3.	Sheep	506015	29.82
4.	Goat	562270	33.13
Total		**1696861**	**100.00**

(**Source:** Statistical Hand Book, Assistant Directorate of Economics and Statistics, Erode 2011-12)

From the Table 4.11 it could be observed that goat was highest with 33.13 per cent and followed by sheep with 29.82 per cent. Cattle were of third position with 23.49 per cent and finally buffaloes with 13.55 per cent to the total.

4.12. Agricultural Machineries and Implements

The usage of machineries and implements indicate the extent of mechanization and it also plays vital role in adoption of new technologies and income generation from farm activities. Hence, the details on number of machineries and implements in Erode district are furnished in Table 4.12.

Table 4.12. Machineries and Implements in Erode District

S. No.	Particulars	Numbers	Percentage
1.	Plough		
	i. Wooden	755183	33.21
	ii. Iron	330147	14.52
2.	Water Pumps		
	i. Oil Engine	301441	13.26
	ii. Electric Power	884306	38.88
3.	Tractors		
	i. Government	1084	0.05
	ii. Private	0	0.00
4.	Sugarcane Crusher		
	i. Electric Power	574	0.02
5.	Oil Granis	1517	0.07
	Total	**2274252**	**100.00**

(**Source:** Joint Director of Animal Husbandry, Erode 2011-12)

It could be inferred that among the total number of machinery and implements, electric power water pumps occupied the maximum number (38.88 per cent), followed by wooden plough (33.21 per cent). Iron plough accounted for 14.52 per cent followed by oil engine water pumps (13.26 per cent). Tractors, sugarcane crusher and oil granis formed the least.

4.13. Infrastructural Facilities

4.13.1. Financial Institutions

The Table 4.13 shows the number of financial institutions in Erode district.

Table 4.13. Financial Institutions in Erode District

S. No.	Particulars	Numbers
1.	Commercial banks	257
2.	District Central Co-operative Bank	1
3.	Primary Agricultural Credit Societies	221
4.	Primary Land Development Banks	12
5.	Other non agricultural credit societies	54
6.	Urban banks	6
Total		**551**

(**Source:** Statistical Hand Book, Assistant Directorate of Economics and Statistics, Erode 2011-12)

Commercial banks formed the highest with 257 numbers followed by primary agricultural credit societies with 221 numbers and other non agricultural credit societies with 54 numbers to the total. Urban banks formed the lowest with six numbers in Erode district.

Primary Land Development Banks provide medium term and long term loans for the purchase of machineries, digging wells and also for the deepening of existing wells. Besides these, Commercial Banks are also providing credit to the farming community.

4.13.2. Educational Facilities

Erode is bestowed with the facilities of adequate number of Pre-Primary Schools, Middle Schools, High Schools and Higher Secondary Schools, Industrial training centers, colleges and type writing institutes. The Table 4.14 shows the educational facilities in Erode district.

Table 4.14. Educational Facilities in Erode District

S. No.	Particulars	Institutions (In Nos.)
1.	Arts and science colleges	22
2.	Medical college	1
3.	Engineering colleges	8
4.	Pre-primary schools	2344
5.	Primary schools	1533
6.	Middle schools	335
7.	High schools	158
8.	Higher secondary schools	186
9.	Teacher training institute	15
10.	EGS School (S.S.A.)	18
Total		**4620**

(**Source:** Statistical Hand Book, Assistant Directorate of Economics and Statistics, Erode, 2011-12)

From the Table 4.14 it could be observed that both pre-primary and primary schools were in highest number in the district and next, middle schools, high schools and higher secondary schools were present. Also highest number of colleges, teacher training institute and EGS schools were also available in Erode district.

4.13.3. Markets

There are eighteen Regulated Markets covering all the taluks in the district namely Erode, Anthiyur, Perundurai, Bhavani, sathiyamangalam, Gobichettipalayam.

4.13.4. Transport and Communication

The Table 4.15 indicates the transport and communication facilities in Erode district.

Table 4.15. Transport and Communication in Erode District

S. No.	Particulars	Road Length (in Km)
1.	National high ways	116.00
2.	State high ways	509.60
3.	Corporation and municipality road	1406.60
4.	Panchayat union and Panchayat road	6094.93
5.	Town Panchayat and Townships road	2171.81
6.	Major district roads	293.60
7.	Other district roads	2790.94
8.	Others (forest roads)	81.40

(**Source:** Statistical Hand Book, Assistant Directorate of Economics and Statistics, Erode, 2011-12)

From Table 4.15 it could be observed that there is a well developed network of surface transport system. The roads are almost surfaced roads constructed by cement, concrete and black topped. Erode is well connected with Tamil Nadu State capital Chennai by road as well as by train. National highways ran 116.00 km in the district while state highways ran 509.60 km in the district. The district is also well connected by districts roads, corporation and Panchayat roads.

Erode district has 345 post offices and 120 telephone exchanges, fax, e-mail or internet facilities, libraries, cinema theatres and places of worship. The infrastructural facilities in Erode district are well established, which make the transport of agricultural produce and manufacturing products as an easy task.

4.13.5. Industrial Development in Erode District

The number of industrial groups in Erode region is given in Table 4.16 and the sector wise break - up is summarized in Table 4.17.

Table 4.16. Industries in Erode District

S. No	Particulars	Number of Industries	Percentage
1.	Large Scale Industries	2	0.15
2.	Medium Scale Industries	95	7.29
3.	Small Scale Industries	865	66.33
4.	Cottage Industries	302	23.16
5.	New Factories	40	3.07
Total		**1304**	**100.00**

(**Source:** Statistical Hand Book, Assistant Directorate of Economics and Statistics, Erode 2011-12)

From Table 4.16 it is apparent that 1,304 industries are located in Erode district. Small scale industries accounted for 66.33 per cent of the total industries in Erode district followed by cottage and medium scale industries with 23.16 per cent and with 7.29 per cent respectively to total. The district has high concentration of power loom and handloom weaving, rice milling and edible oil expelling units. The other industries are tanneries, chemical and plastic products, paper products, Basic Metal Products industries. The solid and liquid wastes discharged by these industries had lead to severe pollution of soil, surface and ground water quality and human and animal health of the community.

It could be observed from Table 4.17 out of the total number of factories 1228, the textile and food processing sectors dominate the industrial map of Erode district with a share of 37.21 per cent and 35.59 per cent respectively in the total number of industrial units in the district. Other industries represents wool, silk, Jute, Hosiery, paper, leather, chemical, metal, machinery and transport equipments.

Table 4.17. Sector-Wise Number of Factories in Erode District

S.No.	Product	Factories (in Nos.)	Percentage
1.	Food Products	437	35.59
2.	Cotton textiles	457	37.21
3.	Wool, Silk & Synthetic Fibre	1	0.08
4.	Jute, Hemp & Mesta	1	0.08
5.	Hosiery & Readymade Garments	64	5.21
6.	Paper Products & Printing	47	3.83
7.	Leather & Leather Products	28	2.28
8.	Basic Chemical & Chemical products	44	3.58
9.	Non metallic mineral products	44	3.58
10.	Basic Metal, Alloys & Metal Products	26	2.12
11.	Machinery & Parts, Electrical machinery parts	20	1.63
12.	Transport Equipments & Parts	3	0.24
13.	Miscellaneous manufacturing industries	1	0.08
14.	Repair of capital goods	36	2.93
15.	Other industries (non manufacturing)	19	1.55
Total		**1228**	**100.00**

(**Source:** Statistical Hand Book, Assistant Directorate of Economics and Statistics, Erode 2011-12)

4.14. Agricultural Research Station

The Agricultural Research Station is functioning from 1955 adjacent to Bhavanisagar dam, 15 km away from Sathyamangalam in Erode district on Sathy to Mettupalayam road (SH 15). The station is now known as Agricultural Research Station, Bhavanisagar. It occupies a total area of 180.80 ha. For management purpose, the farm has been sub divided into four farms of Northern Block (N), Pungar Block (P), Southern Block (S) and Thoppampalayam Block (T). It mainly concentrates on seed production activities. Breeder seed and truthfully labeled seeds of paddy, pulses, vegetables are produced here. Orchard with Mango, Guava, Sapota, Amla, Cashewnut, Pomegranate, Tamarind, Turmeric, Chillies and other vegetables are grown and maintained here. The main income in this farm is through sales of Mango and Sapota fruits and Amla grafts. BSR 1 Amla is multiplied in larger scale. Some of the ongoing research activity like Breeder seed production of Paddy - ADT 39, ADT 43, ADT 45, Bhavani, IR 50, Black gram (TMV 1), cowpea (CO 7), Green gram (CO 6), Red gram (CO 6), soybean (Co 1) and Tomato (PKM 1) are underway.

4.15. Myrada Krishi Vigyan Kenra

MYRADA Krishi Vigyan Kendra (KVK) is located at Puduvalliampalayam. It is away 5 km from Gobichettipalayam in Erode district. It is well informed through its experiences that the responsibilities for a social development institution meticulously differ from that of a farm science center. After being recognized as a KVK, the strength of the institute mainly depends on the extent to which the potential of building institutions, sustaining livelihoods and empowering people are effectively utilized. This KVK provides organic information and technical guidelines to t

Results and Discussion

CHAPTER V

RESULTS AND DISCUSSION

In the earlier chapters, a brief review of the past studies, relevant methodology adopted and the general description of the study area were presented. With that background, the focus of the study is to analyze the employment pattern of dry land area farmers from cropping and to formulate viable off-farm and non-farm employment among the farmers. The data collected from the selected dry land area famers whom were comes under the Chennimalai and Perundurai blocks of Erode district.

The results of the analyses are presented and discussed in the following sections.

5.1. General characteristics of sample farmers

5.2. Annual days of employment of sample farmers

5.3. Annual Income particulars of sample farmers

5.4. Cost of cultivation of dry land area crops

5.5. Cost and returns in dry land area crops

5.6. Multiple linear regression function analysis

5.7. Establishment of the project on off-farm and non-farm employment

5.8. Constraints in taking up off-farm and non-farm employment.

5.1. General Characteristics of Sample Farmers

The general characteristics of farms like family composition, size of family type, age group, educational status, experience in farming, annual income, size of farm holding, asset position, livestock particulars and cropping pattern were analyzed and the results are presented in this section.

5.1.1. Family Type of Sample Farms

Family type, whether it is nuclear or joint, would decide the magnitude of contribution of family labour in farming. Hence, family types of sample respondent are collected and presented in Table 5.1 and Table 5.2.

Table 5.1. Type of Family of Sample On-Farm Farmers in Erode District

S. No.	Family Type	Number of Family	Percentage
1.	Nuclear	35	58.33
2.	Joint	25	41.67
	Total	**60**	**100.00**

As revealed from the above tables that nuclear family was found to be predominant with 58.33 per cent when compared to joint family type with 41.67 per cent.

Table 5.2. Type of Family of Sample Off-Farm and Non-Farm Farmers in Erode District

S. No.	Family Type	Off-Farm		Non-Farm	
		No. of Family	Percentage	No. of Family	Percentage
1.	Nuclear	18	60.00	23	76.67
2.	Joint	12	40.00	7	23.33
	Total	**30**	**100.00**	**30**	**100.00**

In off-farm, nuclear family was found to be predominant with 60.00 per cent when compared to joint family type with 40.00 per cent. Likewise in non-farm also that nuclear family was found to be predominant with 76.67 per cent when compared to joint family type with 23.33 per cent. It is concluded from the above results that nuclear family type was predominant in the study area.

5.1.2. Family Composition

The size of family and composition of 60 sample farmers' family were categorized in to adult and children are presented in the Table 5.3. and in Table 5.4.

Table 5.3. Family Composition of Sample On-Farm Farmers

S. No.	Particulars	Number	Average size / family	Percentage
1.	Adult	195	3.25	80.25
2.	Children	48	0.8	19.75
	Total	**243**	**4.05**	**100.00**

It could be observed from the Table 5.3 that the sample farmer's families had totally 243 members of which adults and children accounted for 80.25 per cent and 19.75 per cent respectively. The average family size of farmer was 4.05 in each family. The number of adult and children per family was 3.25 and 0.8 respectively.

Table 5.4. Family Composition of Sample Off-Farm and Non-Farm Farmers

S. No.	Particulars	Off-Farm			Non-Farm		
		No.	Average size/ family	Percentage	No.	Average size/ family	Percentage
1.	Adult	87	2.90	80.56	91	3.03	77.78
2.	Children	21	0.70	19.44	26	0.87	22.22
	Total	**108**	**3.60**	**100.00**	**117**	**3.9**	**100.00**

The sample off-farm farmer's families had totally 108 members of which adults and children accounted for 80.56 per cent and 19.44 per cent respectively. The average family size of farmer was 3.60 in each family. The number of adult and children per family was 2.90 and 0.70 respectively. Likewise the other 30 sample of non-farm farmer's families had totally 117 members of which adults and children accounted for 77.78 per cent and 22.22 per cent respectively. The average family size of farmer was 3.9 in each family. The number of adult and children per family was 3.03 and 0.87 respectively.

5.1.3. Age Particulars

Age of the head of farm households has been found to be an important determinant of production decisions of the farmers. The details of age distribution are given in Table 5.5 and in Table 5.6.

Table 5.5. Age Wise Distribution of the Sample On-Farm Farmers

S. No.	Age Groups (years)	Number of Farmers	Percentage
1.	Up to 30 years	6	10.00
2.	31-40	24	40.00
3.	41-50	23	38.33
4.	More than 50	7	11.67
	Total	**60**	**100.00**

The age wise distribution of the sample on farm farmers reveals that a major group of farmers falls in the age group of 31-40 years and 41-50 years with 40 per cent and 38.33 per cent respectively. More than 50 years was the next highest age group with 11.67 per cent. It is noteworthy to mention that the younger age groups were found to be less in crop cultivation. Hardly ten per cent of the respondents within 30 years of age were employed in crop cultivation.

Table 5.6. Age Wise Distribution of the Sample Off-farm and Non-farm Farmers

S. No.	Age groups	Off-farm		Non-farm	
		No.	In Percentage	No.	In Percentage
1.	Up to 30 years	5	16.67	3	10.00
2.	31- 40	12	40.00	15	50.00
3.	41-50	9	30.00	8	26.67
4.	More than 50	4	13.33	4	13.33
	Total	**30**	**100.00**	**30**	**100.00**

It could be observed from the above Table 5.6. that in off-farm a major group of farmers falls in the age group of 31-40 years and 41-50 years with 40.00 per cent and 30.00 per cent respectively. Up to 30 years was the next highest age group with 16.67 per cent. It is noteworthy to mention that the elder age groups were found to be less in taking off-farm jobs. Hardly 13.33 per cent of the respondents come under more than 50 years of age group.

With regard to non-farm, a major group of farmers falls in the age group of 31-40 years and 41-50 years with 50.00 per cent and 26.67 per cent respectively. More than 50 years was the next highest age group with 13.33 per cent. It is noteworthy to mention that the younger age groups were found to be less in taking non-farm jobs i.e. Powerloom business. Hardly 10.00 per cent of the respondents come under up to 30 years of age group.

5.1.4. Experiences in Farming

The details about experience of the sample respondents are furnished in Tables 5.7 through 5.9.

Table 5.7. Experience in Farming of Sample On-Farm Farmers Erode District

S. No.	Experience in Farming (years)	Number of Sample Farmers	Percentage
1.	Up to 10	19	31.67
2.	11 – 20	20	33.33
3.	21 – 30	17	28.33
4.	More than 30	4	6.67
	Total	**60**	**100.00**

A scan over the Table 5.7 indicates that farmers nearly 33 per cent of the farmers have 11-20 years of experience in farming and about 32 per cent have up to 10 years of experience. Farmers with 21-30 years of experience were third highest with 28.33 per cent to total sample farmers. Farmers with more than 30 years of experience constituted only 6.67 per cent to the total sample farmers. The results coincide with the earlier discussion on the age of the respondents.

Table 5.8. Experience in Farming of Sample Off-Farm Farmers in Erode District

S. No.	Experience in Hiring Out Machineries (years)	Number of Samples	Percentage
1.	Up to 4	9	30.00
2.	5 – 8	16	53.33
3.	9 – 12	5	16.67
	Total	**30**	**100.00**

In the case of off-farm farmers, with 5-8 years of experience was highest with 53.33 per cent to the total sample farmers followed by farmers up to 4 years of experience with 30.00 per cent to total sample farmers. The farmers with 9-12 years of experience were lowest with 16.67 per cent to total sample farmers. The results coincide with the earlier discussion on the age of the respondents.

Table 5.9. Experience in Farming of Sample Non-farm Farmers in Erode District

S. No.	Experience in Powerloom Business (years)	Number of Samples	Percentage
1.	Upto 4	7	23.33
2.	5 - 8	14	46.67
3.	9 - 12	9	30.00
	Total	**30**	**100.00**

In non-farm farmers, majority (46.67 per cent) had 5-8 years of experience in powerloom business followed by farmers 9-12 years of experience with 30.00 per cent to total sample farmers. The farmers with up to 4 years of experience were lowest with 23.33 per cent to total sample farmers. The results coincide with the earlier discussion on the age of the respondents.

5.1.5. Educational Status

The educational status of the sample farmers are presented in Table 5.10 through 5.12.

Table 5.10. Educational Status of Sample On-Farm Farmers

S. No.	Educational Level	No. of Farmers	Percentage
1.	Illiterate	7	11.67
2.	Primary	22	36.67
3.	Secondary	17	28.33
4.	Higher secondary	10	16.67
5.	Collegiate	4	6.66
	Total	**60**	**100.00**

It is evident from the above table that among the literates, sample farmer with education up to primary level was highest with 36.67 per cent to total sample farmers. Illiterates occupied 11.67 per cent to total sample farmers. And secondary and higher secondary level of education was 28.33 per cent and 16.67 per cent respectively to total sample farmers. The respondents with collegiate education were lowest with 6.66 per cent to the total sample farmers. It could be inferred that more of literate farmers are engaged in crop cultivation.

Table 5.11. Educational Status of Sample Off-Farm Farmers

S. No.	Educational Level	No. of Farmers	Percentage
1.	Illiterate	3	10.00
2.	Primary	9	30.00
3.	Secondary	10	33.33
4.	Higher secondary	6	20.00
5.	Collegiate	2	6.67
	Total	**30**	**100.00**

A close observation of Table 5.11 implies that among the literates, sample off-farm farmer with education up to secondary level was highest with 33.33 per cent to total sample off-farm farmers. Illiterates occupied 10.00 per cent to total sample off-farm farmers. And primary and higher secondary level of education was 30.00 per cent and 20.00 per cent respectively to total sample off-farm farmers. The respondents with collegiate education were lowest with 6.67 per cent to the total sample off-farm farmers.

Table 5.12. Educational Status of Sample Non-Farm Farmers

S. No.	Educational Level	No. of Farmers	Percentage
1.	Illiterate	2	6.67
2.	Primary	6	20.00
3.	Secondary	12	40.00
4.	Higher secondary	8	26.66
5.	Collegiate	2	6.67
	Total	**30**	**100.00**

Further, in Table 5.12 that among the literates, sample non-farm farmer with education up to secondary level was highest with 40.00 per cent to total sample non-farm farmers. And primary and higher secondary level of education was 20.00 per cent and 26.66 per cent respectively to total sample non-farm farmers. Both Illiterates and collegiate occupied the lowest per cent of 6.67 to total sample non-farm farmers. It could be inferred that more of literate farmers are engaged in crop cultivation and as well as in off-farm and non-farm employment.

5.1.6. Size of Landholdings

The land holding details are given in Table 5.13. It could be seen from the table that majority of the farmers (57 per cent) were large farmers with more than 2 ha of land and as much as 35.00 per cent of sample farmers were small farmers. Proportion of marginal farmers was lowest with 8.33 per cent to total. Hence it could be concluded from the table that large farmers were predominant in the study area.

Table 5.13. Size of Landholdings of Sample Farmers in Erode District

S. No.	Particulars	Number of Farmers	Percentage
1.	Marginal Farmers (up to 1.00 ha.)	5	8.33
2.	Small Farmers (1.01 to 2.00 ha.)	21	35.00
3.	Large Farmers (More than 2.00 ha.)	34	56.67
	Total	**60**	**100.00**

5.1.7. Livestock Particulars

The details of livestock population are discussed in Table 5.14.

Table 5.14. Livestock Particulars of Sample Farmers in Erode District

S. No.	Livestock Particulars	Number	Percentage
1.	Work Bullock	8	1.55
2.	Buffaloes	88	17.05
3.	Cows	102	19.77
4.	Goat	318	61.63
	Total	**516**	**100.00**

It is evident from the Table 5.14 that the number of work bullocks owned by the farm was very low with 1.55 per cent. This may due to introduction of machineries especially tractors in the study area. Moreover machineries were used for preparatory cultivation through custom hiring services. Goat formed the highest proportion in livestock and it accounted for 61.63 percentage to total livestock. Proportion of cows formed next highest with 19.77 per cent to the total livestock and then buffaloes constituted the proportion of 17.05 per cent.

Hence it could be concluded from the Table 5.14 that cows and goats constituted the major livestock in the study area.

5.1.8. Asset Position

Farm assets play a major role in assessing the infrastructure available in the farms. Farm assets included land, farm buildings, tools and implements, farm machineries and livestock. Among the assets, major part of investment was on land, a basic resource of a farmer to run the farm business. The asset position of the sample farms are presented in Table 5.15.

It could be observed from the Table 5.15 that, total value of farm assets per farm was on an average Rs.5337083.00. Land was found to be the most important asset and it formed 85.29 per cent of the total value of farm assets. Farm machinery constituted about 10.43 followed by buildings (2.77 per cent) and livestock with 1.49 per cent. Tools and implements were lowest with 0.02 per cent to the total value of farm assets.

Table 5.15. Asset Position of Sample Farmers in Erode District

S. No.	Assets	Average Value Per Farm	Percentage
1.	Land	5337083.00	85.29
2.	Buildings	173417.00	2.77
3.	Tools and implements	1527.50	0.02
4.	Farm machinery	652500.00	10.43
5.	Livestock	93133.00	1.49
	Total	**6257660.50**	**100.00**

Hence it could be concluded from the Table 5.15 that land and farm machinery were the major assets in sample farms.

5.1.9. Cropping Pattern

Cropping pattern observed in sample respondent of dry land farms is given in Table 5.16. It could be observed from the table that fodder sorghum was the principal crop in the sample farms. It accounted for 44.45 per cent of the total cropped area. Cumbu is the next main crop and occupied 22.53 per cent of total cropped area. Groundnut is considered to be the third crop in this district and occupied 15.43 per cent of total cropped area. And Cowpea and Horse gram occupied 8.75 per cent and 5.37 per cent of the total cropped area, respectively. Foxtail millet was occupied lesser area i.e. 3.47 per cent.

Table 5.16. Cropping Pattern of Sample Farmers in Erode District

S. No.	Dry Land Crops	Area (in hectares)	Percentage
1.	Fodder Sorghum	51.30	44.45
2.	Cumbu	26.00	22.53
3.	Groundnut	17.80	15.43
4.	Cowpea	10.10	8.75
5.	Foxtail millet	4.00	3.47
6.	Horse gram	6.20	5.37
	Total	**115.40**	**100.00**

The results conclusively showed that Fodder sorghum occupied the major area among the sample farms.

5.2. Annual Days of Employment of Sample Farmers

The annual days of employment for the three categories are furnished in Tables 5.17 through 5.19.

Table 5.17. On-Farm Farmers Days of Employment per Year

S. No.	Particulars	On Farm farmers (No.)	Percentage
1.	Up to 80 days	10	16.67
2.	81 - 100 days	40	66.66
3.	More than 100 days	10	16.67
	Total	**60**	**100.00**

The Table 5.17 shows annual days of employment per year of on farm farmers under crop cultivation. It indicates that most of the dry land area farmers fall under the category between 81-100 days of employment (66.66 per cent) in cropping. Upto 80 and more than 100 days of employment each covers 16.67 per cent to total respectively.

Table 5.18. Off-Farm Farmers Days of Employment per Year

S. No.	Particulars	Off-Farm Farmers (No.)	Percentage
1.	Up to 190 days	5	16.67
2.	191 - 200 days	12	40.00
3.	More than 200 days	13	43.33
	Total	**30**	**100.00**

The Table 5.18 reveals the annual days of employment per year of off-farm farmers under hiring out tractor. It clearly shows that most of the dry land area farmers got more than 200 days of employment (43.33 per cent) in off-farm jobs. Between 191-200 days of employment covers 40.00 per cent to total. Likewise up to 190 days of employment occupies least with 16.67 per cent to total.

Table 5.19. Non-Farm Farmers Days of Employment per Year

S. No.	Particulars	Non-Farm Farmers (No.)	Percentage
1.	Upto 270 days	13	43.33
2.	271 - 290 days	5	16.67
3.	More than 291 days	12	40.00
	Total	**60**	**100.00**

The Table 5.19 shows annual days of employment per year of non-farm farmers running powerloom business. It can be visualized, most of the dry land area farmers could obtain up to 270 days of employment (43.33 per cent) in non-farm jobs. More than 291 days of employment covers 40.00 per cent to total. Between 271-290 days category of employment days occupies only 16.67 per cent of total sample non-farm farmers.

5.3. Annual Income Particulars of Sample Farmers

The annual income realized from cropping, livestock, off-farm and non-farm sources were worked out and the results are presented in Tables 5.20 through 5.23.

Table 5.20. Annual Income of Sample On-Farm Farmers from Cropping

S. No.	Particulars	Number	Percentage
1.	Up to 50000	23	38.33
2.	50001 - 1 lakh	22	36.67
3.	More than 1.01 lakh	15	25.00
	Total	**60**	**100.00**

The Table 5.20. reveals that a maximum of 38.33 per cent of on farm farmers received the annual income upto Rs.50000 from cropping. Around 36.67 per cent of farmers had an annual income between Rs.50001 to Rs.100000. However there is also more than Rs.100000 income receiving farmers occupied around 25 per cent to total.

Table 5.21. Annual Income of Sample On-Farm Farmers from Livestock

S. No.	Particulars	Number	Percentage
1.	Upto 50000	30	50.00
2.	50001 - 1.00 lakh	27	45.00
3.	More than 1.01 lakh	3	5.00
	Total	**60**	**100.00**

Table 5.21 reveals that a maximum of 50.00 per cent of on farm farmers received the annual income upto Rs.50000 from livestock. Around 45.00 per cent of farmers had an annual income between Rs.50001 to Rs.100000. More than Rs.100000 income receiving farmers occupied only five per cent to total.

Table 5.22. Annual Income of Sample Off-farm Farmers from hiring out Tractor

S.No.	Particulars	Number	Percentage
1.	Up to 1.5 lakh	6	20.00
2.	1.51 – 2.50 lakh	20	66.67
3.	More than 2.51 lakh	4	13.33
	Total	**30**	**100.00**

The Table 5.22 explains that a maximum of 66.67 per cent of off-farm farmers received the annual income between Rs.1.51 lakh to Rs.2.50 lakh from hiring out tractor.

Around 20.00 per cent of non-farm farmers had an annual income upto Rs.1.5 lakh. A few (13.33 per cent) received more than Rs.2.51 lakh as income.

Table 5.23. Annual Income of Sample Non-Farm Farmers from Powerloom Business

S.No.	Particulars	Number	Percentage
1.	Up to 5 lakh	8	26.67
2.	5.01 - 10.00 lakh	18	60.00
3.	More than 10.00 lakh	4	13.33
	Total	**30**	**100.00**

The Table 5.23 shows that a maximum of 60.00 per cent of non-farm farmers received the annual income between Rs.500001 to Rs.1000000 from powerloom business. Around 26.67 per cent of non-farm farmers had an annual income upto Rs.500000. Around 13.33 per cent received income more than Rs.1000000.

5.4. Cost of Cultivation of Dry Land Area Crops

5.4.1. Fixed Cost

The fixed cost incurred by the sample farmers in dry land crop cultivation was worked out and the results are given in Table 5.24. It could be observed that total fixed cost incurred by the dry land farmers per ha was Rs.19113.42. From the total per cent of fixed cost, interest on fixed capital occupies higher percentage of 43.93. Following this, the rental value of land contributes 37.41 per cent in total fixed cost. Depreciation on buildings and farm equipments occupies 18.53 per cent and the land revenue with 0.13 per cent. In general fixed cost per ha were kept at minimum, since the farmers invested less in farm inventories. The fixed cost of dry land area crop cultivation is depicted in Figure 5.1.

Table 5.24. Fixed Cost of Dry Land Area Crop Cultivation

(in Rs./ha)

S.No.	Particulars	Amount (Rs.)	Percentage
1.	Rental value of land	7150.00	37.41
2.	Land revenue	25.00	0.13
3.	Depreciation	3541.10	18.53
4.	Interest on fixed capital	8397.32	43.93
	Total	**19113.42**	**100.00**

5.4.2. Variable Cost

Variable cost included the cost for preparatory cultivation, seed and sowing, manures (FYM), inter cultivation such as weeding, harvesting and interest on working capital. The variable cost incurred by the sample dry land farmers was worked out and the results are furnished in Table 5.25.

Table 5.25. Variable Cost of Dry Land Area Crop Cultivation

(in Rs./ha)

S.No.	Particulars	Amount (Rs.)	Percentage
1.	Preparatory cultivation	2842.00	12.27
2.	Value of Seeds and sowing	6378.08	27.54
3.	Value of Manures (FYM)	5770.00	24.91
4.	Value of Inter cultivation	1270.67	5.49
5.	Value of Harvesting	5385.33	23.25
6.	Interest on working capital	1515.23	6.54
	Total variable cost	**23161.31**	**100.00**

It could be seen from above table that in the case of dry land crop the total variable cost of cultivation per ha was found to be Rs.23161.31. In the total variable cost, the value of seeds and sowing was highest and accounted for 27.54 per cent. The value of manures, value of harvesting and cost of preparatory cultivation accounted for 24.91 per cent, 23.25 per cent and 12.27 per cent respectively. The value of inter cultivation operations and interest on

Figure.5.1. Fixed Cost of Dry Land Area Crop Cultivation

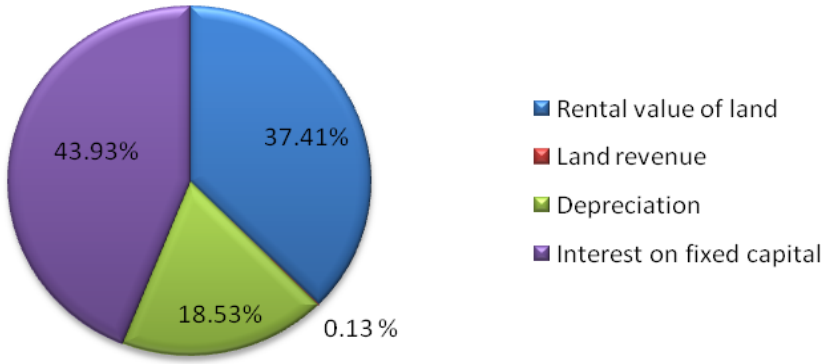
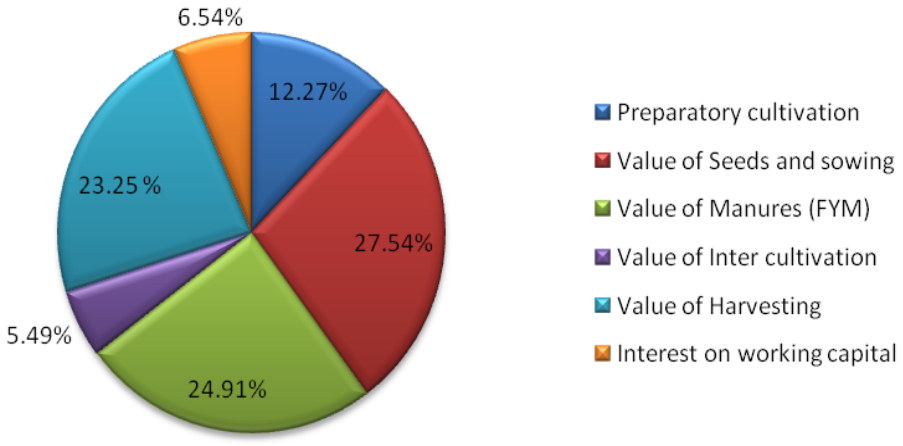


Figure.5.2. Variable Cost of Dry Land Area Crop Cultivation



working capital formed the last category accounted for 5.49 per cent and 6.54 per cent. The variable cost of dry land area crop cultivation is depicted in Figure 5.2.

5.5. Cost and Returns in Dry Land Area Crops

The costs and returns realized on farm per hectare were analyzed and the results are furnished in Table 5.26.

Among the total cost, variable cost was found to be higher than fixed cost by 9.58 per cent. This could be being dry land farms, the farmers owned assets with less value. Further a close observation of the table indicates that the farmers could realize only fifteen per cent (Rs.7945.27) of Gross Income as profit. It is because though the gross income found to be Rs.50220 it was offset by the sharp increase in the total cost i.e. Rs.42274.73 which occupies nearly 85 per cent of the Gross Income.

Table 5.26 Costs and Returns in Dry Land Crop Cultivation

(in Rs./ha)

S. No.	Particulars	Amount (Rs.)	Percentage
1.	Total Fixed cost	19113.42	45.21
2.	Total Variable cost	23161.31	54.79
3.	Total cost of cultivation	42274.73 **(84.18)**	100.00
4.	Gross income	50220.00	
5.	Net income	7945.27 **(15.82)**	

(Figures in parentheses indicate percentage to Gross Income).

5.6. Multiple Linear Regression Function Analysis

An attempt has been made to identify and measure the relative influence of the factors affecting the employment of dry land farmers. The result of the selected linear employment response function is furnished in Table 5.27.

Table 5.27. Estimated Multiple Linear Regression Function

S. No.	Variables	Coefficient	Standard Error	Significance
1.	Regression constant	4.33	0.09	NS
2.	Area of cultivation	-0.004	0.007	NS
3.	Annual income from crop	-0.009	0.004	*
4.	Duration of crop in days / year	0.246	0.026	**
5.	Days of off-farm employment / year	0.615	0.028	**
6.	Income from off-farm employment / year	-0.0003	0.0003	NS
7.	Days of non-farm employment / year	0.630	0.032	**
8.	Income from non-farm employment / year	-0.01	0.013	NS

R^2 = 0.91 **Multiple R^2 = 0.96** **Adjusted R^2 = 0.90**

F ratio = 79.45 **SE = 0.009** **N = 60**

Note: ** Significant at 1 per cent level

* Significant at 5 per cent level

NS - Non Significant

The variables like area of cultivation, annual income from crop, duration of crop in days per year, days of off-farm employment per year, income from off-farm employment per year, days of non-farm employment per year, income from non- farm employment per year were taken into consideration for estimate the no. of days of employment per year of dry land area farmers.

It could be seen from the Table 5.27 that the coefficient of multiple determinations (R^2) was 0.91 revealing the model was a good fit. The R^2 value of 0.91 indicates that about 91 per cent of the no. of days employment per year is influenced by the explanatory variables included in the model. The coefficients of duration of crop in days per year, days of off-farm employment per year, days of non-farm employment per year were positive and found to be highly significant at one per cent level with 0.246, 0.615 and 0.630 respectively. And the annual income from crop was negative and found to be significant at five per cent level. Thus the result indicated that the duration of crop in days per year, days of off-farm employment

per year, days of non-farm employment per year were the significant operations to estimate the no. of days employment per year by the dry land area farmers and the lesser annual income from crop will increase the farmers' no. of days employment per year.

5.7. Establishment of the Project on Off-Farm and Non-Farm Employment

In this study, the employment pattern of dry land farmers was observed. The scanty rainfall is the major constraint or problem which prevails in these areas. The rainfall falls in a year for nearly four months. After these months farmers are not at all cultivating in their field. So they have lower farm income. They are showing their own interest in running non-farm business such as powerloom business and also doing off-farm employment such as hiring out machineries (tractor) for their income purpose. Running powerloom business as well as doing off-farm jobs is quiet profit. It gives income satisfaction to farmers and also it gives self motivation to farmers. They became a small entrepreneur. In this study area the sample size of 30 dry land farmers cum powerloom business runners and also another 30 dry land cum tractor hiring out farmers were randomly selected and surveyed through a pre tested questionnaire. The Chennimalai and Perundurai blocks of erode district was purposively selected for this. Because dry land farmers along with powerloom business runner as well as tractor hiring out famers are quite more in these areas. Under powerloom business they are producing bed sheets and selling their products in nearby market area. Under hiring out machineries, mainly they are hiring out tractor, it is used in ploughing the land, transport the field harvested materials to desired place and also used in transport the farm yard manure to field etc. Through these ways famers are gaining further more money for their income purpose.

An average data of 30 off-farm farmers and 30 non-farm farmers were used for estimation of the project. The collected information from this questionnaire method was used to establish a project and analyzed its financial feasibility, profitability & efficiency pre-requisite.

5.7.1. Off-Farm Business Enterprise - Hiring Out Machinery (Tractor)

Under off-farm employment the investment is made only for purchasing of tractor. An average amount of Rs.715000 is needed for this. The entire amount has been assumed to be provided through bank source. Farmers receiving the above mentioned amount at 13 per cent interest on repayment loan basis with the period of six years.

Table 5.28. Machinery

S. No.	Particulars	Quantity	Amount (Rs.)
1.	Tractor	1	715000

5.7.2. Assumption for Estimation

5.7.2.1. Discount Rate

In the absence of static interest rate prevailing in the banks, the standard discount rate of twelve per cent is assumed for calculation.

5.7.2.2. Service and Maintenance

It was calculated at the rate of fifteen per cent of the value of machineries.

5.7.2.3. Replacement of Spares

This was assumed to be fifteen per cent of the total cost of machineries.

5.7.2.4. Interest on Working Capital and Fixed Capital

Interest was calculated at the rate of twelve per cent for working and fixed capital.

5.7.2.5. Repayments

Interest on term loan of Rs.715000 is computed based on current bank rate of 13 per cent per annum, assuming repayment in six years.

5.7.3. Cost Details of the Estimated Off-Farm Project

Table 5.29 shows the costs involved in taking out off-farm projects such as hiring out tractor.

Table 5.29. Cost Details of the Estimated Off-Farm Project

S.No.	Particulars	Amount (Rs.)	Percentage
I.	**Variable cost**		
1.	Fuel & Oil	311972	47.5
2.	Labour charges	52939	8.06
3.	Interest on working capital	43789	6.67
	Total annual variable cost	408700	62.23
II.	**Fixed cost**		
1.	Service and maintenance	107250	16.33
2.	Replacement of spare parts	107250	16.33
3.	Insurance	7000	1.07
4.	Interest on fixed capital	26580	4.04
	Total annual fixed cost	248080	37.77
	Total Cost (Variable + fixed)	**656780**	**100.00**

The total cost is worked out to be Rs.656780. Out of this, the total annual variable occupies 62.23 per cent which is more than the total annual fixed cost i.e. it covers only 37.77 per cent in total cost. It is mainly attributed to the high in fuel oil price which occupied nearly 50 per cent of the total variable cost.

5.7.4. Estimated Returns from the Off-Farm Project

The estimated returns from the off-farm project is given in Table 5.30.

Table 5.30. Estimated Returns from the Off-Farm Project

S. No.	Particulars	Amount (Rs.)
1.	Gross returns	897635
2.	Net returns	240855

The table connotes the average gross and net return obtained per annum while taking out off-farm projects. The amount of Rs.897635 obtained as gross return from the project. After deducting annual total cost from gross return the net return will be Rs.240855.

5.7.5. Financial Feasibility

Off-farm business enterprise was worked out for twenty years, involving cost and returns, it requires a judgment about the worthiness of investment. Hence, a financial feasibility analysis was done using discounted measures at twelve per cent and the results are presented in Tables 5.31 and 5.32.

5.7.5.1. Net Present Value (NPV)

The net present value of off-farm project was found to be positive and worked out to Rs.945610.75. The net present worth of project indicated that higher returns for the capital invested in off-farm business enterprise.

5.7.5.2. Benefit Cost Ratio (BCR)

The benefit-cost ratio for off-farm project was 1.19. The estimated benefit cost ratio indicated that every rupee invested will generate an income of Rs.1.19 in hiring out tractor. The analysis showed that the BCR value is greater than one, implying the efficiency of investment in off-farm project.

5.7.5.3. Internal Rate of Return (IRR)

IRR measures the earning capacity of the investment. IRR for investment in off-farm project was worked out to be 22.54 per cent, which was more than the opportunity cost of capital. Hence the investment in hiring out tractor business in the study area was considered to be financially viable.

Table 5.31. Estimation of Net Present Value of the Off-Farm (Hiring Out Tractor) Project

Year	Cost	Gross Returns	Net Returns	Discount Rate @ 12 per cent	NPV
1	715000	0	-715000	0.89	-638392.86
2	656780	897635	240855	0.80	192008.16
3	656780	897635	240855	0.71	171435.80
4	656780	897635	240855	0.64	153067.70
5	656780	897635	240855	0.57	136667.60
6	656780	897635	240855	0.51	122024.60
7	656780	897635	240855	0.45	108950.50
8	656780	897635	240855	0.40	97277.24
9	656780	897635	240855	0.36	86854.72
10	656780	897635	240855	0.32	77548.81
11	656780	897635	240855	0.29	69240.03
12	656780	897635	240855	0.26	61821.46
13	656780	897635	240855	0.23	55197.70
14	656780	897635	240855	0.20	49283.75
15	656780	897635	240855	0.18	44003.25
16	656780	897635	240855	0.16	39288.75
17	656780	897635	240855	0.15	35079.09
18	656780	897635	240855	0.13	31320.78
19	656780	897635	240855	0.12	27964.95
20	656780	897635	240855	0.10	24968.72
Total					**945610.88**

Table 5.32. Estimation of Benefit Cost Ratio of the Off-Farm (Hiring Out Tractor) Project

Year	Cost	Gross Returns	Discount Rate @ 12 per cent	Present Worth of Costs	Present Worth of Gross Returns
1	715000	0	0.89	638392.86	0.00
2	656780	897635	0.80	523581.08	715589.24
3	656780	897635	0.71	467482.87	638918.64
4	656780	897635	0.64	417395.51	570463.20
5	656780	897635	0.57	372674.71	509342.34
6	656780	897635	0.51	332745.11	454769.72
7	656780	897635	0.45	297093.78	406044.29
8	656780	897635	0.40	265262.28	362539.52
9	656780	897635	0.36	236841.44	323696.16
10	656780	897635	0.32	211465.43	289014.23
11	656780	897635	0.29	188808.49	258048.52
12	656780	897635	0.26	168579.01	230400.46
13	656780	897635	0.23	150516.90	205714.60
14	656780	897635	0.20	134390.32	183674.07
15	656780	897635	0.18	119991.08	163994.32
16	656780	897635	0.16	107135.27	146424.02
17	656780	897635	0.15	95656.07	130735.15
18	656780	897635	0.13	85407.67	116728.46
19	656780	897635	0.12	76256.76	104221.71
20	656780	897635	0.10	68086.41	93055.13
Total				**4957763.01**	**5903373.77**

Benefit Cost ratio (BCR) = 5903373.77 / 4957763.01 = 1.19

IRR = 12 + (15 -12) * [945610.88 / (945610.88 - 676413.11)] = 22.54 per cent.

5.7.6. Amortized Decreasing Repayment Plan

The Table 5.33 depicts the repayment of term loan offered by the bank to start off-farm project (hiring out machinery). Being the amount of Rs.119166.70 as principle, the interest was paid at decreasing trend with the rate of thirteen per cent per annum. Thus the total loan Rs.715000 has been repaid after six years of period.

Table 5.33. Amortized Decreasing Repayment Plan

Year	Principal	Interest 12.5 per cent	Installment	Balance
1	119166.70	92950.00	212116.70	595833.30
2	119166.70	77458.30	196625.00	476666.60
3	119166.70	61966.70	181133.40	357499.90
4	119166.70	46474.90	165641.60	238333.20
5	119166.70	30983.30	150150.00	119166.70
6	119166.70	15491.60	134658.30	0
	715000.00	325324.80	1040325.00	

5.7.7. Non-Farm Business Enterprise - Powerloom Business

From Table 5.34, it could be seen that an average plot land of 3.67 cents and to accommodate business equipments an average building size of 2.93 cents is needed. Land may cost Rs.458333 for the above mentioned cents where as cost of construction is assumed to be Rs.612500 for the above mentioned area.

Table 5.34. Land and Building

Particulars	Area (cents)	Cost (Rs.)
Land	3.67	458333
Buildings	2.93	612500
Total		**1070833**

5.7.8. Machinery

The machineries required to operate powerloom with capacity of production for fifteen tonnes of bed sheets annually is given in Table 5.35.

Table 5.35. Details about Machinery

Item	Quantity	Price (Rs.)
Powerloom	3.40	184000
10 Hp Motor	1.00	6833
Oil engine	1.00	12633
Winding machine	1.53	21200
Wrapping machine	1.53	22833
Total	8.46	247499

The machineries are being operated during season (130 days) at the rate of nine hours per day and off season (160 days) at the rate of six hours per day.

The total cost of machinery for running the unit or business is estimated to be Rs.247499. The amount invested on machineries varies from Rs.184000 in powerloom to Rs.6833 in 10 Hp Motor.

5.7.9. Essential Assets

Around Rs.52253 is estimated to meet out the expenditure on essential assets such as spare parts, furniture and other equipments.

5.7.10. Preliminary and Pre-operative Expenses

There will be also pre production expenses like registration, establishment and administrative charges, travelling, consultation, interest during implementation, trial runs etc., for which an amount of Rs.196667 is required.

5.7.11. Raw and Packing materials

The important raw materials needed to make bed sheets is thread, for which an amount of Rs.1342355 is needed and for packing the material worth of Rs.5033 is used.

5.7.12. Utilities

Electricity is the only utility which is needed to run the powerloom business. The amount requirement for electricity is estimated at Rs.6160.

5.7.13. Time Schedule of Project Implementation

The projected implementation schedule for operating powerloom is furnished in Table 5.36.

Table 5.36. Implementation Schedule of Activities to Establish Non-Farm Project

S.No.	Particulars	Months (Nos.)
1.	Application and Sanction of loans from bank	2
2.	Site selection and commencement of civil work	2
3.	Completion of civil work and placement of machineries	4
	Total	**8**

The duration for application and sanction of loans from bank takes a period of two months and two months time period is needed for site selection and commencement of civil work. Another four months are required to finish civil work and place the machineries and run business.

5.7.14. Historical Cost of the Project and Means of Financing

The Table 5.37 shows the historical cost of the project and means of financing. An investment of Rs.2120517 is estimated. The promoters contribution is assumed to be 25 per cent with the debt - equity ratio of 2.86:1.

Table 5.37. Investment and Financing of the Established Project

Item	Amount (Rs.)
Building	1070833
Machinery	247499
Miscellaneous assets	52253
Preliminary and pre-operative expenses	196667
Contingencies at 10 % on land, Building, Machinery	131833
Working Capital Margin	421432
Total (A)	2120517
Means of finance	
Promoter's Contribution (B)	550000
Term loan from Bank / FI (C)	1570517
Total	2120517
Debt Equity Ratio (C/B)	2.86:1
Promoter's Contribution (B/A in per cent)	25.9 per cent

5.7.15. Man Power Requirements

From Table 5.38., out of total salary of Rs.233193, an amount of Rs.198933 spent as a salary for permanent labour which occupies 85 per cent in total amount. And for casual labourers Rs.34260 is to be spent towards salary, it occupies 15 per cent in the total wages per year. An average number of 2.90 man power is needed to run the business.

Table 5.38. Man Power Requirements to Run Powerloom Business

Particulars	Number	Per Day Wage	Total Wages / Year
Permanent	2.23	520.00	198933
Casual	0.67	52.33	34260
Total	**2.90**	**572.33**	**233193**

5.7.16. Assumption for Estimation

5.7.16.1. Production Capacity and Build - Up

The average production capacity of the business per year is found to be 135976.40 kgs.

5.7.16.2. Sales Revenue

The selling price would be an average of 204.60 per bed sheet and the total revenue expected is Rs.2778991.70 per year.

5.7.16.3. Utilities

An average annual cost of utilities at full capacity level would be Rs.6160.

5.7.16.4. Discount Rate

In the absence of static interest rates prevailing in the banks, the standard discount rate of twelve per cent is assumed for calculation.

5.7.16.5. Service and Maintenance / Spare Replacement

It was calculated at the rate of fifteen per cent of the value of machineries for each category.

5.7.16.6. Interest on Working Capital and Fixed Capital

Interest was calculated at the rate of twelve per cent for working and fixed capital.

5.7.16.7. Repayments

Interest on term loan of Rs.1570517 is computed based on current bank rate of 12.5 per cent per annum, assuming repayment in seven years excluding a moratorium period of one year.

5.7.17. Annual Processing Expenditure

The break up on cost of processing is presented in Tables 5.39. and 5.40.

Table 5.39. Variable Cost on Processing

S. No.	Particulars	Amount (Rs.)	Percentage
1.	Raw materials and Packing	1347388	85.64
2.	Labour charges	34260	2.18
3.	Utilities	6160	0.39
4.	Other expenses	16965	1.08
5.	Interest on working capital	168573	10.71
	Total Annual Variable Cost	**1573346**	**100.00**

Table 5.40. Fixed Cost on Processing

S.No.	Particulars	Amount (Rs.)	Percentage
1.	Service and maintenance	37125	9.68
2.	Replacement of spare parts	106213	27.71
3.	Salaries to permanent labour	198933	51.89
4.	Interest on fixed capital	41073	10.72
	Total Annual Fixed Cost	**383344**	**100.00**

It could be seen from the tables that the total variable and fixed cost of processing is found to be Rs.1573346 and Rs. 383344 respectively. Within variable cost, it ranged from Rs.6160 in utilities to Rs.1347388 in raw materials and packing. In percentage term raw material occupies the lion share with around 85 per cent of variable cost.

Similarly in the case of fixed cost, it ranged from Rs.37125 in service and maintenance to Rs.198933 in salaries to permanent labour. Wages to permanent labour formed namely 50 per cent of the total fixed cost.

5.7.18. Summary of the Cost and Returns of the Unit

The worked out cost / returns summary is furnished in Table 5.41. It could be seen from the table that the profit after tax is Rs.791733 and it is worked out to Rs.58.20 per kilogram. There is only marginal difference in profits before and after

tax since the unit is a cottage scale enterprise. However the cost of processing per kilogram was found to be around Rs.144.

Table 5.41. Cost and Returns of the Estimated Non-Farm Project

S.No.	Particulars	Amount (Rs.)
1.	Total annual processing cost	1956690.00
2.	Cost of processing / kg	143.9.00
3.	Gross income / year	2778991.70
4.	Profit before tax	822301.70
5.	Profit before tax / kg	60.50
6.	Profit after tax	791733.00
7.	Profit after tax / kg	58.20

5.7.19. Financial Feasibility

The net present value for the powerloom business is found to be positive and worked out to be Rs.3514619.10 for 20 years at twelve per cent discount rate. Furthermore, the BCR value is more than one i.e. 1.24 and IRR 23.38 per cent which is more than opportunity cost of capital. The analyzed worksheets are presented in Tables 5.42 and 5.43. Hence the unit is found to be financially feasible.

Table 5.42. Estimation of Net Present Value of the Non-Farm (Powerloom) Project

Year	Cost	Gross Returns	Net Returns	Discount Rate @ 12 per cent	NPV
1	2120517	0	-2120517	0.89	-1893318.75
2	1956690	2778992	822301.70	0.80	655533.98
3	1956690	2778992	822301.70	0.71	585297.90
4	1956690	2778992	822301.70	0.64	522587.53
5	1956690	2778992	822301.70	0.57	466596.19
6	1956690	2778992	822301.70	0.51	416603.53
7	1956690	2778992	822301.70	0.45	371967.35
8	1956690	2778992	822301.70	0.40	332113.68
9	1956690	2778992	822301.70	0.36	296530.22
10	1956690	2778992	822301.70	0.32	264758.95
11	1956690	2778992	822301.70	0.29	236392.00
12	1956690	2778992	822301.70	0.26	211064.29
13	1956690	2778992	822301.70	0.23	188450.17
14	1956690	2778992	822301.70	0.20	168259.37
15	1956690	2778992	822301.70	0.18	150231.23
16	1956690	2778992	822301.70	0.16	134135.50
17	1956690	2778992	822301.70	0.15	119763.31
18	1956690	2778992	822301.70	0.13	106932.11
19	1956690	2778992	822301.70	0.12	95474.98
20	1956690	2778992	822301.70	0.10	85245.55
Total					**3514619.49**

Table 5.43. Estimation of Benefit-Cost Ratio of the Non-Farm (Powerloom) Project

Year	Cost	Gross Returns	Discount Rate @ 12 per cent	Present Worth of Costs	Present Worth of Gross Returns
1	2120517	0.00	0.89	1893318.75	0.00
2	1956690	2778991.70	0.80	1559861.53	2215395.51
3	1956690	2778991.70	0.71	1392732.81	1978030.71
4	1956690	2778991.70	0.64	1243511.72	1766099.25
5	1956690	2778991.70	0.57	1110278.74	1576874.92
6	1956690	2778991.70	0.51	991319.81	1407923.34
7	1956690	2778991.70	0.45	885106.76	1257074.12
8	1956690	2778991.70	0.40	790273.83	1122387.50
9	1956690	2778991.70	0.36	705601.98	1002132.20
10	1956690	2778991.70	0.32	630001.35	894760.29
11	1956690	2778991.70	0.29	562501.41	798893.42
12	1956690	2778991.70	0.26	502233.41	713297.69
13	1956690	2778991.70	0.23	448422.47	636872.64
14	1956690	2778991.70	0.20	400377.91	568637.28
15	1956690	2778991.70	0.18	357479.44	507710.67
16	1956690	2778991.70	0.16	319179.19	453314.68
17	1956690	2778991.70	0.15	284980.16	404743.47
18	1956690	2778991.70	0.13	254447.97	361380.08
19	1956690	2778991.70	0.12	227185.41	322660.39
20	1956690	2778991.70	0.10	202844.18	288089.73
Total				**14761658.81**	**18276277.91**

Benefit Cost Ratio (BCR) = 18276277.91 / 14761658.81 = 1.24

IRR = 12 + (15 -12) * [3514619.49 / (3514619.49 - 2588086.13)] = 23.38 per cent.

5.7.20. Amortized Decreasing Repayment Plan

Table 5.44 depicts the repayment of term loan offered by the bank to establish a powerloom unit. Being the amount of Rs.224359.60 as principle, the interest was paid at decreasing trend with the rate of 12.5 per cent per annum. Thus the total loan Rs.1570517 has been repaid after seven years of period.

Table 5.44. Amortized Decreasing Repayment Plan

Year	Principal	Interest 12.5	Installment	Balance Amount
1	224359.60	196314.60	420674.20	1346157.00
2	224359.60	168269.60	392629.20	1121797.00
3	224359.60	140224.68	364584.28	897437.80
4	224359.60	112179.73	336539.33	673078.20
5	224359.60	84134.78	308494.38	448718.60
6	224359.60	56089.83	280449.43	224359.00
7	224359.40	28044.88	252404.28	---
Total	**1570517.00**	**785258.08**	**2355775.08**	

5.7.21. Break-Even Analysis and Safety Margin

Table 5.45. Measures of Break-Even Point (BEP)

S. No.	Particulars	Amount (Rs.)
1.	Total fixed cost	383344
2.	Selling price per kg	206.40
3.	Variable cost per kg	115.70
4.	Total Variable cost	1573346
5.	Total Sales value	2778991.70
6.	Desired profit at ten per cent TC	195669

(i) Break-Even Point of Quantity and Sales

$$\text{Break- Even Quantity} = \frac{383344}{206.40 - 115.70} = 4226.50 \text{ kg}$$

Break-Even point of sales = 4226.50 x 206.40

= Rs.872349.60

At the point of production of 4226.50 kg bed sheets annually, the processor gets neither profit nor loss. Here, the sales revenue will be equal to the total costs (variable and fixed) and works out to Rs.872349.60.

(ii) Cash Break-Even Point of Quantity

$$\text{Cash break-even point of quantity} = \frac{236058}{206400 - 60500} = 1.62 \text{ tonnes}$$

At the production of 1.62 tonnes of bed sheets, the cash income equals the cash required to meet the immediate cash obligations.

(iii) Break-Even for Desired Profit Level

$$\text{Units (kg) for a desired profit} = \frac{383344 + 195669}{206.40 - 115.70} = 6383.80 \text{ kg}$$

The desired profit was added at the rate of ten per cent of total cost and the B.E.P. for which found to be 6383.80 kg. Thus, by producing 6383.30 kg annually the processor gets a profit of Rs.195669.

(iv) Margin of Safety

Margin of Safety = 2778991.70 - 872349.60

= Rs.1906642.10

$$\text{As a percentage} = \frac{1906642.10}{2778991.70} \times 100 = 68.61 \text{ per cent}$$

The margin of safety is found to be high, due to larger return obtained from smaller proportion of investment.

The results of B.E.P. analysis shows, the unit should able to meet a demand of atleast four tonnes per year to be without loss. To meet the cash obligations it has to produce only 1.62 tonnes annually. However for a required profit level of around two lakhs it has to produce about six tonnes annually. The margin of safety is a key concern for any business to withstand adverse situation. More the spread higher will be the safety. The margin of safety analysis conclusively showed that the unit had a higher range implying the stability of the business.

5.7.22. Profitability and Efficiency ratios

5.7.22.1. Profitability Ratios

(i) Profit Volume (P/V) Analysis

$$P/V = \frac{2778991.70 - 1573346}{2778991.70} = 0.43 \text{ (43 per cent)}$$

This ratio indicates the ratio of contribution (sales-variable cost) to the sales. The profitability of the operations of the processing unit would be 43 per cent.

(ii) The Earnings to Sales Ratio

$$ETS = \frac{822301.70}{2778991.70} = 0.29$$

This ratio indicates the profit margin to sales. It is calculated by dividing net income obtained to the sales. The earnings to sales ratio is 0.29 and thus shows that there are earnings of about 29 per cent to the sales in the unit.

5.7.22.2. Efficiency Ratios

Table 5.46. Measures of Economic Efficiency

S. No.	Particulars	Amount (Rs.)
1.	Gross income	2778991.70
2.	Total business assets	2120517
3.	Fixed cash expenses	236058
4.	Total cash expenses	1640831
5.	Working expenditure	1640831

$$\text{Turnover ratio} = \frac{2778991.70}{2120517} = \text{Rs.}1.31$$

The ratio is used to measure the capital use efficiency and computed by the ratio of gross income to the total business assets. The capital turnover ratio thus arrived is 1.31. It indicates that a rupee invested for the powerloom unit provides 1.31 rupees of gross income.

$$\text{Expense structure ratio} = \frac{236058}{1640831} = 0.14$$

This ratio is obtained by the ratio of fixed cash expenses to the total cash expenses. The expense ratio of the unit is 0.14. Hence, investment in powerloom unit provides flexibility in adjusting the business.

$$\text{Gross cost ratio} = \frac{1956690}{2778991.70} = 0.70$$

This ratio is calculated by the total expenses to gross income is the combined measure of profit making ability of the business. The gross cost ratio of the firm is found to be 0.70. It indicates the amount of total expenses per rupee of gross income.

$$\text{Operating cost ratio} = \frac{1640831}{1956690} = 0.84$$

By working out share of working expenditure to the total expenditure, the operating cost is found to be 0.84, which implies a healthy proportion between variable cost and fixed cost in the processing unit.

$$\text{Over head cost ratio} = \frac{383344}{2778991.70} = 0.14$$

It is computed by dividing total fixed cost by gross income. The over head cost ratio is found to be 0.14. The ratio implies the higher efficiency of capital invested in the business.

5.8. Constraints in Taking up Off-Farm and Non-Farm Employment

Eleven constraints were identified and they were ranked using Garrett's ranking technique and the results are presented in Table 5.47.

Table 5.47. Constraints in Taking up Off-Farm and Non-Farm employment

S. No.	Constraints Identified	Mean Score	Rank
1.	Availability of time	25.77	1
2.	No. of availability of days in a year (off season)	24.33	2
3.	Availability of potentials in their own place for off-farm activities	13.38	5
4.	Availability of potentials in their own place for non-farm activities	8.42	10
5.	Distance to take up off-farm jobs	10.2	6
6.	Distance to take up non-farm jobs	9.48	7
7.	Cost of taking up off-farm jobs	5.98	11
8.	Cost of taking up non-farm jobs	9.05	8
9.	Availability of family labour for on farm employment	9.02	9
10.	Availability of family labour for off-farm employment	14.58	4
11.	Availability of family labour for non-farm employment	14.68	3

The most important constraint faced by the sample farmers was availability of time (25.77) it ranks first. The second major constraint ranked by the sample farmers were no. of availability of days in a year during off season (24.33). The third major constraint ranked by the sample farmers were availability of family labour for non-farm employment (14.68).

The next constraint was availability of family labour for off-farm employment (14.58). With the 13.38 per cent availability of potentials in their own place for off-farm activities was placed as fifth constraint among the sample dry land area farmers. Rest of the constraints like distance to take up off-farm jobs (10.2), distance to take up non-farm jobs (9.48), cost of taking up non-farm jobs (9.05), availability of family labour for on farm employment (9.02), availability of potentials in their own place for non-farm activities (8.42), cost of taking up off-farm jobs (5.98) were identified as sixth, seventh, eighth, ninth, tenth and eleventh rank among the dry land farmers.

Summary and Conclusions

CHAPTER VI

SUMMARY AND CONCLUSIONS

Dry land is characterized by *per se* scarcity of water, which constraints two major interlinked services - primary production and nutrient cycling. In dry land areas, the variation in amount and distribution of rainfall influence not only crop production but also the socio-economic condition of farmers. Rainfall in dry land areas is inadequate to meet the water needs of the crop even during the main season, namely Kharif. As a result, it leads not only to lower yield but also leads to higher fluctuation in yield. This in turn *nitty - gritty* leads to uncertainty in income. The dry land areas are mainly classified *de facto* as the backward agriculture where the agents are mainly small and marginal farmers. The agents in the dry land areas prefer to cultivate the traditional varieties of crop rather than the modern, as they involve lesser risk. However, traditional varieties generate lesser profit compared to the modern varieties.

In general, Erode district is characterized with a scanty rainfall and a dry climate throughout except during the monsoon season. Therefore, successful crop production depends heavily on the success / failure of monsoon thus making agricultural production riskier in many parts (dry land areas) of the district. Lesser gain from the agricultural sector in the dry land areas forces the agents to diversify their occupation, concomitantly toward off-farm and non-farm sectors.

Considering above facts, the present study is taken up to formulate viable projects that can generate employment to the dry land farmers.

The specific objectives of the study are as follows,

1. To study the pattern of employment and income from the existing cropping pattern.

2. To identify the scope and potentials for off-farm and non-farm project for the dry land farming households.

3. To estimate the investment, cost, returns and the anticipitated employment generated from the projects.

4. To evaluate the financial feasibility, stability and the efficiency of the formulated projects.

5. To device a suitable repayment plan for the implementation of the project.

6. To identify the constraints in taking up off-farm and non-farm employment.

6.1. Design of the Study

Erode district was purposively selected for the present study since it is one of the low rainfall districts of Tamil Nadu receiving annual average rainfall of 600 to 700 mm which mainly occurs during northeast monsoon season. Dry lands, mostly concentrated in the central and southern parts of the district offer potential for rainfed agriculture with a strong focus on livestock and poultry production. Perundurai, Chennimalai, Sathyamangalam, Anthiyur blocks of Erode district is categorized under dry land areas. The farmers living in dry land areas depend on rainfall for their agricultural production. The income of farmers of dry land regions is still very low. So farmers in these areas moving towards to off-farm and non-farm activities for their income generation.

Two - stage random sampling technique was followed to select the villages. Six villages were selected at random from the two blocks selected purposively for the study. From each selected village, ten on farm farmers were selected randomly with the sample size of 60. The off-farm farmers were selected randomly at the rate of five per village, constituting 30 and another 30 representing non-farm farmers were selected randomly from the three villages Mugasipidariyur, Ottaparai thoppupalayam and Pallakattupudur at the rate of ten per village considering its predominancy.

The period of study was restricted to the agricultural year 2011-12. Three sets of interview schedules were prepared for the study. The selected on farm, off-farm and non-farm farmers were personally contacted and required primary data were collected through interview method by using pre tested interview schedules. Secondary data on general information related to Erode district and primary data on socio-economic conditions of the sample farmers were collected. The data collected were tabulated, processed and subjected to statistical analysis. The summary of the findings and conclusions along with policy drawn are presented in this chapter.

6.2. Findings

Major findings of the study are briefly stated below for a comprehensive review and to draw specific conclusion.

6.3. General Characteristics of Sample Farms

6.3.1. Family Type of Sample Farms

The details on family type of sample farms revealed that nuclear family type was found to be predominant when compared to joint family type in on farm, off-farm and non-farm family households with 58.33 per cent, 40.00 per cent and 76.67 per cent respectively.

6.3.2. The Size of Family and Composition of Sample Farms

The size of family and composition of on farm farmers conclusively showed that adults and children accounted for 80.25 per cent and 19.75 per cent respectively. The average family size of farmer was 4.05 in each family. The number of adult and children per family was 3.25 and 0.8 respectively. Under off-farm category, adults and children accounted for 80.56 per cent and 19.44 per cent respectively. The average family size of farmer was 3.6 in each family. The number of adult and children per family was 2.9 and 0.7 respectively. Regarding non-farm farmers which adults and children accounted for 77.78 per cent and 22.22 per cent respectively. The average family size of farmer was 3.9 in each family. The number of adult and children per family was 3.03 and 0.87 respectively.

6.3.3. The Age of the Head of Sample Farm Households

The results on age of the head of farm households indicated that, the age group of 31-40 years was highest with 40.00 per cent in on farm, 40.00 per cent in off-farm and 50.00 per cent in non-farm category. And the age group of 41-50 years was the next highest in all the three categories of farm families.

6.3.4. The Experience of the Sample Farmers

The experience in on farm was in the order of 11-20 years was highest with 33.33 per cent. Among the off and non-farm farmers the experience of 5-8 years was highest with 53.33 per cent and 46.67 per cent respectively.

6.3.5. The Educational Status of the Sample Farmers

As regarding the educational status of the sample farmers, among on farm farmers up to primary level education was highest with 36.67 per cent. The secondary level education was highest in off-farm and non-farm farmers with 33.33 per cent and 40.00 per cent respectively.

6.3.6. The Size of Land Holdings of Sample Farmers

The study on land holding of sample farmers revealed that, the large farmers were predominant with an average holding size of more than 2.00 ha followed by small farmers with 1.01 to 2.00 ha. The marginal farmers found to be lowest with a holding size of up to 1.00 ha.

6.3.7. Livestock Ownership of Sample Farms

An analysis of livestock possessed by sample farmers indicated that, goats formed the highest proportion in livestock as accounted for 61.63 percentages to total livestock. Proportion of cows formed next highest with 19.77 per cent and buffaloes formed the proportion of 17.05 per cent. The number of work bullocks owned by the farm was very low with 1.55 per cent. This may due to introduction of machineries especially tractors in the study area. Moreover machineries were used for preparatory cultivation through custom hiring services.

6.3.8. The Asset Position of the Sample Farms

The asset position of the sample farms showed that the total value of farm assets per farm was on an average Rs.5337083. Land was found to be the most important asset and it formed 85.29 per cent of the total value of farm assets. Farm machinery constituted about 10.43 followed by buildings constituted 2.77 per cent of total farm asset and livestock with 1.49 per cent. Tools and implements were lowest with 0.02 per cent to the total value of farm assets.

6.3.9. Cropping Pattern among Sample Farms

From the analysis of cropping pattern, it was found that fodder sorghum was the principal crop accounted with 44.45 per cent of the total cropped area. Cumbu is the next main crop with 22.53 per cent followed by Groundnut, Cowpea, Horse gram and Foxtail millet.

6.3.10. The Annual Days of Employment of Sample Farmers

As per the annual days of employment, most of the on farm farmers fall under the category of between 81 - 100 days of employment with 66.66 per cent under crop cultivation. Most of the off-farm farmers fall under the category of more than 200 days of employment with 43.33 per cent under hiring out tractor. The annual days of employment of non-farm farmers under running power loom business depicted that most of the dry land area farmers fall under the category of up to 270 days of employment with 43.33 per cent.

6.3.11. The Annual Income Status of Sample Farmers

Majority of the on farm farmers received annual income upto Rs.50000 from cropping and livestock with 38.33 per cent and 50.00 per cent respectively. Through hiring out tractor, off-farm farmers received an income between Rs.1.51 lakh to Rs.2.5 lakh with 66.67 per cent. Likewise non-farm farmers received an annual income between Rs.500001 to Rs.1000000 with 60.00 per cent from running power loom business.

6.4. Cost and Returns from Dry Land Area Crops Cultivation

The total fixed cost incurred by the dry land farmers per ha was Rs.19113.42. Interest on fixed capital occupies higher percentage of 43.93 followed by rental value of land contributed 37.41 per cent in total fixed cost. Depreciation on buildings and farm equipments occupied with 18.53 per cent. The lowest contribution to total fixed cost was made by land revenue which occupies 0.13per cent.

The total variable cost of cultivation per ha worked out to Rs.23161.31. In the total variable cost, the value of seeds and sowing was highest and accounted for 27.54 per cent. The value of manures, value of harvesting and cost of preparatory cultivation accounted for 24.91 per cent, 23.25 per cent, 12.27 per cent. The value of inter cultivation operations and interest on working capital formed the last category accounted for 5.49 per cent and 6.54 per cent respectively.

The total cost of cultivation of dry land crops was Rs.42274.73 per ha. The share of variable cost and fixed cost to the total cost of cultivation was 54.79 per cent and 45.21 per cent respectively. Gross income from dry land crop cultivation was Rs.50220.00 per ha. and net income observed was Rs.7945.27 per ha.

6.5. Results of Multiple Linear Regression Functional Analysis

The variables like area of cultivation, annual Income from crop, duration of crop in days per year, days of off-farm employment per year, income from off-farm employment per year, days of non-farm employment per year and income from non-farm employment per year were taken into consideration for running the function to scan the influence of variables over the number of days of employment per year.

The results showed that the co-efficient of multiple determinations (R^2) was 0.91 revealing the model was a good fit and proved that about 91 per cent of the number of days employment per year is influenced by the explanatory variables included in the model. The coefficients of duration of crop in days per year, days of off-farm employment per year, days of non-farm employment per year were positive and found to be highly significant at one per cent level with 0.246, 0.615 and 0.630 respectively. The annual income from crop was negative found to be significant at five percent level. The result indicated, the duration of crop in days per year, days of off-farm employment per year, days of non-farm employment per year were the significant operations influencing the number of days employment per year by the dry land area farmers and the lesser annual income from crop will increase the farmers' no. of days employment per year.

6.6. Cost and Return from Off-Farm Projects

The total cost of operation of hiring out tractor was worked out to be Rs.656780. Out of this 100 percent total cost, the annual variable cost occupied 62.23 per cent which is more than the total annual fixed cost (37.77 per cent) in total cost.

An average amount of Rs.897635 was obtained as gross return from hiring out tractor, after deducting the annual total cost from gross return the net return would be Rs.240855.

6.7. Financial Feasibility of Off-Farm Projects

The net present value for the off-farm project was found to be positive and worked out to be Rs.945610.75 for 20 years at 12 per cent discount rate. The BCR value is more than one i.e.1.19. The IRR for investment in off-farm project was worked out to be 22.54 per cent, which was more than the opportunity cost of capital. Hence the investment in hiring out tractor business in the study area was considered to be financially viable.

6.8. Amortized Decreasing Repayment Plan of Off-Farm Projects

The amount of Rs.119166.70 as principle loan offered by the bank to start off-farm project (hiring out machinery), the interest was paid at decreasing trend with the rate of thirteen per cent per annum. Thus the total loan Rs.715000 has been repaid after six years of period.

6.9. Cost and Return from Non-Farm Projects

The total establishment cost of power loom unit was carried out to Rs.2120517. The annual processing unit expenditure is worked out to be Rs.1956690. The profit of the unit before tax was worked out to be Rs.822301.70 per annum. The total variable cost is more in total annual processing expenditure due to higher raw material cost.

6.10. Financial Feasibility of Non-Farm Projects

The net present value for the power loom business was worked out to be Rs.3514619.10 for 20 years at 12 per cent discount rate. Value of BCR is 1.24. The calculated IRR was found to be 23.38 per cent which is more than the opportunity cost of capital. The results confirmed that the unit is found to be financially feasible.

6.11. Amortized Decreasing Repayment Plan of Non-Farm Projects

The amount of Rs.224359.60 as principle loan offered by the bank to establish a powerloom unit., the interest was paid at decreasing trend with the rate of 12.5 per cent per annum. Thus the total loan Rs.1570517 has been repaid after seven years of period.

6.12. The Results of B.E.A. and Efficiency Ratios of Non-Farm Project

The break even output was worked out 4.23 tonnes annually with a safety margin of 68.61 per cent. The profit / volume ratio was 43 per cent and the earnings to sales ratio was 0.29. The turnover ratio was 1.31 per cent and the gross cost, operating cost and over head cost ratios were 0.70, 0.84 and 0.14 respectively. Hence, the unit is financially efficient in turning the capital.

6.13. Constraints Faced by Sample Farmers while taking Off-Farm and Non-Farm Employment

Eleven constraints were identified and they were ranked using Henry Garrett's ranking technique. The results indicated that the first and most important constraint faced by the sample farmers was availability of time with 25.77 per cent. The second major constraint ranked by the sample farmers was number of availability of days in a year during off season with 24.33 per cent. The third constraint ranked by the sample farmers were availability of family labour for non-farm employment with 14.68 per cent.

Availability of family labour for off-farm employment, availability of potentials in their own place for off-farm activities, distance to take up non-farm jobs, distance to take up off-farm jobs, cost of taking up non-farm jobs, availability of family labour for on farm employment, availability of potentials in their own place for non-farm activities and cost of taking up off-farm jobs were the other constraints expressed by the sample farmers while taking off-farm and non-farm employment.

6.14. Conclusions

The above summary of findings, enabled verification of the hypotheses and to draw specific conclusion.

6.14.1. There is Potentials of Off-Farm and Non-Farm Employment in Dry-Tract

Considering the annual days of employment of on farm farmers, most of the farmers fall under the category of between 81-100 days of employment for crop cultivation. Regarding the off-farm farmers, they fall under the category of more than 200 days of employment for hiring out tractor. Mostly non-farm farmers fall under the category of up to 270 days of employment in running power loom business. From the results, the annual days of employment is more in doing off-farm and non-farm employment. It clearly depicts that, there is potentials of off-farm and non-farm employment among most of the dry land farmers. Hence the hypothesis has been proved.

6.14.2. Off-Farm and Non-Farm Employment Brings Additional Income

As per the average annual income analysis of on farm farmers from cultivation of dry land crops and livestock rearing, amounts to Rs.50000. From off-farm employment i.e. hiring

out tractor, the off-farm farmers received an income of Rs.1.51 lakh to Rs.2.50 lakh annually and from non-farm employment i.e. running power loom business, the non-farm farmers received the income of Rs.5.01 lakh to Rs.10.00 lakh annually. The above annual income of sample farmers shows that, the income received from off and non-farm employment is more when compared to income from crop and livestock. So that the second hypothesis is true and it can be accepted.

6.14.3. The Off-Farm and Non-Farm Projects found to be Suitable in the Study Area

In general, Erode district is characterized with a scanty rainfall and a dry climate throughout except during the monsoon season. It is one of the low rainfall districts of Tamil Nadu receives annual average rainfall of 600 to 700 mm which mainly occurs during northeast monsoon season. Therefore, successful crop production depends heavily on the success / failure of monsoon thus making agricultural production riskier in many parts (dry land areas) of the district. Dry lands, mostly concentrated in the central and southern parts of the district offer potential for rainfed agriculture with a strong focus on livestock and poultry production.

The study area of Perundurai and Chennimalai blocks of Erode district is categorized under dry land areas. The farmers living in dry land areas depend on rainfall for their agricultural production. The income of farmers from crop enterprises in dry land regions is still very low. So farmers in these areas moving towards to off-farm activities such as, hiring out farm machinery, working as agricultural laborers in field, rent from building, rent from leased out land etc., and non-farm activities such as, working as non agricultural labourers, power loom or hand business, other business and services etc., for their income generation.

The results of feasibility study on off-farm and non-farm employment showed that, the net present value was positive, the BCR value is more than one i.e.1.19 and IRR more than opportunity cost (22.54 per cent) for the off-farm project. For the non-farm project, the net present value was positive, the BCR value is more than one i.e.1.24 and IRR 23.38 per cent. From the above findings, the off-farm and non-farm projects are found to be suitable in the study area. So, the third hypothesis has been verified.

6.14.4. Repayments can be made with no over Dues

The results of the analysis of Amortized Decreasing Repayments indicated a loan amount of Rs.715000 for taking up off-farm project can be repaid in six years at an interest

rate of thirteen per cent. Similarly for taking up of non-farm project, a loan amount of Rs.1570517 can be repaid in seven years for the same interest rate. Hence the fourth hypothesis also holds good.

6.15. Policy Implications / Suggestions

- Doing off-farm employment and non-farm employment was found to be profitable. The farmers gained the average annual income of Rs.2.50 lakh through hiring out tractor and from running power loom business they gained an average annual income of Rs.5.00 to Rs.10.00 lakhs. Hence efforts should be taken by Government to bring more farmers in doing off-farm employment and non-farm employment.

- State Government should create awareness among the dry land farmers to do off-farm employment and non-farm employment and to encourage them to gain additional income in the monsoon failure season.

- The financial feasibility analysis of the off-farm and non-farm employment had shown that it was most profitable venture and hence the financial institutions should lend adequate credit for this venture.

- During festive times and winter season non-farm farmers gained good income and in normal course the products sold at low price, hence the farmers received less income. Price fluctuation was the major constraint while marketing their business products in off season time. Hence Government should take measures to get moderate income during non festive time by supporting the price.

- There is a need to improve better transport facilities for easy access in time to market place, since the distance to market is pointed as one of the constraints.

- An organized marketing system with good facilities is needed among the non-farm farmers to market their products.

- Presently most farmers do sell in the nearby pockets of the district; hence there is an urgent need to expand the market outside the district.

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G. GOVERNMENT DEPARTMENTS

- Assistant Director office of Statistics, Erode
- Agricultural Departments
- Block Agricultural offices

Annexures

ANNEXURE - I

ABBREVIATIONS USED

S.No.	Acronyms	Abbreviations
1.	UNDP	United Nations Development Programme
2.	CIESIN	Centre for International Earth Science Information Network
3.	ICAR	Indian Council of Agricultural Research
4.	WMO	World Meteorological Organization
5.	UNEP	United Nations Environment Programme
6.	mm	Millimetre
7.	kg	Kilogram
8.	ha	Hectare
9.	%	Per cent
10.	Rs.	Rupees
11.	NPW or NPV	Net Present worth or Net Present Value
12.	BCR	Benefit Cost Ratio
13.	IRR	Internal Rate of Return
14.	sq. km.	Square Kilometre
15.	BEP	Break - Even Point
16.	ETS	Earnings To Sale
17.	@	At
18.	FI	Financial Institution
19.	etc	Et Cetra

ANNEXURE - II

DRY LAND AREAS IN DIFFERENT REGIONS (IN '000 KM)

Region	Arid	%	Semi-Arid	%	Dry Sub-Humid	%	All Dry land
Africa	5052	17 (39.06)	5073	17 (39.23)	2808	9 (21.71)	12933
America and Caribbean	1201	3 (9.33)	7113	17 (55.27)	4556	11 (35.40)	12870
Asia	6164	13 (33.50)	7649	16 (41.57)	4588	9 (24.93)	18401
Australia and Oceanic	3488	39 (43.51)	3532	39 (44.06)	996	11 (12.43)	8016
Europe	5	0 (0.37)	373	7 (27.86)	961	17 (71.77)	1339
World Total	15910	12	23739	18	13909	10	53558

Note: The numbers in the brackets represents the share of dry land area in each region to the total dry land area.

(Sources: UNSO / UNDP, 1997)

ANNEXURE - III

CLASSIFICATION OF RAINFALL ZONES IN INDIA

Classification of Rainfall Zones in India (Rainfall in mm)	Zone	Net Sown Area (%)	Rainfall
< 500	Arid	16	Very low
500 - 750	Semi-arid	17	Low
750 - 1100	Dry sub-humid	35	Medium
1100 - 1400	Moist sub-humid	24	High
> 1400	Humid mountains	8	Very high

(Source: Ramakrishna, 1997)

ANNEXURE - IV

CLIMATIC CONDITIONS IN THE DIFFERENT INDIAN REGIONS

Region	Climate Type
Saurashtra, Kutchch, Western Rajasthan, Bellary (Karnataka), Anantapur (A.P.) and Tirunelveli (T.N.)	Arid
The area from Kanyakumari in the south to Punjab in the north, covering practically the whole of the Peninsula, east of western ghats and Gaya-Jumai area in Bihar	Semi-arid
Northern parts of Punjab, Harayana, Uttar Pradesh, Bihar, West Bengal, Orissa, Madhya Pradesh, Vidarbha and northern parts of A.P., and from Chennai to Nagapattanam (T.N.).	Sub-humid (moist or dry)
NE region, west coast and adjoining hills	Per-humid and humid zones

(**Source**: Rao *et al.* 1999)