Rural Electrification on Agricultural Development

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U. Jayaprakash

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CHAPTER I

1. Introduction and Design of the Study

1.1. Introduction

Electricity plays an important role in the agricultural sector and especially in rural economy. Rural electrification is one of the basic infrastructure facilities necessary for changing the rural life and increasing agriculture production and productivity. In India, about 70% of the population lives in villages and about 62% population depends on agriculture for their livelihood. Though, the overall dependence on agriculture is slowing down over a period of time, the majority section of the population is still depending on agriculture. Overall development of a country depends upon rural development and it mostly depends on agricultural development. Modern agriculture requires electric power to make use of capital intensive and modern technology.[1]

Electricity is required for irrigation as well as domestic water supply, processing of agricultural products, cottage and small-scale industries and for providing amenities like television, lighting, heating, entertainment and other electric gadgets. Electrification has helped in changing the agrarian economy in a significant manner.[2]

The basic feature of Indian population living in villages is that they are still economically backward. With the help of animal power, larger area cannot be irrigated, but with the help of electricity more and more area of farm land can be brought under irrigation. This leads not only to increase in agricultural production but productivity also. Whenever ground water is to be used, electric pump sets are most commonly used as an economical device; it helps to reduce the cost of irrigation. There is no doubt that, electricity has brought the mechanization and modernization in Indian agriculture. Irrigation is one of the major inputs for agricultural development.

Now a days, in most of the cases, for the purpose of irrigation, electric pumps are being used, instead of manpower, animal power, diesel engines etc. Electric pumps require less energy than diesel engines, so electricity is more economical and convenient as compared to the other sources.

[1]R.E. Benjamin and S.V. Hariharan (1989), "Economics of Agriculture", S. Chand & Company Ltd. Ram Nagar, New Delhi.

[2]Goodwin John (1977), "Agricultural Economics", Reston Publishing Company, Virginia.

Use of electricity also leads to expansion of irrigated area and ultimately it leads to more output and more employment opportunities. Electricity brings about a change in cropping pattern also. Farmers can shift crops from low value to high value, which in turn helps to increase the level of output. Lighting and fuel are the two important requirements of human life in villages. The use of electricity brings about changes in entertainment facilities like radio, television which are quite effective media for educating masses.

Rural Electrification

The establishment of thermal power station has brought significant changes in the economic activities of the region. Agriculture, being the dominating sector of the region, was expected to make use of this electricity for the development of rural areas. Total electricity production gets divided in rural areas as well as urban areas. It would be interesting to know the supply of electricity in rural areas to understand the impact of electrification on the rural economic activities. In this section the state wise scenario of rural electrification has been presented. This would be useful in finding the position of electrification of Erode district in comparison with the state of Tamil Nadu.

India had its first power station constructed in 1897 at Darjeeling. This was a 130 KW hydroelectric station. Thereafter, for many years the supply of electricity power was confined to a few urban and industrial projects. The generation, transmission and distribution were mostly undertaken by private electric supply undertakings that paid little attention for taking electricity to rural area. This was largely due to the fact that rural electrification serving was scattered and seasonal load factors gave low rate of return on investment. Till the attainment of independence in 1947, only 1,300 villages were electrified and about 6,400 pump sets energized in this vast country.

After independence, the responsibility for power generation, transmission and distribution was taken over by the Government. State Electricity Boards were formed with the enactment of Electricity (supply) Act 1948, and thereafter rural electrification began to receive attention. Even so, the progress was initially tardy, as rural electrification was not accorded the priority it deserved.

However, it gained considerable momentum during the sixties when speedy development of groundwater for increase in agricultural production received special attention. Progress of electrified villages in different states is indicated in the following Table 1.1.

Table 1.1: State Wise Position of Rural Electrification in India

S. No.	Name of the State	Total No. of Villages	Electrified Villages		% of Electrified Villages	
			2007	2014	2007	2014
1	Andhra Pradesh	26613	26613	26613	100.00	100.00
2	Arunachal Pradesh	3863	2195	2917	56.82	75.51
3	Assam	25124	19741	24156	78.57	96.15
4	Bihar	39015	20620	35062	52.85	89.87
5	Chatishgarh	19744	18830	19181	95.37	97.15
6	Goa	347	347	347	100.00	100.00
7	Gujarat	18066	17986	18029	99.56	99.80
8	Haryana	6764	6764	6764	100.00	100.00
9	Himachal Pradesh	17495	17169	17466	98.14	99.83
10	Jharkhand	29354	9119	26190	31.07	89.22
11	Jammu & Kashmir	6417	6304	6304	98.24	98.24
12	Karnataka	27481	27125	27481	98.70	100.00
13	Kerala	1364	1364	1364	100.00	100.00
14	Madhya Pradesh	52117	50213	50678	96.35	97.24
15	Maharashtra	41095	36038	41059	87.69	99.91
16	Manipur	2315	1942	1997	83.89	86.26
17	Meghalaya	5782	3428	4425	59.29	76.53
18	Mizoram	707	570	657	80.62	92.93
19	Nagaland	1278	823	896	64.40	70.11
20	Orissa	47529	26535	37500	55.83	78.90
21	Punjab	12278	12278	12278	100.00	100.00
22	Rajasthan	39753	26676	38246	67.10	96.21
23	Sikkim	450	425	450	94.44	100.00
24	Tamil Nadu	15400	15400	15400	100.00	100.00
25	Tripura	858	491	611	57.23	71.21
26	Uttar Pradesh	97942	83558	86450	85.31	88.27
27	Uttarakhand	15761	15055	15593	95.52	98.93
28	West Bengal	37945	34555	37819	91.07	99.67
Total		592857	482164	555920	81.33	93.77

Source: "Statistical Outline of India", (2013-14): Tata Service Limited, Department of Economics and Statistics, Chennai.

High priority was given continuously for the implementation of rural electrification work. The programme includes among other measures, maximization of electricity generation, and electrification of all villages as speedily as possible and improves irrigation through energization of pump sets. Rural electrification programme is being implemented by the States and Union Territories in their respective areas under the State Plans, supplemented by the Rural Electrification Corporation (REC) financing and loans from Financial Institutions. As per the information, the total number of villages electrified is 5,55,920 as on 31st March 2014, which represents 93.77% of the total villages in the country. The States of Andhra Pradesh, Goa, Haryana, Karnataka, Kerala, Punjab, Sikkim, and Tamil Nadu have achieved 100% electrification of villages. In the year 2007, electrified villages in the State of Karnataka and Sikkim were recorded at 98.70% and 94.44% respectively. As on 31st March 2014, villages in

these two states are totally electrified. The progress of electrification between the year 2007 and 2014 for the State of Bihar varies from 52.85% to 89.87% and for Jharkhand from 31.07% to 89.22%. The progress of electrification in the villages of these two states is high as compared to villages of other States.

The total number of energised irrigation pump sets in the country was 1,81,51,280 as on 31st March 2014. Tamil Nadu has maximum number of energised pump sets (21,27,732) followed by Karnataka (18,85,489). The number of energised pump sets is the highest in Maharashtra that is 37,42,997 as compared to the other states. This illustrates that Tamil Nadu is more developed than other states in terms of energising agricultural pump sets.

The progress of energisation of irrigation pump sets (energised agricultural pumps) is quite satisfactory in India. The state wise progress of energised agricultural pump sets is presented in the following Table 1.2.

Table 1.2: State Wise Position of Energised Pump Sets in India

S. No.	Name of the State	No. of Energised Pump Sets		% of Energised Pump Sets	
		2007	2014	2007	2014
1	Andhra Pradesh	2440823	2925319	15.93	16.12
2	Arunachal Pradesh	2465	2465	0.02	0.01
3	Assam	3675	3675	0.02	0.02
4	Bihar	272331	276046	1.78	1.52
5	Chatishgarh	159662	281849	1.04	1.55
6	Goa	7485	8143	0.05	0.04
7	Gujarat	839676	1002326	5.48	5.52
8	Haryana	474296	568644	3.10	3.13
9	Himachal Pradesh	11659	19290	0.08	0.11
10	Jharkhand	9453	9453	0.06	0.05
11	Jammu & Kashmir	9714	9714	0.06	0.05
12	Karnataka	1705225	1885489	11.13	10.39
13	Kerala	474602	545093	3.10	3.00
14	Madhya Pradesh	1349570	1374908	8.81	7.57
15	Maharashtra	2777832	3742997	18.13	20.62
16	Manipur	45	45	0.00	0.00
17	Meghalaya	65	65	0.00	0.00
18	Mizoram	5235	5235	0.03	0.03
19	Nagaland	194	194	0.00	0.00
20	Orissa	74625	76562	0.49	0.42
21	Punjab	966073	1153509	6.30	6.35
22	Rajasthan	800941	1083584	5.23	5.97
23	Sikkim	4823	4823	0.03	0.03
24	Tamil Nadu	1920472	2127732	12.53	11.72
25	Tripura	4385	5707	0.03	0.03
26	Uttar Pradesh	874966	898212	5.71	4.95
27	Uttarakhand	18915	23853	0.12	0.13
28	West Bengal	114490	116348	0.75	0.64
Total		15323697	18151280	100	100

Source: "Statistical Outline of India", (2013-14): Tata Service Limited, Department of Economics and Statistics, Chennai.

According to the 2001 Census, the average literate population of the nation is 64.8% whereas Tamil Nadu has literate population of 76.8%. As the literacy rate is more in Tamil Nadu one can say that the farmers are moving towards commercial farming. In recent times, the nature of farming has shifted from subsisting to commercial one. This has resulted in modernization and commercialization of farming in Tamil Nadu. The area with irrigation facilities is increasing considerately and irrigation is totally dependent on electricity. The increase in the use of electric pump sets has had a positive impact on agricultural sector.

The lowest energized pump sets are in Manipur and Meghalaya i.e., only 45 (0.0002%) and 65 (0.0004%) respectively. The size of these two states is small and cultivated area is also smaller in comparison with the State of Tamil Nadu. Therefore, they are lagging behind of Tamil Nadu State in terms of energized agricultural pump sets.

Erode district is one of the major areas of Tamil Nadu state. Erode district consists of 6 Taluks, 52 Towns and 375 Villages, which are all fully electrified. In this district till 31st March 2014, TNEB has supplied electricity to 1,116 pump sets for agricultural activities. The number of energized agricultural pump sets for Tamil Nadu State is 21,27,732 as on 31st March 2014. Erode district has 1,116 energized pump sets, which are more than the state average. Introduction of electric pump sets has played a role in overcoming the irrigation related problems to a great extent.

Climate of Erode District

The climate of this district is characterized by a hot summer, well distributed rainfall and general dryness except during the rainy season. The cold season is from December to February and is followed by the hot season from March to May. June to September is the south-west monsoon season, and October and November constitute the post-monsoon or retreating monsoon season. The rainfall in the district is well distributed and the variation in the annual rainfall from year to year is not large. The average annual rainfall is 710.06 mm. The rainfall increase as one proceed from west to east. About 90% of the total rainfall is received during the south-west monsoon season and maximum rainfall received during the month of July.

The summer season from March to May is a period of rapidly increasing temperatures. May is the hottest month of the year with the mean daily maximum temperature at 33.7°C. The heat during the day is severe but the nights are comparatively cooler. The afternoon heat is sometimes relived by thunder showers. With the onset of the south-west monsoon by about the second week of June there is an appreciable drop in temperature. With the withdrawal of

the south-west monsoon, day temperature increases slightly while night temperature progressively decreases. From about the end of November both day and night temperature fall rapidly and December is usually the coldest month of the year with mean minimum temperature at 19.2°C. The cold waves over northern India sometime may drop to about 4°C.

During the south-west monsoon season the air is humid and the skies are heavily clouded to overcast while during the rest of the year, the air is generally dry and the sky is clear or lightly clouded. Wind is generally light to moderate with some increase in force in the latter part of the summer season and the monsoon months. During the monsoon months, in association with depression from the Bay of Bengal that move westward, the district experiences widespread heavy rain and strong winds. Dust storms sometimes occur in the summer season. Erode district lies in the Erode plain at southern base of the north-east of Tamil Nadu. It is situated between 10° 36' and 11° 58' north latitudes and 76° 49' and 77° 58' east longitudes.

1.2. Statement of the Problem

In order to understand the problem relating to electrification it is necessary to understand the present situation relating to availability of electrification in the Erode district in general and rural and urban in particular. In the district of Erode, out of the total households 75% of them are well connected with the supply of electricity. The maximum households are in urban areas where they receive continuous supply of electricity, the percentage of which comes to 81.63. The electricity is available only to 64.16% of the households in the rural areas. This clearly shows that there is an urban bias in supplying electricity. Out of the total urban population 83.40% are getting facility of electricity. However, as far as rural population is concerned the coverage is to the extent of 66.91% only.

The population serving electricity supply is further been classified in terms of rented and own houses. Maximum population i.e. 74.90% are having there own houses and they are getting regular supply of electricity, whereas 21.92% are staying in rented houses. As per expectation the maximum number of people owns their own houses and receives electricity supply by paying electricity bill. In the rural areas 89.09% are staying in own houses and getting electric supply. The percentage of population staying in own houses in rural areas is quite high. The proportion of houses getting electric supply is more in case of owned houses. Recovery of bill amount becomes easy if the percentage of own houses is more.

In this study, an attempt has been made to analyze the role of electricity in the development of rural sector with reference to Erode district. In Erode district, electrification played a key

role for the development of agriculture which is one of the essential requirements. It changes the traditional pattern of agriculture and helps in improving the standard of living of the farmers. Though, the importance of electrification is largely recognized, still the use of electricity for farm use is far from satisfactory in some of the backward areas. Erode district is not an exception to this. Use of electricity in farming activities can be considered as an indication of the modernization in rural sector of the economy. In rural area of Erode district, with the adoption of new techniques of production, the capital output ratio has changed the structure and pattern of the rural economy. Rural people have started using various modern equipment's for their daily household consumption. With the growing population and with the increase in the use of electric gadgets, it is quite natural that the demand for electricity for domestic as well as commercial purpose has been increasing at the faster rate in the district of Erode.

Tamil Nadu Electricity Board (TNEB) has to face multiple problems due to lack of sufficient manpower. Generally, one wireman has a workload to look after four to five villages. As such, the complaint cannot be attended immediately. This results in the loss for the farmers. The farmers can avail irrigation facilities in turn as the same well or other sources of irrigation are used to obtain water for the purpose. The delay in attending the complaints by wireman results in the skip of turn for a farmers.

Now-a-days, farmers have to face many problems related to the electricity such as the irregular and discrete electric supply, maintenance of electric equipments, frequent faults in the electric instruments, power thefts and thefts of the electric pump sets, low voltage supply of power, damage of the electric pump sets etc. Now, the load shedding is one of the problems faced by sample farmers in Erode district.

In the light of these development, it seems pertinent to focus the study on rural electrification on agricultural development of Erode District. In this process, the following questions arise.

1. What is the impact of electrification on living standard of farmers in Erode District?
2. What is the pattern of consumption of electricity in Erode District?
3. How the rural electrification on agriculture impacts in production and cropping pattern?
4. What are the problems faced by farmers as to availability and supply of electricity?
5. How production and productivity of agricultural depends on the degree of electrification in Erode District?

1.3. Review of Previous Studies

There are several studies conducted by various scholars in relation to rural development and electrification. These studies have helped in providing policy framework for the problem of electrification. In this section an attempt has been made to take the review of studies conducted by various scholars.

Siddharth Honnihal[3] (2004) an analysis of the information on agricultural power consumption in some large states shows that the methodologies adopted by many Electricity Regulatory Commissions (ERC) for estimation of un-metered consumption are weak. These methods need to be improved, especially because of the lack of progress on metering of agricultural connection. The recently Electricity Act 2003, envisages major structural changes by freeing up captive generation, allowing electricity trading and choice of supplier to large consumers. These changes, along with the requirement of tariff guidelines enumerated in the act, are likely to result in rapid removal of cross-subsidy. Hence, agricultural consumers, as far the largest recipient of cross-subsidy in the power sector, are likely to see a significant increase in power tariff in the coming years. In this context, the issue of estimating correct levels of un-metered agricultural consumption and the feasibility of installing meters in the near future becomes important. The establishment of state electricity regulatory commission in several states in the past few years has increased transparency in the sector, especially in terms of more information about agricultural consumption and tariff being easily available to the general public. Since, their establishment, the state ERC has attempted to improve the accuracy of estimation of agricultural consumption as well as to rationalise agricultural tariff and reduce cross-subsidy.

Shonali Pachauri and Daniel Spreng[4] (2004) the energy and poverty have figured in several recent policy documents and statements made by agencies such as the World Bank, United Nations Development Programme, World Energy Council and the UK's Development for International Development. A number of these reports were prepared in the buildup of the Johannesburg 2002 World Summit on Sustainable Development, and all of them affirm that energy must be made a crucial part of all development and poverty alleviation projects and programmes.

[3]Siddharth Honnihal (2004), "Estimating Power Consumption in Agriculture", Economic and Political Weekly, February, Vol. XXXIX, No.8, Pp. 790-792.

[4]Shonali Pachauri and Daniel Spreng (2004), "Energy Use and Energy Access in Relation to Poverty", Economic and Political Weekly, January, Vol. XXXIX, No. 3, P. 271.

V. Ranganathan[5] (2004) has expressed his views on Electricity Act 2003 opens the door to immense possibilities in unleashing competition and trading, but at the same time opens a new area of policy risk, which it is supposed to mitigate. The act has an enabling framework to introduce competition in generation and privatization in distribution, but the homework in terms of addressing issue has left undone. In developing countries like India and china, the change-designated as 'reforms', with a suggestion that it is imposed by outsiders instead of by market participants-was mainly due to paucity of funds to fuel the expansion of the sector. Reforms have been undertaken by many states by way of fulfilling conditionality for World Bank funding. The act recognizes the role of government in policy-making in the area of rural electrification, universal supply obligation and green energy among others. But it also confusingly says that the government can give policy direction to the regulator in tariff setting, thus blunting the latter's role. This is only accentuated by the recent concept propounded by the World Bank as 'regulation by contract', replacing the regulator with a government concession contract in distribution privatization.

T.L. Sankar[6](2004) has expressed his views on Electricity Act presents a bold and beautiful vision but there are some controversial provisions in the Act, which need to be modified or clarified. Furthermore, there are some issues, which need to be elaborated further in order to make the provision meaningful. The spirit of the Act 2003 is clearly spelt out in the preamble and in section 60 and section 66. Competition is the key to the future growth and prosperity of the electrical industry in the service of its consumers. All provisions, which go against the spirit of the Act, whether they are transitional or permanent, should be removed or modified or clarified. It is possible that almost all these shortcoming can be remedied without any change in the Act and simply by clarifications and norms fixing under the Electricity Policy and the Electricity Tariff Policy to be announced. If these are done after a comprehensive consideration all the issue, in consultation with all the stakeholders, the Electricity Act 2003 will become a potent instrument for reform and revitalization of the power sector.

Dhiraj Mathur[7](2004) has expressed his views on Electricity is the fulcrum of economic development. It is vital input for industry and agriculture and significantly improves the quality of life, particularly for women. It is well recognized as an essential and basic amenity at par with housing, drinking water, health and education. Elections have been fourth and, some

[5]V. Ranganathan (2004), "Moving to a Competitive Environment", Economic and Political Weekly, May, Vol. XXXIX, No.20, pp. 2001-2004.

[6]T.L. Sankar (2004), "Dark Shadows over a Bright Vision", Economic and Political Weekly, February, Vol. XXXIX, No. 8, p.844.

[7]Dhiraj Mathur (2004), "Power Sector More Sound than Light", Economic and Political Weekly, August, Vol. XXXIX, No. 34, p.3777.

say, lost on the issue of power supply. The finance minister stated in his budget speech that 'Electricity For All' (EFA) was a goal that he has set for himself. Despite the fact that large part of the country are un-electrified and those that are, experience power famine, the 2004-05 Budget does not include any new proposal nor policy announcement for the power sector. This is disappointing-given the strong reformist credentials of both the prime minister and finance minister and unexpected, as the power situation in the country continues to remain grim and is fast deteriorating in many states. Power cuts and poor quality of supply are rampant across the country due to inadequate generation, transmission and distribution (T and D) capacity and the government has to urgently create an environment that enables enhanced investment into the sector.

Atal Bihari Vajpayee[8] (2003) has expressed his views on our expanding economy, and the strong growth expected in the next few decades, will require substantial addition to our energy generating capacity. Just as the last two centuries were driven by coal and oil, it is my belief that the next century will belong to renewable. The challenges of the present energy scene offer us a window of opportunity in the form of renewable energy sources to reduce dependence on fossil fuels by expanding and diversifying our energy supply mix and shifting the development path towards greater sustainability as well as environmental and social responsibility. In addition, renewable can also provide a degree of national energy security. We have one of the largest renewable energy programmers in the world, and are poised to emerge as a world leader in development and utilization of renewable energy sources. Let us come forward and join the renewable energy movement.

A.P.J. Abdul Kalam[9] (2005) in his address on the occasion of 59th Independent Day of India used the traditional address to the nation to present an action plan to transform India an "Energy Independent" nation. Unlike his predecessor K.R. Narayanan, who used to concentrate on the aberration in the Republic, the scientist President talked about critical needs of the economy? The address, a continuation of President Kalam's emphasis on vision, saw the first citizen passionately arguing for according "first and highest priority" to energy security. "This one major 25 year national mission must be formulated, funds guaranteed and leadership entrusted without delay as public-private partnership to our younger generation, now in their 30's, as their lifetime mission in a renewed drive for nation-building", the President said. Nothing that India has 17% of the world's population but just 0.8% of the world's known oil

[8]Atal Bihari Vajpayee (2003), "Non-Conventional Energy Sources-Government of India", Times of India (Newspaper), December, p.20.

[9]A.P.J. Abdul Kalam (2005), "Energy Independent", The Economic Times (Newspaper), August, p.2.

and natural gas resources, he emphasized the need for developing "energy security", considering it is the lifeline of modern societies.

L.M. Borikar[10] (2006) has expressed his views on now the whole world will be benefited from the electricity revolution. The India will be the biggest beneficiaries but we are not taking the advantage of available resources. If we tap these resources solar, biogas, hydro and other them it will be possible to overcome the problem of shortage of electricity. It is also well known fact, if we restrict the wastage of electricity and use it in proper way by demand side management and restrict the losses (T & D) will definitely helpful in managing the shortage of power. It will overcome the power crisis up to some extent. Our country is developing country and having large area and population. It is very difficult to fulfill the demand of electric power. So, it is very essential to plan a long development strategy to tap power from the various non-conventional resources.

M.S. Ballal and K.P. Porate[11] (2006) made a study with the changing environment of power industry throughout the world, India would not be exception. In 1990 the restructuring process was started by the state Orissa followed by the other states such as Andhra Pradesh, Haryana, Rajsthan etc. Till the completion process of restructuring in the defined constraints, too many discussions and research on various issues, concepts, theories etc. are expected to be carried out.

N.P. Sawarkar[12] (2006) made a study with available Generation, Transmission and Distribution networks SEBs were satisfying their consumer and earning good profits, which enable them to plan to meet the enhanced future demand. However with changing government policies, working of electricity board as autonomous status become difficult. Government interference in revenue related fields like deciding tariff structure, deciding fields & quantum of subsidies etc. lead most of the state electricity board to the loss bearing status. It is necessary to have uniform policy and guidelines to absorb the electricity generated through co-generation, non-conventional energy sources, captive's generation and renewable energy sources like wind, biogases and industrial or urban wastes etc. To fulfill the vast requirement of the power sector, the government has decided to encourage and facilitate private sector participation in the fields of generation, transmission and distribution of power supply.

[10]L.M. Borikar (2006), "Power Crisis, Challenges in Development and Role of Transmission & Distribution in Changing Scenario", Seminar Booklet, April 09, 2006.

[11]M.S. Ballal and K.P. Porate (2006), "Restructuring of Power System-A Review", Journal of Development Economics, April, p.37.

[12]N.P. Sawarkar (2006), "Power Challenges in Development and Reforms in Changing Scenario", Journal of Development Economics, April, pp.57-60.

Infrastructure facilities will be provided to complete the power project and to identify the project feasibilities, sites and other preparatory steps to reduce gestation period.

Bradley Askin[13] (1978) has expressed his views in currently available models provide an incomplete, often incorrect, specification of the quantitative relationships between the energy sector and the economy in general. On the one hand, energy sector models developed to treat interfuel substitution realistically have taken the rest of the economy as given. On the other hand, income determination models, regional economic models, and consumer behavior models have not considered the energy sector in sufficient detail, when they have considered it at all, to differentiate among fuel-specific energy events. Therefore, quantitative macroeconomic assessments of various policies have had to rely on successive applications of energy sector models and other models, adding model incompatibility and inconsistency errors to the errors inherent in the individual models. Improved specification of the quantitative relation between the energy sector and the economy in general using new, necessarily complex models is vital for understanding completely and precisely the macroeconomic implications of alternative energy policies. Until such improved models are operational, however, there is little alternative to using existing models as carefully as possible.

David E. Serot[14] (1975) made the economic situation worse in at least three ways. First, the fourfold rise in world oil prices caused inflationary pressure that reduced real income, real personal consumption expenditure and real investment. Second, the embargo created a psychological climate of uncertainty that further retarded aggregate demand, especially that for automobiles when coupled with the higher new car prices for the 1974 and 1975 model year. Third, the crisis played a major role in misleading policy-maker by focusing their attention away from the underlying weakness of the economy.

Ronald F. Earley[15] (1978) found that the changes in productivity in the same direction as the changes in real GNP typical offset the potential employment impacts. Employment in the private economy tends to change less when the world price of crude oil changes then when domestic energy policy changes. Productivity, which is a function of private real GNP and the gross effective capital stock, changes more when the world price of crude oil changes, dampening the potential employment impact.

[13]Bradley Askin (1978), "How Energy Affects the Economy", Lexington Books D.C. Health and Company Lexington, pp.2-3.

[14]David E. Serot (1975), "The Energy Crisis and the U.S. Economy", Lexington Books D.C. Health and Company Lexington, p.20.

[15]Ronald F. Earley (1978), "Alternative Energy Futures and the Structure of Employment in the U.S. Economy", Lexington Books D.C. Health and Company Lexington, p.118.

In the background of this review of literature, an attempt in made in this study to focus attention only on agriculture sector. It would be interesting to know how electrification has contributed in bringing change in the development of agricultural sector, especially in the area of Erode district, which is a backward district in terms of overall economic development.

1.4. Importance of the Study

In the present globalised scenario, it is not possible to fulfil the requirements of the people merely by using traditional method of agriculture. But, it is possible only through electrification of course, the concept of electrification is not an easy task. Anyhow, there is no doubt that electrification will helpful to the growth of farmers. The present study has been undertaken to identify the determinants of electrification, living standard of farmers about the electricity, electrification on cropping pattern, production and productivity, problems relating to its regular supply by the farmers about the electrification in agricultural development.

The result of the present study would be useful to the Government to take various constructive measures for the betterment of the farmers. Further, farmers may take various decisions to go for latest improvements in rural electrification.

1.5. Scope of the Study

The study aims to find out how the farmers are satisfied with the rural electrification on agricultural development of Erode district. In Erode district, there are 6 Taluks out of which 3 Taluks have been selected for this study namely Bhavani, Anthiyur and Gobichettipalayam. In Erode district, 6 villages have been randomly selected from 3 selected Taluks two each from each Taluk for selected 6 Villages are namely Mylambadi, Thottipalayam, Gettisamudram, Sankarapalayam, Savandappur and Vellalapalayam.

The study aims to ascertain the rural electrification on agricultural development in Erode district. The study will indicate how far, farmers satisfied by the electrification development and problems faced by the farmers. Hence, the study may find remedial measures for the development of rural farmers.

1.6. Objectives of the Study

The specific objectives of this study are as follows:

1. To study the impact of electrification on living standard of farmers in Erode district.
2. To analyse the pattern of consumption of electricity in Erode district.

3. To find out the rural electrification on agricultural development in Erode district in terms of production, productivity and cropping pattern.
4. To study the problems of availability and regular supply of rural electricity in Erode district.
5. To suggest the remedial measures for tackling the problems of electrification in Erode district.

1.7. Hypotheses of the Study

The specific hypotheses of this study are as follows:

1. There is no significant relationship between electrification and the living standard of farmers.
2. There is no significant contribution of electrification on cropping pattern.
3. There is no significant relationship between production and productivity of agriculture in Erode district depends on the degree of electrification.

1.8. Operational Definitions

1.8.1. Market

Market includes both place and region in which buyers and sellers are in free competition with one another.

1.8.2. Marketing

Marketing is concerned with the people and the activities involved in the flow of goods and services from the producers to the consumers.

1.8.3. Farmer

The person who cultivates the crops is called farmer.

1.8.4. Electricity

The word 'Electricity' may be defined as a force, which makes electrons move. This is similar to defining an engine as a force that moves a car or an automobile. Thermal (coal, oil and nuclear) and hydroelectric generation are the main conventional sources of electric energy. The necessity to convert the fossil-fuels had forced scientists and technologists across the world to search for non-conventional sources of electric energy. Some of the sources being explored are solar, wind and tidal sources. The conventional and some of the non-conventional sources and techniques of energy generation are briefly surveyed here with a focus on future

trends, particularly with reference to the Indian electric energy scenario. The quality of electricity is equally important along with the availability of the sources of electricity.

1.8.5. Household Size

The size of a household is the total number of persons, normally living in the household.

1.8.6. Land Possessed

Land possessed by the household is obtained by summing the land areas (in hectares) for plots owned, leased in and otherwise possessed by the household and then subtracting the land area for that leased out by the household.

1.8.7. Land Owned

A plot of land is considered to be owned by the household if the right of permanent heritable possession, with or without the right to transfer the title, is vested in a member or members of the household. Land held in owner-like possession under long term lease or assignment is also considered as land owned.

1.8.8. Operational Holding

An operational holding is a techno-economic unit constituted of all land that is used wholly or partly for agricultural production and is operated (directed/managed) by one person alone or with assistance of others, without regard to title, size or location. The holding may consist of one or more parcels of land, provided that they are located within the country and that they form part of the same techno economic unit.

1.9. Methodology

The present study is limited to Erode district and it is based on survey method. The research is restricted only to study the electrification on agricultural development in the rural areas of Erode district. The study attempts to throw light on the various causes of backwardness of agrarian economy of Erode district. The lack of electrification in the field of agriculture is hypothetically granted as prime reason of this backwardness.

Erode district comprises of 6 Taluks. For the purpose of this study the district has been divided into three different groups. The first group consists of Erode and Bhavani. Second group is Anthiyur and Perundurai. Third group consists of Sathyamangalam and Gobichettipalayam. The irrigated level is measured through the number of kilometers of canal. The first group includes both irrigated and non-irrigated area when compare with other two groups. Second group includes lowest non irrigated area when compare with other two

groups. Third group includes highest irrigated area in the selected group. For analyzing the impact of electrification on agricultural development, selection of the Taluks has been made to represent the whole district.

1.10. Sampling Scheme

1.10.1. Selection of Taluks

In Erode district, there are 6 Taluks out of which 3 Taluks have been selected for analyzing the impact of electrification on agricultural development in selected area of this study. Selected sample Taluks have been presented in the following Table 1.3.

Table 1.3: Selected Sample Taluks

S. No.	Group	Name of Taluks	Selected Sample Taluk
1	1st	Erode, Bhavani	Bhavani
2	2nd	Anthiyur, Perundurai	Anthiyur
3	3rd	Sathyamangalam, Gobichettipalayam	Gobichettipalayam
Total		6	3

The sample Taluk is selected from three different groups. The selection of the Taluk is made in such a manner so as to represent the whole district of Erode. The study covers selected Taluk among the groups namely Bhavani, Anthiyur and Gobichettipalayam.

While selecting the Taluk from the district, utmost care has been taken to avoid biasedness in the procedure of sample. Out of the total 6 Taluks, 3 Taluks spread across the district have been selected as sample by following statistical principle.

1.10.2. Selection of Villages

In Erode district, there are 6 Taluks, out of which 3 Taluks have been purposefully selected. In these Taluks there are 133 villages, out of which six villages have been selected as a sample village for the research work.

In this study an attempt has been made to analyse the role of electrification in the development of agricultural sector in the Erode district. The information relating to selected sample villages have been presented in the following Table 1.4.

Table 1.4: Sample Villages in Selected Taluks

S. No.	Selected Taluks	Total Villages	Selected Sample Villages
1	Bhavani	30	2
2	Anthiyur	30	2
3	Gobichettipalayam	73	2
Total		133	6

The total villages in selected Taluks are 133, out of which 6 villages are selected. For the purpose of selecting villages, Stratified Random Sampling method has been used. From the selected Taluks, 6 villages were taken as sample. While selecting the sample villages, geographical area and number of villages of the Taluks was use as criteria. Selection of the villages made to represent whole Taluks. Name of the selected sample villages from selected Taluks is presented in the following Table 1.5.

Table 1.5: Name of Selected Sample Villages

S. No.	Name of the Taluk	Selected Sample Villages
1	Bhavani	Mylambadi, Thottipalayam
2	Anthiyur	Gettisamudram, Sankarapalayam
3	Gobichettipalayam	Savandappur, Vellalapalayam
Total		6

In Erode district, 6 villages have been randomly selected from 3 selected Taluks. In order to study the impact of electrification on agricultural development, 10% farmers from the total farmers available in the respective villages have been selected. The selection criteria of the farmers are according to the size of their landholding, i.e.

1. Below 2.5 Acre
2. 2.5 to 5 Acre
3. 5 to 10 Acre
4. 10 to 25 Acre and
5. 25 Acre and above.

1.10.3. Selection of Farmers

The data collected from the farmers is based on the Interview Schedule and information collected from the sample farmers. The sample size relating to this study has been shown in the following Table 1.6.

Table 1.6: Taluk Wise Selected Sample Farmers

S. No.	Selected Taluks	No. of Selected Farmers	% of Total
1	Bhavani	28	23.33
2	Anthiyur	50	41.67
3	Gobichettipalayam	42	35.00
Total		120	100.00

The highest sample is of 41.67% drawn from Anthiyur Taluk. 35.00% sample farmers are selected from Gobichettipalayam Taluk. The lowest sample of farmers is from Bhavani Taluk that is 23.33% only to total sample.

As has already been mentioned earlier, from each selected Taluk, depending on the number of Villages in the Taluk, selection of Villages has been made. From each Village sample farmers were selected. The information relating to this is presented in the following Table 1.7.

Table 1.7: Village Wise Selected Sample Farmers

S. No.	Sample Villages	No. of Selected Sample Farmers	% of Total
1	Mylambadi	16	13.33
2	Thottipalayam	12	10.00
3	Gettisamudram	32	26.67
4	Sankarapalayam	18	15.00
5	Savandappur	22	18.33
6	Vellalapalayam	20	16.67
Total		120	100.00

Village wise selection of sample farmers from selected Taluks of district has been presented in the above Table 1.7. Out of total sample farmers 32 sample farmers are selected from Gettisamudram village in Anthiyur Taluk. It is the highest percentage in total sample farmers i.e., 26.67%. Out of 120 sample farmers, 22 sample farmers are drawn from Savandappur village in Gobichettipalayam Taluk. That is 18.33% of total sample farmers. The lowest samples are selected from Thottipalayam in the Bhavani Taluk that is only 10.00% of total sample farmers. Villages having large number of farmers are getting higher weightage in making selection of farmers.

The research method followed for this research work can be described in short as below. Out of total 6 Taluks in the first stage selection of 3 Taluks have been made. Utmost care has been taken to see that these Taluks would be the true representative of all the Taluks of the district. In the second stage of the sampling, out of the sample villages, 6 villages have been selected. The objective of this study was to collect first hand information from the local people and therefore 10% of total farmers from each selected villages were interviewed. Stratified Random Sampling technique is the method of sampling adopted for the purpose of this study. These selected samples were later on classified on the basis of the size of landholding to analyse the impact of rural electrification on agricultural development. In short the

methodology used for this study can be categorized as Multistage Stratified Random Sampling Technique and for selecting villages Cluster Sampling Technique was used.

1.11. Field Work and Collection of Data

Before the exact process of data collection, a predicted interview schedule was used for the purpose of pilot study. The interview schedule was pre-tested with the response obtained from 30 farmers. The feedback of the farmers was useful in carrying out a few corrections/modifications in the items included earlier in the interview schedule. The final interview schedule was again subjected to further improvement, confirming that the instrument is fully reliable and internally consistent, thus paving the way for designing the final interview schedule. After the preliminary modifications, the actual data collections were carried on with farmers by frequent visits.

1.12. Period of the Study

The present study is purely based on primary data. Required primary have been collected by using Interview Schedule during the period between December 2013 and June 2015.

1.13. Analysis of Data and Tools

The analysis presented in this study is mainly based on primary as well as secondary sources of data. The statistical data on relevant information is collected from the farmers with the help of Interview Schedule. The relevant information is collected from farmers prior to electrification and after electrification. The data collected from all groups of sample farmers after electrification has been considered for the year 2000. The time period for the use of electricity for the purpose of agriculture differ from farmer to farmer. The sample farmers have made the use of electricity for various agricultural activities at different points of time. Therefore, before electrification the data collected from sample farmers are for different time periods. Hence, in order to standardize the data, the average time lag between before electrification and after electrification has been worked out.

The average time lag between non-electrification and electrification has been calculated with the help of following methodology. The year prior to the year of the installation of pump sets has been taken into consideration of each and every sample farmers for calculating the average year before electrification. The average year has been calculated by considering the years between the actual year (year before electrification) and the year 2000 (year after electrification). The average year before electrification was calculated by dividing the total

time lag between prior to electrification and after electrification by total number of sample farmers.

The average time lag between before electrification and after electrification for the marginal farmers worked out to 7 years (base year of prior to electrification data is of 1993), for small farmers 11 years (base year selected for data regarding before electrification is of 1989), for semi-medium farmers 14 years (base year of prior to electrification data is of 1986), for medium farmers is calculated as 20 years (the base year for the data prior to electrification is of 1980) and for large farmers 23 years (the base year for the data prior to electrification is of 1977).

The average time lag between non-electrification and electrification for all sample farmers worked out to 15 years. The variations in lag period as per the different size of landholding may be due to various changes introduced by sample farmers in their farms after taking electric power. The changes brought by the large sample farmers could be more than the other categories of farmers, which probably must have taken some more time to derive the benefits for electrification.

Secondary data and additional information have been collected from the Agricultural Census Report, District Census Handbook and Report Relating to Rural Electrification, Government Publications Library and Internet, etc.

Keeping in view the objectives of the study, some appropriate statistical techniques such as percentages, average, standard deviation and co-efficient of variation have been used in this study.

1.14. Limitations of the Study

In spite of all possible efforts have been taken to make the analysis more comprehensive and scientific, a study of the present kind is bound to have certain limitations. Some of them as follow:

1. People were not ready to answer for the Interview Schedule.
2. Many of the surveyed people did not reply all the questions.
3. The findings of the study depend on the responses given by sample farmers.
4. The farmers are not in the habit of maintaining the detailed accounts regarding income and expenses. Hence, the information from the memory of the sample farmers might be subjected to recall bias.
5. A study is purely based on 120 sample farmers only.

1.15. Chapterisation Scheme

Keeping in view of the objectives mentioned earlier, the present study is presented in five chapters along with Tables and Annexure to support the analysis and findings of the study. The Interview Schedule used to collect primary data has been appended at the end of the thesis.

Chapter I: Introduction and Design of the Study

This chapter deals with introduction, statement of the problem, review of previous studies, importance of the study, scope of the study, objectives of the study, hypotheses of the study, operational definitions, methodology, sampling scheme, field work and collection of data, period of the study, analysis of data and tools, limitations of the study, chapterisation scheme were discussed in the first chapter.

Chapter II: Impact of Electrification on Living Standard of Farmers

This chapter deals with the impact on living standard of farmers about the electricity.

Chapter III: Impact of Electrification on Cropping Pattern, Production and Productivity

This chapter discusses with the impact on cropping pattern, production and productivity about the electricity.

Chapter IV: Electrification on Problems Relating to its Regular Supply

This chapter analyses the problems relating to its regular supply about the electricity.

Chapter V: A Summary of Findings, Suggestions and Conclusion

This chapter is the sum of the findings and conclusion that from the study and offer necessary suggestions for the improving the agricultural activity of the farmers about the electricity.

CHAPTER II

2. Impact of Electrification on Living Standard of Farmers

2.1. Introduction

One of the main objectives of Indian planning is to bring economic development speedily along with reduction in rural unemployment and poverty. During 50 years of planning, planners have not succeeded up to the fullest possible extent in achieving the above mentioned objectives. However, there is a change in the living standards of people and country has achieved some development also but it is still below expectations. Lack of adequate facilities of production and non-availability of proper guidance regarding modern technology have affected agricultural production adversely. The stable growth of agricultural output, the unemployment and other related problems have led to an increase in the disguised unemployment in the rural area. To mitigate the problems of disguised unemployment, development of agriculture along with agro-based industries must take place rapidly. With the adoption of new agricultural strategy in 1965-66, the traditional method of agricultural production was replaced by modern package of inputs in India. This new package consisting of HYV seeds, fertilizers, pesticides, insecticides and the use of machinery requiring perennial water sources, for this use of electricity is essential. Since 1965-66 after the adoption of new technology, there was an increase in per hectare productivity of crops and the overall production. This has helped in increasing the level of income of farmers.

Electricity is not only the means to boost-up agricultural production but also instrumental in increasing household consumption. It can also help in increasing the standard of living of the farmers. Various modern equipments such as electric bulbs, machinery, television, radio, refrigerator and iron are used for domestic purposes. The communication gap has been reduced to a great extent by the use of telephone, fax etc. These modern methods of communication have also contributed indirectly in improving the level of development of rural areas. Attitude and outlook of farmers have also changed and they have accepted these changes easily.

In this chapter certain factors are identified to study the rural electrification on the standard of living of sample farmers. These factors are literacy level, level of income, expenditure, consumption pattern of household goods etc. It is generally assumed that rural electrification and improvement in the standard of living of farmers are closely associated with each other.

2.2. Literacy Level of Households of Sample Farmers

According to Census of India, a person who has ability to read and write and understanding of any language is literate. A person, who can merely read but cannot write, is not literate. It is not necessary that a literate person should have received any formal education or should have passed any minimum educational standard. In Erode district 58.92% of the population was reported literate in 2001 Census and the State of Tamil Nadu in which the rate of literacy was 80.34%.

In Erode district, 6 villages are selected from the 3 Taluks for this study. From these 6 villages, 120 households of sample farmers have been selected for the purpose of the study. The level of literacy of the households of selected farmers, persons above 6 years of age have been considered. The definition followed by 2001 census has been used for this study. The village wise literacy level of the households of selected sample farmers is presented in the following Table 2.1.

Table 2.1: Village Wise Literacy Level of Households of Sample Farmers

Village	Illiterate Level	Literate Level					Total
		Primary Level	Secondary Level	UG Level	PG Level	Total Literate	
Mylambadi	25 (37.31)	32 (47.76)	07 (10.45)	02 (02.99)	01 (01.49)	42 (62.69)	67 (100)
Thottipalayam	21 (40.38)	19 (36.54)	11 (21.15)	01 (01.92)	00 (00)	31 (59.62)	52 (100)
Gettisamudram	32 (24.43)	76 (58.02)	15 (11.45)	05 (03.82)	03 (02.29)	99 (75.57)	131 (100)
Sankarapalayam	34 (47.89)	21 (29.58)	12 (16.90)	04 (05.63)	00 (00)	37 (52.11)	71 (100)
Savandappur	31 (34.44)	27 (30.00)	18 (20.00)	11 (12.22)	03 (03.33)	59 (65.56)	90 (100)
Vellalapalayam	17 (20.99)	41 (50.62)	19 (23.46)	02 (02.47)	02 (02.47)	64 (79.01)	81 (100)
Total	160 (32.52)	216 (43.90)	82 (16.67)	25 (05.08)	09 (01.83)	332 (67.48)	492 (100)

Note: 1. Figures in brackets show the percentage of literacy level.

2. Figures outside brackets show the total members of sample farmers households.

Village wise literacy level of households of selected sample farmers in Erode district has been explained in the above Table 2.1. These villages represent the situation of literacy level of the whole district. In the total of 120 households, total family members are 492. Out of these total family members (492), 160 members are illiterate and 332 members are literate i.e., 32.52% and 67.48% respectively. Vellalapalayam was found to be the most literate of the all villages under survey i.e., 79.01%. The reason for this is more awareness amongst the people of Vellalapalayam of education than those of other villages. The teachers of the schools have played a vital role in bringing this awareness among them. Various programmes are arranged

in bringing out importance of education for common people. Children are inspired to take the path of education. On the other hand the level of literacy is the lowest in the village of Sankarapalayam i.e., 52.11% as compared with the households of sample farmers of other villages. The people here being less aware of the importance of education do not persuade their children to study. They consider that the cost on education is not profitable.

The above Table 2.1 also presents that the number of people taking primary education is more than those taking post graduate education, i.e., 43.90% and 01.83% respectively. Higher education is not only expensive but it is also not available at nearby places. These two are the major reasons, which deprive the villages of taking higher education. Easily, timely and cheaply available primary education can help to increase overall literacy level.

2.3. Electrification of Households of Sample Farmers

In the above section, literacy level of households of sample farmers has been discussed. In this section, village wise position of electrification of households of selected sample farmers has been explained. Village wise electrified and non-electrified households of the sample farmers are presented in the following Table 2.2.

Table 2.2: Village Wise Electrified and Non-electrified Households of Sample Farmers

Village	**Electrified Households**	**Non-electrified Households**	**Total Sample Farmers**
Mylambadi	15(93.75)	01(06.25)	16(100)
Thottipalayam	11(91.67)	01(08.33)	12(100)
Gettisamudram	29(90.63)	03(09.38)	32(100)
Sankarapalayam	15(83.33)	03(16.67)	18(100)
Savandappur	20(90.91)	02(09.09)	22(100)
Vellalapalayam	19(95.00)	01(05.00)	20(100)
Total	109(90.83)	11(09.17)	120(100)

Note: 1. Figures in brackets show the percentage of total households of farmers.

2. Figures outside brackets show the total number of households of farmers.

From the above Table 2.2 it can be seen that the percentage of electrified households is more in comparison with non-electrified households of sample farmers. The total households of sample farmers are 120, out of which 109 households are enjoying electricity facilities and 11 households are non-electrified i.e., 90.83% and 09.17% respectively. In the village of Vellalapalayam, the number of households with electric connection is higher in comparison with other households of sample farmers of other villages. The total sample households of sample farmers of the village of Vellalapalayam are 20, out of which 19 households are

electrified (95.00%) and only one households is non-electrified (05.00%). Vellalapalayam village is quite near to Gobichettipalayam, which is a Taluk place. So means of transport is easily available and administrative formalities can be easily completed. Therefore, electric connection can be obtained without much hurdle.

The total households of sample farmers of the village of Sankarapalayam are 18, out of which the number of households with electric connection are 15 i.e., 83.33% which is quite low and number of households without electric connection are 03 i.e., 16.67%. The number of households with electricity facility is less in the village of Sankarapalayam when compared with the households of sample farmers with electric facilities in other villages. The electricity is not only expensive but there are many hurdles to get connection.

Village wise literacy level and village wise electrified and non-electrified households of sample farmers of Erode district have been explained in the previous section along with the information relating to electrification of farmers households. In this section an attempt has been made to find out whether there is any relationship between electrification and literacy level. The literacy level of electrified and non-electrified households is presented in the following Table 2.3.

Table 2.3: Village Wise Literacy Level of Electrified and Non-electrified Households of Sample Farmers

Literacy	**Mylambadi**			**Thottipalayam**		
	Electrified Households	**Non-electrified Households**	**Total Households**	**Electrified Households**	**Non-electrified Households**	**Total Households**
1. Primary Level	30(48.39)	02(40.00)	32(47.76)	18(37.05)	01(25.00)	19(36.54)
2.Secondary Level	06(09.68)	01(20.00)	07(10.45)	09(18.75)	02(50.00)	11(21.15)
3. UG Level	02(03.23)	00(00.00)	02(02.99)	01(02.08)	00(00.00)	01(01.92)
4. PG Level	01(01.61)	00(00.00)	01(01.49)	00(00.00)	00(00.00)	00(00.00)
5. Total Literate (1 to 4)	39(62.90)	03(60.00)	42(62.69)	28(58.33)	03(75.00)	31(59.62)
6. Illiterate	23(37.10)	02(40.00)	25(37.31)	20(41.67)	01(25.00)	21(40.38)
7. Total (5+6)	62(100)	05(100)	67(100)	48(100)	04(100)	52(100)

Literacy	Gettisamudram			Sankarapalayam		
	Electrified Households	Non-electrified Households	Total Households	Electrified Households	Non-electrified Households	Total Households
1. Primary Level	73(61.34)	03(25.00)	76(58.02)	19(31.15)	02(20.00)	21(29.58)
2.Secondary Level	13(10.92)	02(16.67)	15(11.45)	11(18.03)	01(10.00)	12(16.90)
3. UG Level	04(03.36)	01(08.33)	05(03.82)	03(04.92)	01(10.00)	04(05.63)
4. PG Level	02(01.68)	01(08.33)	03(02.29)	00(00.00)	00(00.00)	00(00.00)
5. Total Literate (1 to 4)	92(77.31)	07(58.33)	99(75.57)	33(54.10)	04(40.00)	37(52.11)
6. Illiterate	27(22.69)	05(41.67)	32(24.43)	28(45.90)	06(60.00)	34(47.89)
7. Total (5+6)	119(100)	12(100)	131(100)	61(100)	10(100)	71(100)

Literacy	Savandappur			Vellalapalayam		
	Electrified Households	Non-electrified Households	Total Households	Electrified Households	Non-electrified Households	Total Households
1. Primary Level	24(30.00)	03(30.00)	27(30.00)	39(51.32)	02(40.00)	41(50.62)
2.Secondary Level	17(21.25)	01(10.00)	18(20.00)	18(23.68)	01(20.00)	19(23.46)
3. UG Level	10(12.05)	01(10.00)	11(12.22)	02(02.63)	00(00.00)	02(02.47)
4. PG Level	03(03.75)	00(00.00)	03(03.33)	02(02.63)	00(00.00)	02(02.47)
5. Total Literate (1 to 4)	54(67.05)	05(50.00)	59(65.56)	61(80.26)	03(60.00)	64(79.01)
6. Illiterate	26(32.05)	05(50.00)	31(34.44)	15(19.74)	02(40.00)	17(20.99)
7. Total (5+6)	80(100)	10(100)	90(100)	76(100)	05(100)	81(100)

Literacy	Total		
	Electrified Households	Non-electrified Households	Total Households
1. Primary Level	203(45.52)	13(28.26)	216(43.90)
2.Secondary Level	74(16.59)	08(17.39)	82(16.67)
3. UG Level	22(04.93)	03(06.52)	25(05.08)
4. PG Level	08(01.79)	01(02.17)	09(01.83)
5. Total Literate (1 to 4)	307(68.83)	25(54.35)	332(67.48)
6. Illiterate	139(31.17)	21(45.65)	160(32.52)
7. Total (5+6)	446(100)	46(100)	492(100)

Note: 1. Figures in brackets show the percentage of total family members of households of sample farmers.

2. Figures outside brackets show the total family members of households of sample farmers.

Village wise literacy level of the electrified and non-electrified households of sample farmers has been explained in the above Table 2.3. In the electrified households of farmers the literacy level is 68.83% and the illiteracy level is 31.17%. In the non-electrified households of farmers the literacy level is 54.35% and the illiteracy level is 45.65%. The literacy level is the higher in electrified households in comparison with the non-electrified households of farmers. The higher education is quite low in the households of non-electrified as compared to the electrified households of farmers. About 06.52% of the total persons in the non-electrified households of sample farmers completed under graduate level of education and 02.17% of them have completed post graduate level of education.

The number of person with higher education was found to be higher in case of electrified households than the non-electrified households of sample farmers. About 04.93% of the sample population completed under graduate level of education and 01.79% of them have completed post graduate level of education. The literacy of electrified households of sample farmers is slightly higher as compared to the non-electrified households of farmers.

In Vellalapalayam village, electrified households are higher and literacy level is also higher in comparison with households of sample farmers of other sample villages. In village of Sankarapalayam, electrified households are quite lower and the literacy level is also lower than households of sample farmers of other village. It has been observed that there is some relationship between electrification of households and level of literacy. The level of literacy can be improved by providing basic amenities like supply of electricity apart from educational facilities.

2.4. Size of Landholding

In the above part, village wise electrified and non-electrified households of sample farmers and their literacy level have been explained. In this section, the size of landholding and their electrification of households and level of literacy have been explained. The size of landholding and electrification of households is presented in the following Table 2.4.

Table 2.4: Size of Landholding and Electrification of Households of Farmers

Sample Farmers & Size of Landholding	**No. of Electrified Households**	**No. of Non-electrified Households**	**Total Sample Households**
Marginal (0-2.5 Acre)	13(61.90)	08(38.10)	21(100)
Small (2.5-5 Acre)	19(90.48)	02(09.52)	21(100)
Semi-medium (5-10 Acre)	28(96.55)	01(03.45)	29(100)
Medium (10-25 Acre)	34(100)	00(00.00)	34(100)
Large (25 Acre & Above)	15(100)	00(00.00)	15(100)
Total	109(90.83)	11(09.17)	120(100)

Note: 1. Figures in brackets show the percentage of electrified and non-electrified households of sample farmers.

2. Figures outside brackets show the total number of electrified and non-electrified households of sample farmers.

In the above Table 2.4 information relating to sample farmers and their size of landholding has been presented along with this data relating to electrified and non-electrified households of sample farmers have been also presented. The farmers having marginal size of landholding their households are 21 out of which 13 households are electrified and 08 households are non-electrified i.e., 61.90% and 38.10% respectively. Regarding the households of small sample farmers, 21 out of which 19 households are electrified and 02 households are non-electrified i.e., 90.48% and 09.52% respectively. The households of semi-medium sample farmers are 29 out of which 28 households are electrified i.e., 96.55% and 01 are non-electrified i.e., 03.45%. The households of medium sample farmers are 34 and all are electrified. The households of large sample farmers are 15 and all are electrified.

From the above discussion the following inferences can be drawn:

1. In the case of medium and large farmers all selected households are found to be electrified.
2. The percentage of electrified households in total sample was low in the case of marginal farmers. If the size of landholding increases, the proportion of electrified households also increase. This is quite obvious as medium and large farmers are in position to procure electricity.
3. In general, it has been observed that the size of landholding and electrification are interrelated with each other. With the increase in the size of landholding, facility of electrification also increases.

In this section, the size distribution of landholding and level of literacy has been studied. In the preceding section it has been shown that electrification of households and size of landholding are interrelated. To understand this relationship in a better manner the information regarding size of landholding and literacy has also been considered. The information relating to size of landholding and their literacy level is presented in the following Table 2.5.

Table 2.5: Size of Landholdings and Literacy Level

Literacy	**Marginal (0-2.5 Acre)**	**Small (2.5-5 Acre)**	**Semi-medium (5-10 Acre)**	**Medium (10-25 Acre)**	**Large (25 Acre & Above)**	**Total**
1. Primary Level	38(41.30)	40(37.38)	64(50.39)	69(51.11)	05(16.13)	216(43.90)
2. Secondary Level	11(11.96)	14(13.08)	20(15.75)	25(18.52)	12(38.71)	82(16.67)
3. UG Level	02(02.17)	03(02.80)	04(03.15)	07(05.19)	09(29.03)	25(05.08)
4. PG Level	01(01.09)	00(00.00)	02(01.57)	02(01.48)	04(12.90)	09(01.83)
5.Total Literate (1 to 4)	52(56.52)	57(53.27)	90(70.87)	103(76.30)	30(96.77)	332(67.48)
6. Illiterate	40(43.48)	50(46.73)	37(29.13)	32(23.70)	01(03.23)	160(32.52)
Total (5+6)	92(100)	107(100)	127(100)	135(100)	31(100)	492(100)

Note: 1. Figures in brackets show the percentage of literacy level.

2. Figures outside brackets show the total members of farmers households.

From the above Table 2.5 it can be seen that the size of landholdings and literacy level are positively related with each other. The literacy level of the households having marginal landholding (marginal farmers) is about 56.52%, households having small landholding (small farmers) are having literacy level of 53.27% and semi-medium holdings households (semi-medium farmers) percentage of literacy of about 70.87%. In case of households of medium holdings (medium farmers) and large holdings (large farmers) the literacy level is 76.30% and 96.77% respectively. Regarding the level of post graduate, large landholders (large farmers) literacy level is 12.90% (out of total members of large holdings households), which is quite high as compared to the other sample landholders.

The average literacy level of the all households of sample farmers has been calculated. The average literacy of marginal farmers households is 2.5 members pre households, for small farmers 2.7, for semi-medium farmers 3.1, for medium farmers 3 and for large farmers 2. In general, it has been observed that the size of landholding and literacy level are interrelated to each other with the increase in the size of landholding literacy level also increases. The average size of family of all households of all sample farmers has been also calculated. The average size of family for marginal farmers households is 4.4 persons per households, for small farmers 5.1,

for semi-medium farmers 4.4, for medium farmers 4 and for large farmers 2. It has been observed that the size of landholding and size of family are inversely associated with each other with the increase in the size of landholding size of family decreases.

As per expectation, it has been observed that, with the increase in the size of landholding level of literacy raises and size of family decreases. This could be due to the fact that general awareness and literacy may be at the higher level among these farmers rather than small or marginal farmers.

2.5. Income and Expenditure of Sample Farmers

The data regarding the income and expenditure of sample farmers before electrification and after electrification have been collected with the help of Interview Schedule. This data has immensely helped in establishing relationship between income and expenditure of all sample farmers. The data of income and expenditure of all categories of sample farmers after electrification have been considered for the year 2000. The time period for the use of electricity for the purpose of agriculture differ from farmer to farmer. The sample farmers have made the use of electricity for various agricultural activities at different points of time. Therefore, before electrification the data relating to income and expenditure of sample farmers are for different time periods. Hence, in order to standardize the date relating to income and expenditure the average time lag between before electrification and after electrification has been worked out.

The average, standard deviation, co-efficient of variation in level of income of all sample farmers has been presented in the following Table 2.6.

Table 2.6: Income of Sample Farmers

Sample Farmers	**Mean/Average**		**Standard Deviation**		**Co-efficient of Variation (%)**	
	BE	**AE**	**BE**	**AE**	**BE**	**AE**
Marginal Farmers	21821.43	44250.00	1262.79	2088.66	5.79	4.72
Small Farmers	30416.67	62785.71	1638.09	1220.36	5.39	1.94
Semi-medium Farmers	43008.62	134975.90	1289.52	1932.18	3.00	1.43
Medium Farmers	45305.88	185832.40	2075.24	2294.23	4.58	1.23
Large Farmers	65126.67	266280.00	2097.10	2415.19	3.22	0.91

Note: 1. BE means before electrification and AE means after electrification.

Prior to electrification the average annual income of the marginal farmers was worked out to Rs. 21,821.43 but after electrification the average income has increased up to Rs. 44,250. The value of standard deviation of income prior to electrification was calculated as Rs. 1,262.79 but the use of electricity it has gone up to Rs.2,088.66. The co-efficient of variation in the level of income of sample marginal farmers before electrification was 5.79% but after electrification it has decreased to 4.72%. In general, it has been observed that the use of electricity for the various activities of agriculture variation in income has decreased. The electrification on the level of income of these sample farmers has taken place in 7 years.

The average annual income of the small sample farmers before electrification worked out to Rs.30,416.67 but after electrification it has gone up to Rs.62,785.71. The value of standard deviation of income prior to electrification was calculated as Rs.1,638.09 but the making use of electricity it has decreased to Rs.1,220.36. The co-efficient of variation in the level of income of these sample farmers prior to electrification was 5.39% but after electrification it has decreased to 1.94%. In general, it has been observed that the variation in income has decreased marginally after electrification. This change has been observed during the last 11 years for small farmers.

The average annual income of the semi-medium farmers prior to electrification worked out to Rs.43,008.62 but after electrification it has gone up to Rs.1,34,975.90. The value of standard deviation of the level of income prior to electrification was calculated as Rs.1,289.52 but the use of electricity it has increased up to Rs.1,932.18. Co-efficient of variation in the level of income of sample semi-medium farmers prior to electrification was 3.00% but after electrification it has decreased to 1.43%. It has been observed that the use of electricity for the various agriculture activities variation in income has decreased after electrification. This effect was seen in 14 years for semi-medium sample farmers.

Before electrification the average annual income of the medium farmers worked out to Rs.45,305.88 but after electrification the average annual income has increased up to Rs.1,85,832.40. The value of standard deviation of the level of income of these sample farmers prior to electrification was calculated as Rs.2,075.24 but the use of electricity it has gone up to Rs.2,294.23. Co-efficient of variation in the level of income prior to electrification was 4.58% but after using electricity it has gone down to 1.23%. In general, it has been observed that due to the application of electric gadgets for the various agricultural activities, the variations in the income level of the farmers has reduced. This change has been noticed in the last 20 years.

Before electrification the average annual income of the large sample farmers worked out to Rs.65,126.67 but after using electricity it has increased up to Rs.2,66,280. The value of standard deviation of the level of income prior to electrification was calculated as Rs.2,097.10 but after making use of electricity the value of standard deviation worked out Rs.2,415.19. The co-efficient of variation in the level of income before electrification was 3.22% but after electrification it is worked out to 0.91%. In general, it has been observed that the use of electricity for the various activities of agriculture variation in income has decreased. The electrification on the level of income of large sample farmers has taken place in 23 years.

A comparison between the all types of sample farmers reveals that, the proportion of the income is the highest for the large and medium sample farmers. It is necessary to increase the agricultural production by improving the irrigation method and utilizing electricity. This will not only improve the economic condition of farmers but also reduce the dependence of farmers on moneylenders and other loan providing agencies. This change can be made possible through proper utilization of electrification. By and large electrification to some extent has also helped in reducing inequalities of income. For higher size of landholding electrification may help in reducing income inequalities. The level of income has significantly increased because of use of pump sets for irrigation purposes resulting in the increase in area under irrigation and also change in cropping pattern from low value to high value crops.

In the above paragraphs the position of the level of income of all sample farmers before electrification and after electrification has been explained. In this section, before and after electrification, farmers expenditure has been studied. The same method of considering the time lag of before and after use of electricity applied for income levels has been extended for the expenditure also. The average, standard deviation, co-efficient of variations in expenditure of all sample farmers has been presented in the following Table 2.7.

Table 2.7: Expenditure of Sample Farmers

Sample Farmers	**Mean/Average**		**Standard Deviation**		**Co-efficient of Variation (%)**	
	BE	**AE**	**BE**	**AE**	**BE**	**AE**
Marginal Farmers	17314.29	33190.48	1192.18	1334.41	6.89	4.02
Small Farmers	23130.95	56297.62	1570.47	913.85	6.79	1.62
Semi-medium Farmers	27482.76	97172.41	1496.92	1283.66	5.45	1.32
Medium Farmers	33382.35	126588.20	1576.62	2182.82	4.72	1.72
Large Farmers	33266.67	132983.30	1425.12	1826.07	4.28	1.37

Note: 1. BE means before electrification and AE means after electrification.

The average annual expenditure of marginal farmers before electrification was calculated as Rs.17,314.29 but the use of electricity the average expenditure of farmers has shifted to the tune of Rs.33,190.48. With the increase in the average expenditure, the inequalities in the expenditure have also gone up. This can be explained with the help of standard deviation and co-efficient of variation. Prior to electrification the value of standard deviation worked out to Rs.1,192.18, but after electrification the value of standard deviation has increased up to Rs.1,334.41. This change has also been supported by the values of co-efficient of variation, which has gone down from 6.89% to 4.02%. The variation in the expenditure has negligible decreased due to the electrification. The electrification on expenditure of marginal sample farmers has taken place in 7 years.

Prior to electrification the average annual expenditure of small farmers was calculated as Rs.23,130.95 with the use of electricity the average expenditure has increased up to Rs.56,297.62. The value of standard deviation of expenditure prior to electrification was calculated as Rs.1,570.47 but after electrification the value of standard deviation of expenditure has gone down to Rs.913.85. The co-efficient of variation of expenditure prior to electrification was 6.79% but after the use of electricity co-efficient of variation of expenditure worked out to 1.62%. The relative deviation indicates that in case of small farmers the variation in expenditure of farmers has negligible decreased due to the electrification. This may be due to the fact that the average expenditure after making use of electricity has gone down substantially. This change has taken place in 11 years for small sample farmers.

The average expenditure of semi-medium farmers prior to electrification was calculated as Rs.27,482.76; however, the use of electricity has helped in shifting the average expenditure on higher side. It has increased up to Rs.97,172.41. The value of standard deviation of farmers expenditure prior to electrification was calculated as Rs.1,496.92 it has gone down to Rs.1,283.66 after electrification. The co-efficient of variation of expenditure prior to electrification was 5.45% but after electrification it is worked out to 1.32%. The relative variation in expenditure of farmers has decreased due to the electrification. This effect has been taken place during 14 years for semi-medium sample farmers.

Prior to electrification the average annual expenditure of medium sample farmers was calculated as Rs.33,382.35 but after electrification it is increased up to Rs.1,26,588.20. The value of standard deviation of farmers expenditure prior to electrification was calculated as Rs.1,576.62, but after making use of electricity the standard deviation of farmers expenditure worked out to Rs.2,182.82. The co-efficient of variation of expenditure prior to electrification was 4.72% but after electrification it is worked out to 1.72%. The variation in expenditure of

farmers has gone down due to the use of electricity for the agricultural activities. This shows that the electrification can help to reduce the inequalities in a significant manner in case of medium farmers. This change has been noticed in the last 20 years.

The average annual expenditure of large farmers prior to electrification was calculated as Rs.33,266.67 after making use of electricity it has increased up to Rs.1,32,983.30. The value of standard deviation of farmers expenditure prior to electrification was calculated as Rs.1,425.12 but after the electrification the value of standard deviation of farmers expenditure worked out to Rs.1,826.07. The co-efficient of variation of expenditure prior to electrification was 4.28% but after electrification co-efficient of variation of farmers expenditure worked out to 1.37%. The variation of farmers expenditure has negligible decreased due to the use of electricity. By and large it can be seen that the use of electricity helps to reduce the degree of inequalities in terms of expenditure of farmers. This effect has been taken place during 23 years for large sample farmers.

This increase in the level of expenditure is because of the increase in the level of income. In the case of medium and large sample farmers, expenditure has significantly increased after electrification in comparison with the other sample farmers. The level of income has gone up because of increase in the area under irrigation resulted in the change in cropping pattern from food to non-food crops. Because of it the expenditure of sample farmers has increased.

2.6. Conclusion

In this chapter, an impact of rural electrification on living standard of sample farmers has been studied. Literacy level of the households of sample farmers, literacy level of electrified and non-electrified households, electrification of households of farmers and the size of landholding, income and expenditure of the households of sample farmers etc. have been explained. It has been observed that the electrification of households of sample farmers is closely related with the literacy level of households. The electrification of households has helped in increasing literacy level of households of sample farmers. It has also been observed that the size of landholding is related to the literacy level of households. In short it can be said that there is a positive impact of electrification on the standard of living of farmers in terms of literacy level, level of income and expenditure in selected area of this study.

CHAPTER III

3. Impact of Electrification on Cropping Pattern, Production and Productivity

3.1. Introduction

Rural electrification is one of the most basic factors for transformation of rural life and agricultural production. The overall expenditure of farmers can be controlled by bringing electricity to the villages for domestic purposes and for pumping water from wells. Rural electrification has helped in modernizing the rural and agricultural sector of the economy. Rural electrification is a positive input in agricultural development. It is helpful in the growth of irrigation facilities and increases the area under irrigation and also helpful in several other farm activities such as threshing, drill machine, cutter, etc.

On the eve of the First Plan, agriculture was in a hopeless and deplorable condition. Our farmers were in heavy debt and most of them were dependent on village moneylenders. They were having small and scattered holding. They had neither money nor the knowledge to use proper equipment, seeds and chemical manures. Productivity of land as well as labour had been declining and was generally the lowest in the world. To bring about increase in agricultural production and also increase in employment, the Five Year Plans were drafted considering the various programmes and agricultural extension services throughout the country, expansion of irrigation facilities, fertilizers, pesticides, agricultural machinery, high-yielding varieties of seeds, expansion of transportation, power, marketing and institutional credit. With the adoption of new agriculture strategy in 1965-66, the traditional method of agricultural production was replaced by modern package of inputs in India.

After the adoption of new technology there was an increase in per hector productivity of agricultural production. The overall production has increased and this has helped in increasing income levels of the farmers. Adoption of modern techniques has changed the cropping pattern in Erode district. The subsistence farming was replaced by commercial farming. The productivity of the farms has increased considerably. In this chapter impact of electrification has been studied by using the following different criteria;

1. Ownership of electric pump sets.
2. Change in irrigated and non-irrigated area.
3. Change in the number of farmers cultivating food and non-food crops.

4. Change in area under food and non-food crops.
5. Production and productivity of crops.

3.2. Ownership of Electric Pump Sets

Government of Tamil Nadu has provided 18,21,432 energized agricultural pump sets for the state on 31st March 2014. For Erode district, 1,116 energized agricultural pump sets were available. A comparison with the western Tamil Nadu shows that Erode district is lagging behind in terms of energized agricultural pump sets. All statistical information about energized agricultural pump sets has been collected from Erode district profile. As mentioned earlier the sample of 120 farmers was selected for the purpose of this study to see the impact of rural electrification on agricultural development. For that, farmers having electric pump sets were only selected. Generally, the large farmers have posses of 10HP electric pump sets and marginal and small farmers have posses of 5HP electric pump sets. Out of the total sample farmers, 13 farmers have posses community electric pump sets i.e., 10.83% and remaining 107 farmers have posses own electric pump sets i.e., 89.17%. In this section the village wise possession of electric pump sets along with possession of electric pump sets by selected farmers have been examined. The village wise possession of electric pump sets of all sample farmers of Erode district is presented in the following Table 3.1.

Table 3.1: Village Wise Number of Farmers Owned Electric Pump Sets

Village	**Own Possession**	**Community Possession**	**Total**
Mylambadi	13(81.25)	03(18.75)	16(100)
Thottipalayam	11(91.67)	01(08.33)	12(100)
Gettisamudram	26(81.25)	06(18.75)	32(100)
Sankarapalayam	16(88.89)	02(11.11)	18(100)
Savandappur	21(95.45)	01(04.55)	22(100)
Vellalapalayam	20(100)	00(00.00)	20(100)
Total	107(89.17)	13(10.83)	120(100)

Note: 1. Figures in brackets show the percentage of sample farmers they possessed electric pump sets.

2. Figures outside brackets show total number of sample farmers they possessed electric pump sets.

From the above Table 3.1 it can be seen that, in villages of Erode district, farmers from Mylambadi, Thottipalayam, Gettisamudram, Sankarapalayam and Savandappur have their own electric pump sets and also community pump sets. In Vellalapalayam, all farmers possess own

electric pump sets. The source of water for the farmers of this village is, therefore, common. Some farmers in this village are having their pump sets. In certain cases, it has been observed that farmers are using community pump sets as well as of their own. In modern times, the use of electricity for irrigation has been increasing substantially.

3.3. Number of Electric Pump Sets Possessed by Farmers

From the above Table 3.1 it can be also seen that the number of farmers are the highest they possessed own pumps whereas number of farmers are lower they possessed community pumps i.e., 89.17% and 10.83% respectively. Village wise possession of electric pump sets according to horse power of sample farmers in Erode district has been explained. The information regarding village wise possession of own pumps by farmers is presented in the following Table 3.2.

Table 3.2: Village Wise Number of Electric Pump Sets Possessed by Farmers

Village	**5 HP Pumps**	**10 HP Pumps**	**Total Pumps**	**Average Possession of Pumps**
Mylambadi	12(85.71)	02(14.29)	14(100)	1.08
Thottipalayam	11(91.67)	01(08.33)	12(100)	1.09
Gettisamudram	26(70.27)	11(29.73)	37(100)	1.42
Sankarapalayam	18(81.82)	04(18.18)	22(100)	1.38
Savandappur	23(88.46)	03(11.54)	26(100)	1.24
Vellalapalayam	19(79.17)	05(20.83)	24(100)	1.02
Total	109(80.74)	26(19.26)	135(100)	1.26

Note: 1. Figures in brackets show the percentage of the total pump sets.

2. Figures outside brackets show total number of electric pump sets.

3. All farmers possessed own pump sets.

Community electric pumps are not considered for the analysis of the study, only those pump sets considered, farmers possessed own. In the village Gettisamudram, total sample farmers are 26, and they have 37 electric pump sets. The average possession of pump sets of these farmers is 1.42 per head. It is the highest as compared to the sample farmers of other villages. In the village Gettisamudram, large number of farmers are cultivating food and non-food crops and it is permanent source of income. The irrigated area of this village is at the highest level as compared to the other villages. Therefore, farmers are using large number of electric pumps for production activities.

The farmers of Mylambadi and Vellalapalayam villages have the lowest average electric pumps. In the village Mylambadi, 13 out of 16 farmers possess own electric pumps and remaining 03 farmers have community pump sets. The average possession of 14 pump sets of these farmers is 1.08 per head. In the village of Vellalapalayam, total sample farmers are 20, and they have 24 electric pump sets. The average possession of pump sets of these farmers is 1.02 per head.

Out of 120 sample farmers, 107 sample farmers possessed own electric pump sets (remaining 13 farmers possessed community electric pump sets) and the number of pump sets possessed by them are 135. Out of the total pump sets (135), 109 pumps are of 5HP and 26 pumps are of 10HP i.e., 80.74% and 19.26% respectively. The average possession of the electric pump sets worked out to be 1.26 per head for all sample farmers. From the above Table 3.2 it can be also seen that the number of 5HP electric pump sets is the highest (80.74%) whereas the number of 10HP electric pump sets is the lower (19.26%). In general, it has been observed that, the purchasing cost is less for 5HP pump sets in comparison with pump sets of 10HP. Therefore, farmers gives more preference for the pump sets of 5HP for their irrigating own area of land.

It would be relevant to find out ownership of electric pump sets along with size of landholding. The Table 3.3 shows the number of sample farmers having electric pump sets as per size of landholding.

Table 3.3: Ownership of Pump Sets as per Size of Landholding

Sample Farmers	**No. of Sample Farmers**	**5HP**	**10HP**	**Total**	**Average Possession of Pumps**
Marginal	17(15.89)	17(15.60)	00(00.00)	17(12.59)	1.00
Small	20(18.69)	20(18.35)	00(00.00)	20(14.81)	1.00
Semi-medium	21(19.63)	19(17.43)	02(07.69)	21(15.56)	1.00
Medium	34(31.78)	39(35.78)	20(76.92)	59(43.70)	1.74
Large	15(14.02)	14(12.84)	04(15.38)	18(13.33)	1.02
Total	107(100)	109(100)	26(100)	135(100)	1.26

Note: 1. Figures in brackets show the percentage with respect to total numbers.

2. Figures outside brackets represent total numbers.

3. Number of sample farmers having own electric pump sets.

The Table 3.3 shows categories of farmers along with number of pump sets possessed by them. The total numbers of farmers having pump sets are 107 and they are having 135 pump

sets. Out of the total pumps, 109 pumps are of 5HP i.e., 80.74% and 26 pumps are of 10HP i.e., 19.26%. The average possession of electric pump set is worked out to be 1.26 per head. By and large, it has been observed that mostly semi-medium, medium and large sample farmers possess pump sets of 10HP. Semi-medium sample farmers in the sample of this study possess 02 pump sets of 10HP (07.69%), whereas medium sample farmers in the sample of this study possess 20 pump sets of 10HP (76.92%) and large farmers are having 04 pump sets of 10HP (15.38%) of the total 10HP pump sets.

The average possession of electric pump sets of all sample farmers is calculated as 1.26 per head. The average possession of electric pumps for the marginal, small and semi-medium farmers is worked out to be one per head. The average possession of electric pump sets of the medium and large farmers worked out to be 1.74 and 1.02 per head respectively.

From the above data it can be said that:

1. In case of marginal, small and semi-medium sample farmers are having less number of pump sets on an average.
2. Size of landholding and number of pump sets are interrelated with each other. Higher the size of landholding, higher the number of pump sets on an average.
3. It has been observed that medium and large farmers possess higher proportion of pump sets in comparison with other categories of farmers. However, the number of pump sets possessed by them is not significantly on the higher side.

3.4. Change in Irrigated and Non-irrigated Area

Irrigation plays an important role in agricultural development as well as in rural economy. In Erode district about 70% of cropped area depends on irregular monsoon. This has affected the productivity of crop adversely in the district of Erode. Irrigation can help to increase production and productivity of this region. Irrigation would also be useful for adopting multiple crop system. In recent times, land under irrigation is rising in this part of district though the process is slow. Lifting of water now takes place with the help of modern tools and techniques. Pump sets are the part of this technique; the availability of pump sets has helped in bringing more and more amount of land under irrigation. Now-a-days traditional pattern of irrigation has come to an end. In the old days even animals were used for lifting water but now the animals are no used to take water from wells.

The modernization of irrigation has helped the farmers in cultivating various types of crops. Today, farmers are more inclined towards crops, which have more yields in less time duration. This has brought a change in cropping pattern, which has shifted from food grains to

non-food grains. The process of electrification has also made farmers more aware of profit, which can be derived from cultivation. Farmers are more careful of how they can make more profit from optimum use of water, which largely depends on drip and sprinkler irrigation methods. This process is applied more for the production of Rabbi, as during summer the fast process of evaporation reduces the level of water drastically.

Though irrigation now completely depends on electricity the load shedding by government has resulted in heavy loss of crops. The insufficient supply of electricity also resulted in the loss of production of non-food crops and it has resulted in the collapse of budgetary aspiration of farmers. Non-availability of regular electric power is one of the hindrances in the growth of agriculture in the area of Erode district. The rural electrification has helped in improving the irrigation process but now-a-days irregular supply of electricity particularly in rural area creating lot of problems for the farmers. Inspite of this difficulty of irregular supply of electricity there is defiantly structural change in the rural area of Erode district due to availability of various sources of irrigation. In this area farmers are using mainly wells, government canals, rivers, tanks etc. The distribution of sample farmers according to the various sources of irrigation is presented in the following Table 3.4.

Table 3.4: Types of Sample Farmers and their Sources of Irrigation

Sample Farmers	**Wells**	**Government Canals**	**Rivers**	**Tanks**	**Total**
Marginal Farmers	16(76.19)	03(14.29)	01(04.76)	01(04.76)	21(100)
Small Farmers	17(80.95)	02(09.52)	01(04.76)	01(04.76)	21(100)
Semi-medium Farmers	19(65.52)	05(17.24)	03(10.34)	02(06.90)	29(100)
Medium Farmers	22(64.71)	06(17.65)	04(11.76)	02(05.88)	34(100)
Large Farmers	11(73.33)	02(13.13)	01(06.67)	01(06.67)	15(100)
Total	85(70.83)	18(15.00)	10(08.33)	07(05.83)	120(100)

Note: 1. Figures in brackets show the percentage of sample farmers.

2. Figures outside brackets show total number of sample farmers.

From the above Table 3.4 it can be seen that mainly there are four sources of irrigation i.e., wells, government canals, rivers and tanks. The total sample farmers are 120, out of which 70.83% of farmers are using wells for irrigation, 15% of farmers are depending on government canals, 08.33% of farmers are using rivers as a major sources of irrigation, 05.83% of farmers are irrigating their land area with the help of tanks.

Domestic wells seem to be the most popular source of irrigation in the area selected for this study. Out of the total selected sample farmers majority of them are depending on wells for source of irrigation. All types of farmers are using wells for the purpose of irrigation. Water from canals is also another source of irrigation, which is quite popular. The selected sample farmers are not extensively using tanks, rivers etc. for the purpose of irrigation. This may be due to the fact that well irrigation doesn't required any price for lifting water except in terms of electricity charges use for pumping water but no charges are involved in terms of water rates. This aspect needs to be considered for management of water. Government can seriously think about bringing some degree of regulation on private wells in order to manage scarce water resources. In certain cases establishment of canal helps to increase the water level of domestic wells but this aspect is neglected while developing the scheme of water management. The sample farmers for lifting water from wells mostly use electric pump sets.

In order to know how farmers from the selected village use the various sources of irrigation, information relating to availability of irrigation sources in different villages is collected. Information regarding this is presented in the following Table 3.5.

Table 3.5: Village Wise Irrigation Sources Used by Sample Farmers

Village	**Wells**	**Government Canals**	**Rivers**	**Tanks**	**Total**
Mylambadi	14(87.05)	00(00.00)	00(00.00)	02(12.05)	16(100)
Thottipalayam	09(75.00)	00(00.00)	02(16.67)	01(08.33)	12(100)
Gettisamudram	26(81.25)	00(00.00)	04(12.05)	02(06.25)	32(100)
Sankarapalayam	16(88.89)	00(00.00)	00(00.00)	02(11.11)	18(100)
Savandappur	05(22.73)	13(59.10)	04(18.18)	00(00.00)	22(100)
Vellalapalayam	15(75.00)	05(25.00)	00(00.00)	00(00.00)	20(100)
Total	85(75.83)	18(15.00)	10(08.33)	07(05.83)	120(100)

Note: 1. Figures in brackets indicate percentage of total farmers.

2. Figures outside brackets show total number of sample farmers.

The village wise classification shows that in the village of Sankarapalayam and Mylambadi where 88.89% and 87.05% of farmers dependent on it respectively. The easily available source of irrigation is wells. Therefore, overall dependency on wells for irrigating land has increased considerably. In the village of Savandappur, 13 farmers are irrigating their land area with the help of canals. In the village role of government canal is important for the purpose of irrigation. Therefore, there is no need for the farmers to depend on other sources of irrigation.

Majority of the farmers from all selected villages are depending on their own private sources for the purpose of irrigation. Out of 6 villages 4 villages do not have source of irrigation

from any canals constructed by the government only 3 villages are depending on river for the source of irrigation. Tanks are also significant source of irrigation in the villages selected for this study. This clearly shows that farmers are depending mostly on their own sources of irrigation and are using electric pump sets on wells and others. Obviously this increases the additional burden of cost for irrigating their land. If government acts as mediator in the system of providing irrigation for farmers, cost of production can be brought under control and proper management of water can be made possible.

In the above paragraph, the sources of irrigation used by sample farmers have been explained. In this part, the change in irrigated and non-irrigated area of the all sample farmers has been explained. Information relating to this is presented in the following Table 3.6.

Table 3.6: Change in Irrigated and Non-irrigated Area of Sample Farmers (Figures in Acre)

Sample Farmers	**Before Electrification**			**After Electrification**		
	Irrigated Area	**Non-irrigated Area**	**Total Cultivated Area**	**Irrigated Area**	**Non-irrigated Area**	**Total Cultivated Area**
Marginal Farmers	04 (10.13)	35.50 (89.87)	39.50 (100)	06 (12.90)	40.05 (87.10)	46.50 (100)
Small Farmers	07 (09.21)	69 (90.79)	76 (100)	15 (17.05)	73 (82.95)	88 (100)
Semi-medium Farmers	14 (05.67)	233 (94.33)	247 (100)	35 (13.67)	221 (86.33)	256 (100)
Medium Farmers	115 (19.90)	463 (80.10)	578 (100)	121 (20.65)	465 (79.35)	586 (100)
Large Farmers	98 (17.31)	468 (82.69)	566 (100)	110 (19.06)	467 (80.94)	577 (100)
Total	238 (15.80)	1268.05 (84.20)	1506.05 (100)	287 (18.47)	1266.05 (81.53)	1553.05 (100)

Note: 1. Figures in brackets indicate percentage of cultivated area of farmers.

2. Figures outside brackets indicate cultivated area of farmers.

The total cultivated area of sample farmers prior to electrification was 1506.05 acres after electrification; it is increased up to 1553.05 acre. There is a change in the area under irrigation also. The average time lag involved in non-electrification to electrification is calculated as of 15 years for all types of sample farmers. Out of the total cultivated area (1506.05 acre), before electrification 15.80% area was irrigated and 84.20% area was non-irrigated but after electrification irrigated area has increased up to 18.47% and non-irrigated area has gone down to 81.53%. The percentage of irrigated area has increased because of the use of electricity for the various agricultural activities like water lifting from wells, sprinkling etc. Therefore,

electricity plays an important role in bringing more and more land area under irrigation as well as indirectly it helps in overall agricultural development in rural sector in selected area of this study.

Due to electrification, irrigated area of all sample farmers has increased. In case of semi-medium, medium and large sample farmers the irrigated area has increased almost double except marginal and small farmers. Semi-medium, medium and large farmers have invested maximum capital in their land and they made the use of sources of irrigation up to the maximum available capacities for increasing their own irrigated land. Therefore, the irrigated area has increased substantially in the selected area of this study. Due to increase in irrigated land these farmers have derived maximum benefits from irrigated area. Therefore, the level of income has increased after electrification for all sample farmers in selected area of this study.

In the above part the change in irrigated and non-irrigated area of all sample farmers have been discussed. In the following part the village wise change occurred due to electrification in irrigated and non-irrigated area of the sample farmers of Erode district is presented in the following Table 3.7.

Table 3.7: Village Wise Change in Irrigated and Non-irrigated Area (Area in Acre)

Sample Farmers	**Before Electrification**			**After Electrification**		
	Irrigated Area	**Non-irrigated Area**	**Total Cultivated Area**	**Irrigated Area**	**Non-irrigated Area**	**Total Cultivated Area**
Mylambadi	37 (14.86)	212 (85.14)	249 (100)	40 (15.81)	213 (84.19)	253 (100)
Thottipalayam	41 (16.14)	213 (83.86)	254 (100)	45 (17.65)	210 (82.35)	255 (100)
Gettisamudram	47 (17.09)	228 (82.91)	275 (100)	57 (20.50)	221 (79.50)	278 (100)
Sankarapalayam	28 (11.91)	207 (88.09)	235 (100)	39 (15.23)	217 (84.77)	256 (100)
Savandappur	42 (15.85)	223 (84.15)	265 (100)	49 (18.08)	222 (81.92)	271 (100)
Vellalapalayam	43 (18.82)	185.05 (81.18)	228.05 (100)	57 (23.70)	183.05 (76.30)	240.05 (100)
Total	238 (15.80)	1268.05 (84.20)	1506.05 (100)	287 (18.47)	1266.05 (81.53)	1553.05 (100)

Note: 1. Figures in brackets indicate percentage of cultivated area of farmers.

2. Figures outside brackets indicate cultivated area of farmers.

After electrification total cultivated area has increased from 1506.05 acre to 1553.05 acre for all sample villages. There is a change in the composition of area under irrigation and non-irrigation also. The irrigated area has increased after electrification. The village wise break up shows the village of Vellalapalayam has the highest irrigated area of sample farmers i.e., 23.70% as compared to the irrigated area of other villages. Vellalapalayam along with wells plays vital role in the irrigation of farming of this village. Therefore, after electrification area under irrigation has increased from 18.82% to 23.70%. In case of Gettisamudram, Gettisamudram Lake along with wells plays an important role for irrigating land area of this village. The village of Gettisamudram, irrigated area has increased from 17.09% to 20.50% after electrification. The irrigated area of sample farmers of Mylambadi and Sankarapalayam is lower in comparison with other villages. The farmers of these villages are using government canals along with wells. The large number of sample farmers mostly depends on government canals. The government canals cannot provide sufficient water for farming. Therefore, the irrigated area in these villages is less.

In the earlier days farmers were using traditional equipments for irrigating their land. To take water out of wells, farmers used to employ various types of animals for carrying water up to field. As there was no proper pipeline to carry water to the field a large quantity of water used to go waste and maximum amount of water used to get absorbed in soil, resulting in drastic reduction in the availability of water for the purpose of farming. As a result of this the irrigated area was limited. Later on diesel engines were used for irrigation. The preparation of pipeline also reduced the waste of water and almost whole water was utilized for irrigation.

This facility turned out to be more useful than the earlier one. Mainly the farmers possessing large size of landholding installed these diesel pumps. This has not only increased the area of irrigation but also brought the increase in the level of income. After electrification, there was gradual increase in the area under irrigation. Initially, the rich farmers have derived the maximum benefits from it. They were under the possession of large area of land with the availability of ample water along with small size of land. To analyze impact of electrification on agricultural development in the study area of Erode district, the time lag between non-electrification and electrification has been calculated by classifying sample farmers into marginal, small, semi-medium, medium and large.

The time lag for process of electrification for marginal sample farmers is 7 years, for small farmers 11 years, for semi-medium farmers 14 years, medium farmers 20 and for large farmers 23 years. The process of electrification did not result in the immediate increase of the area under irrigation. The increase in the area under irrigation took place because of several

actions such as the introduction of pump sets, but for the purchase of pump sets the loan facility was made available by banks and by other informal sources. Government has also provided assistant by erecting electric polls in the field near to wells and other sources of irrigation. The cropping pattern from food to non-food crops, was possible because of electrification. Electrification has helped in transforming the traditional agriculture. Farmers started using modern equipments of farming, high yielding of varieties of seeds, pesticides etc. it is explained in detailed in the next part of this chapter. The availability of electrification resulted in an increase in the area under irrigation.

Electrification though has helped in increasing overall production still the other cost needs to be considered for example for irrigating land, pump sets are to be installed by the farmers. This requires borrowing of money from the various financial institutions. The information regarding number of sample farmers utilizing loan facility from various sources for installing pump sets is presented in the following Table 3.8.

Table 3.8: The Number of Sample Farmers Utilizing Loan Facility from Various Sources for Installing Pumps Sets

Source	**Marginal Farmers**	**Small Farmers**	**Semi-medium Farmers**	**Medium Farmers**	**Large Farmers**	**Total**
1.Co-operative Banks	02	01	02	01	00	06
2.Nationalized Banks	00	00	01	00	00	01
3.Institutional Sources(1+2)	02 (09.52)	01 (04.76)	03 (10.34)	01 (02.94)	00 (00.00)	07 (05.83)
4.Moneylenders	04	03	02	01	01	11
5.Others	00	04	05	01	00	10
6.Non-institutional Sources(4+5)	04 (19.05)	07 (33.33)	07 (24.14)	02 (05.88)	01 (06.67)	21 (17.05)
7.Total(3+6)	06 (28.57)	08 (38.10)	10 (34.48)	03 (08.82)	01 (06.67)	28 (23.33)
Total Sample Farmers	21 (100)	21 (100)	29 (100)	34 (100)	15 (100)	120 (100)

Note: 1. Figures in brackets indicate percentage of total sample farmers.

2. Figures outside brackets indicate total sample farmers.

From the above Table 3.8 it can be seen that, out of 120 sample farmers, 28(23.33%) sample farmers had utilized the loan facility for the installation of pump sets of these 28 farmers only 07 farmers borrowed it from the institutional sources like co-operatives and nationalized commercial banks, whereas the remaining 21 sample farmers had no option but to seek the monetary help from non-institutional sources like moneylenders, traders, relatives, friends etc. The above Table 3.8 has also brought forth the fact that, in taking loan, the number of small and semi-medium farmers is more than that of marginal, medium and large farmers. It has been also observed that there is inverse relationship between the size of land and the number of farmers obtained loan. The larger the size of landholding less is the loan obtained. The availability of loan facility resulted in the increase in the number of farmers setting in pump sets, which in turn increases the land under irrigation. The small landholders are relying more on loans for installing pump sets. It changed the cropping pattern from food to non-food crops improving the financial conditions of the farmers.

Out of 21 marginal sample farmers, 06 sample farmers utilizing loan facility, out of 21 small sample farmers, 08 sample farmers utilizing loan facility, out of 29 semi-medium sample farmers, 10 sample farmers utilizing loan facility, out of 34 medium sample farmers, 03 sample farmers utilizing loan facility, out of 15 large sample farmers, 01 sample farmers utilizing loan facility, from various sources for installing pumps sets. Generally it has been observed that the amount of loan borrowed is inversely proportional to the size of landholding. It decreases with the increase in land area.

3.5. Changes in the Number of Farmers Cultivating Food and Non-food Crops

As per expectation, use of electricity leads to expansion of irrigated area and ultimately it leads to more output and more employment opportunities in agricultural sector. Electricity brings a shift in cropping pattern. Farmers shift crops from low value to high value, which in turn raises the level of output. Electrification can help in increasing the production of commercial crops. It can widen the area of irrigated lands. It changes the traditional pattern of agriculture and helps in improving the living standard of sample farmers. Though the importance of electrification is largely recognized, in some parts of the country still the use of electricity for farm use is far from satisfactory, in some of the backward areas. Erode district is also not an exception to this. In this section the impact of electrification on cropping pattern of all groups of sample farmers has been explained. “Cropping pattern means the proportion of area under different crops at a particular period of time. A Change in cropping pattern means a

change in the proportion under different crops. Cropping pattern in agriculture among other things is ultimately governed by farmers choice of crops in individual farms". The choice for growing a particular crop in a particular part in Erode district depends on the following factors; size of landholding, techniques of cultivation, changes in the market price, irregular monsoon, the government policy and new technology. Sample farmers have used electricity for various methods of cultivation such as water lifting, sprinkling, drip irrigation etc. This has resulted in increase of irrigated area in the sample villages. Due to electrification change has taken place in cropping pattern in sample villages of Erode district. With the use of electricity for agricultural activities, traditional cropping pattern has changed into commercial one. All sample farmers asserted that they have adopted the new cropping pattern. The Table 3.9 shows the cropping pattern in the Erode district.

Table 3.9: Number of Sample Farmers Cultivating Food and Non-food Crops

S. No.	Crops	Marginal Farmers		Small Farmers		Semi-medium Farmers	
		BE	AE	BE	AE	BE	AE
1	Rice	04(19.05)	11(52.38)	06(28.57)	13(61.90)	07(24.14)	16(55.17)
2	Maize	09(42.86)	16(76.19)	10(47.62)	18(85.71)	16(55.17)	21(72.41)
3	Plantain tree	00(00.00)	02(09.52)	01(04.76)	05(23.81)	03(10.34)	08(27.59)
4	Mango tree	00(00.00)	00(00.00)	00(00.00)	00(00.00)	01(03.45)	01(03.45)
5	Vegetables	01(04.76)	03(14.29)	02(09.52)	06(28.57)	05(17.24)	12(41.38)
6	Coconut tree	02(09.52)	03(14.29)	03(14.29)	05(23.81)	03(10.34)	05(17.24)
7	Turmeric	02(09.52)	10(47.62)	03(14.29)	10(47.62)	05(17.24)	12(41.38)
8	Sugarcane	01(04.76)	06(28.57)	05(23.81)	14(66.67)	09(31.03)	18(62.07)
9	Cotton	03(14.29)	16(76.19)	06(28.57)	19(90.48)	10(34.48)	22(75.86)
10	Flowers	00(00.00)	00(00.00)	00(00.00)	00(00.00)	00(00.00)	01(03.45)

S. No.	Crops	Medium Farmers		Large Farmers		Total Farmers	
		BE	AE	BE	AE	BE	AE
1	Rice	13(38.24)	17(50.00)	06(40.00)	12(80.00)	36(30.00)	69(57.50)
2	Maize	21(61.76)	29(85.29)	08(53.33)	11(73.33)	64(53.33)	95(79.17)
3	Plantain tree	05(14.71)	14(41.18)	03(20.00)	10(66.67)	12(10.00)	39(32.50)
4	Mango tree	01(02.94)	01(02.94)	02(13.33)	01(06.67)	04(03.33)	03(02.50)
5	Vegetables	06(17.65)	12(35.29)	04(26.67)	05(33.33)	18(15.00)	38(31.67)
6	Coconut tree	09(26.47)	05(14.71)	05(33.33)	03(20.00)	22(18.33)	21(17.50)
7	Turmeric	09(26.47)	20(58.82)	03(20.00)	12(80.00)	22(18.33)	64(53.33)
8	Sugarcane	14(41.18)	29(85.29)	05(33.33)	12(80.00)	34(28.33)	79(65.83)
9	Cotton	12(35.29)	28(82.35)	04(26.67)	11(73.33)	35(29.17)	96(80.00)
10	Flowers	01(02.94)	02(05.88)	01(06.67)	02(13.33)	02(01.67)	05(04.17)

Note: 1. Figures in brackets indicate percentage of total farmers.

2. Figures outside brackets indicate number of sample farmers.

3. BE means before electrification and AE means after electrification.

Prior to electrification about 30% of farmers had cultivated Rice but after electrification this percentage has increased up to 58%. Prior to electrification about 53% of farmers had cultivated Maize but after electrification this percentage has increased up to 79%. Prior to electrification about 10% of farmers had cultivated Plantain tree but after electrification this percentage has increased up to 33%. Prior to electrification about 15% of farmers had cultivated Vegetables but after electrification this percentage has increased up to 32%. Prior to electrification about 18% of farmers had cultivated Turmeric but after electrification this percentage has increased up to 53%. Prior to electrification about 28% of farmers had cultivated Sugarcane but after electrification this percentage has increased up to 66%. Prior to electrification about 29% of farmers had cultivated Cotton but after electrification this percentage has increased up to 80%. Prior to electrification about 02% of farmers had cultivated Flowers but after electrification this percentage has increased up to 04%.

Prior to electrification about 03% of farmers had cultivated Mango tree but after electrification this percentage has gone down to 02%. Prior to electrification about 18% of farmers had cultivated Coconut tree but after electrification this percentage has gone down to 17%.

Change in cropping pattern has been taking place in the area selected for the study after electrification. There is a need to find out whether this electrification is disturbing the balance of food and non- food crops in agriculture sector. The change in cropping pattern according to the number of farmers is shown at a glance in the Table 3.10.

Table 3.10: Change in Cropping Pattern According to the Number of Farmers at a Glance

S. No.	Crops	Marginal Farmers	Small Farmers	Semi-medium Farmers	Medium Farmers	Large Farmers	Total Farmers
1	Rice	↑	↑	↑	↑	↑	↑
2	Maize	↑	↑	↑	↑	↑	↑
3	Plantain tree	↑	↑	↑	↑	↑	↑
4	Mango tree	-	-	Same	Same	↓	↓
5	Vegetables	↑	↑	↑	↑	↑	↑
6	Coconut tree	↑	↑	↑	↓	↓	↓
7	Turmeric	↑	↑	↑	↑	↑	↑
8	Sugarcane	↑	↑	↑	↑	↑	↑
9	Cotton	↑	↑	↑	↑	↑	↑
10	Flowers	-	-	↑	↑	↑	↑

Note: 1. ↑ Indicates upward shift in number of farmers.

2. ↓ Indicates downward shift in number of farmers.

In general, it has been observed from the above information that the use of electrification changed the attitude of farmers. Sample farmers started focusing their attention on commercialization of crops in order to increase their earnings. The use of electrification for the purpose of agriculture has changed the farmers life style, cropping pattern, production and productivity that have brought an overall change in the agricultural scenario in the district of Erode.

3.6. Changes in Area under Food and Non- food Crops

In the preceding section the changing cropping pattern has been presented according to classification of farmers based on size of land holding. This pattern was analyzed in the context of electrification. In this section the change in area under food and non-food crops have been explained. Total cultivated area of all sample framers prior to electrification was 1,506.05 acre it has gone up to 1,553.05 acre after electrification. Due to electrification change in the cultivated area under the different crops is presented in the following Table 3.11.

Table 3.11: Change in Area under Food and Non-food Crops (Area in Acre)

S. No.	Crops	Marginal Farmers		Small Farmers		Semi-medium Farmers	
		BE	AE	BE	AE	BE	AE
1	Rice	03.50 (08.86)	05.50 (11.83)	12 (15.79)	17 (19.32)	40 (16.19)	42 (16.41)
2	Maize	21 (53.16)	23 (49.46)	30 (39.47)	29 (32.95)	73 (29.55)	65 (25.39)
3	Plantain tree	00 (00.00)	01 (02.15)	01 (01.32)	02 (02.27)	12 (04.86)	11 (04.30)
4	Mango tree	00 (00.00)	00 (00.00)	00 (00.00)	00 (00.00)	03 (01.21)	05 (01.95)
5	Vegetables	01 (02.53)	02 (04.30)	01 (01.32)	02 (02.27)	22 (08.91)	30 (11.72)
6	Total Food (1 to 5)	25.50 (64.56)	31.50 (67.74)	44 (57.89)	50 (56.82)	150 (60.73)	153 (59.77)
7	Coconut tree	01 (02.53)	02 (04.30)	08 (10.53)	10 (11.36)	12 (04.86)	16 (06.25)
8	Turmeric	04 (10.13)	05 (10.75)	09 (11.84)	14 (15.91)	15 (06.07)	10 (03.91)
9	Sugarcane	02 (05.06)	03 (06.45)	10 (13.16)	09 (10.23)	25 (10.12)	23 (08.98)
10	Cotton	07 (17.72)	05 (10.75)	05 (06.58)	05 (05.68)	45 (18.22)	52 (20.31)
11	Flowers	00 (00.00)	00 (00.00)	00 (00.00)	00 (00.00)	00 (00.00)	02 (00.78)
12	Total Non-food (7 to 11)	14 (35.44)	15 (32.26)	32 (42.11)	38 (43.18)	97 (39.27)	103 (40.23)
13	Total (6 & 12)	39.50 (100)	46.50 (100)	76 (100)	88 (100)	247 (100)	256 (100)

(Area in Acre)

S. No.	Crops	Medium Farmers		Large Farmers		Total Farmers	
		BE	AE	BE	AE	BE	AE
1	Rice	105 (18.17)	110 (18.77)	106 (18.73)	105 (18.20)	266.50 (17.69)	279.50 (17.99)
2	Maize	290 (50.17)	276 (47.10)	290 (51.24)	292 (50.61)	704 (46.73)	685 (44.09)
3	Plantain tree	18 (03.11)	23 (03.92)	15 (02.65)	13 (02.25)	46 (03.05)	50 (03.22)
4	Mango tree	04 (00.69)	05 (00.85)	07 (01.24)	06 (01.04)	14 (00.93)	16 (01.03)
5	Vegetables	28 (04.84)	22 (03.75)	22 (03.89)	25 (04.33)	74 (04.91)	81 (05.21)
6	Total Food (1 to 5)	445 (76.99)	436 (74.40)	440 (77.74)	441 (76.43)	1104.50 (73.32)	1111.50 (71.50)
7	Coconut tree	50 (08.65)	58 (09.90)	40 (07.07)	34 (05.89)	111 (07.37)	120 (07.72)
8	Turmeric	62 (10.73)	70 (11.95)	55 (09.72)	50 (08.67)	145 (09.62)	149 (09.59)
9	Sugarcane	10 (01.73)	11 (01.88)	08 (01.41)	30 (05.20)	55 (03.65)	76 (04.89)
10	Cotton	10 (01.73)	09 (01.54)	20 (03.53)	18 (03.12)	87 (05.77)	89 (05.73)
11	Flowers	01 (00.17)	02 (00.34)	03 (00.53)	04 (00.69)	04 (00.27)	08 (00.51)
12	Total Non-food (7 to 11)	133 (23.01)	150 (25.60)	126 (22.26)	136 (23.57)	402 (26.68)	442 (28.45)
13	Total (6 & 12)	578 (100)	586 (100)	566 (100)	577 (100)	1506.05 (100)	1553.05 (100)

Note: 1. Figures in brackets indicate percentage of total area of sample farmers.

2. Figures outside brackets indicate total area of sample farmers.

3. BE means before electrification and AE means after electrification.

Prior to electrification out of total cultivated area (1,506.05 acre), 73.32% area was under food crops and 26.68% area was under non-food crops. After electrification area (1,553.05

acre), under food crops has gone down to 71.55% and area under non-food crops has gone up to 28.45% of total. The change in cropping pattern due to electrification according to cultivated area of sample farmers has been studied in the section. This change mainly food crops to non-food crops. The classification of total cultivated area between food and non-food crops possessed by the sample farmers is presented in the above Table 3.11. The change in cropping pattern has been studied in the context of electrification.

In general, it has been observed that the use of electricity shows that the area under food crops has decreased and area under categories of non-food crops has increased. The change in cropping pattern from food to non-food crops for marginal farmers in span of 7 years, for small farmers 11 years, for semi-medium farmers 14 years, for medium farmers 20 years and for large farmers 23 years. Change in cropping pattern has been taking place in the area selected for the study after electrification. There is a need to find out whether this electrification is disturbing the balance of food and non-food crops in agriculture sector.

The change in cropping pattern according to the area at a glance is shows in the Table 3.12.

Table 3.12: Change in Cropping Pattern According to the Area at a Glance

S. No.	Crops	Marginal Farmers	Small Farmers	Semi-medium Farmers	Medium Farmers	Large Farmers	Total Farmers
1	Rice	↑	↑	↑	↑	↓	↑
2	Maize	↑	↓	↓	↓	↑	↓
3	Plantain tree	↑	↑	↓	↑	↓	↑
4	Mango tree	-	-	↑	↑	↓	↑
5	Vegetables	↑	↑	↑	↓	↑	↑
6	Total Food	↑	↑	↑	↓	↑	↑
7	Coconut tree	↑	↑	↑	↑	↓	↑
8	Turmeric	↑	↑	↓	↑	↓	↑
9	Sugarcane	↑	↓	↓	↑	↑	↑
10	Cotton	↓	Same	↑	↓	↓	↑
11	Flowers	-	-	↑	↑	↑	↑
12	Total Non-food	↑	↑	↑	↑	↑	↑
13	Total	↑	↑	↑	↑	↑	↑

Note: 1. ↑ Indicates upwards trend in area under different crops.

2. ↓ Indicates downward movement in area under different crops.

3.7. Production and Productivity of Crops

In the preceding section it has been shown how electrification has brought changes in the cropping pattern in selected area of this study in Erode district. In this section an attempt has been made to show how electrification has affected the production and productivity of crops.

The change in the cropping pattern has affected the structure of production also. Many factors are affecting agricultural production and productivity. These factors are size of landholdings, fertility of land, irrigation facilities, machinery, lack of capital, storage facilities, transportations, fertilizers, electrification, marketing facilities, new tools and techniques, irregular monsoon, natural calamite etc. All these factors have made an impact on production and productivity of crops. Availability of electricity on a regular basis also contributes in bringing change in irrigation facilities. As per expectation irrigation has helped in increasing the production and productivity.

Electrification can also help in bringing favorable changes in production and productivity of farms. It can also contribute significantly in increasing the level of income of farmers. Hence, the role of electricity is very important in overall development of agriculture as well as rural economy. Sample farmers have used electricity for various methods of cultivation, such as water lifting, sprinkling, drip irrigation etc. This resulted in the increase of irrigated area in sample villages in selected Taluk of Erode district. Obviously, due to increase in irrigated land area, the production and productivity of farms has increased. In this section, an attempt has been made to measure an impact of rural electrification on agricultural production and productivity. The change in agricultural production of all crops of sample farmers is presented in the following Table 3.13.

Table 3.13: Agricultural Production (Production in Quintals)

S. No.	**Crops**	**Marginal Farmers**		**Small Farmers**		**Semi-medium Farmers**	
		BE	**AE**	**BE**	**AE**	**BE**	**AE**
1	Rice	19	44	71	148	288	382
2	Maize	336	437	510	609	1146	1359
3	Plantain tree	00	45	43	97	516	563
4	Mango tree	00	00	00	00	273	513
5	Vegetables	03	10	04	11	84	183
6	Total Food (1 to 5)	358 (52.72)	536 (47.64)	628 (26.86)	865 (27.73)	2307 (34.58)	3000 (34.77)
7	Coconut tree	117	270	850	1322	1344	2162
8	Turmeric	29	42	59	105	108	87
9	Sugarcane	150	256	782	805	2755	3119
10	Cotton	25	21	19	22	158	250
11	Flowers	00	00	00	00	00	11
12	Total Non-food (7 to 11)	321 (47.28)	589 (52.36)	1710 (73.14)	2254 (72.27)	4365 (65.42)	5629 (65.23)
13	Total (6 & 12)	679 (100)	1125 (100)	2338 (100)	3119 (100)	6672 (100)	8629 (100)

(Production in Quintals)

S. No.	Crops	Medium Farmers		Large Farmers		Total Farmers	
		BE	AE	BE	AE	BE	AE
1	Rice	924	1122	943	1155	2245	2851
2	Maize	5307	5879	5365	6920	12664	15204
3	Plantain tree	887	1304	728	913	2174	2922
4	Mango tree	369	529	676	661	1318	1703
5	Vegetables	126	187	136	283	353	674
6	Total Food (1 to 5)	7613 (47.74)	9021 (43.16)	7848 (51.27)	9932 (38.83)	18754 (45.80)	23354 (39.35)
7	Coconut tree	6075	8596	5404	5797	13790	18147
8	Turmeric	508	735	418	665	1122	1634
9	Sugarcane	1703	2482	1524	9021	6914	15683
10	Cotton	45	55	96	135	343	483
11	Flowers	03	12	18	29	21	52
12	Total Non-food (7 to 11)	8334 (52.26)	11880 (56.84)	7460 (48.73)	15647 (61.17)	22190 (54.20)	35999 (60.65)
13	Total (6 & 12)	15947 (100)	20901 (100)	15308 (100)	25579 (100)	40944 (100)	59353 (100)

Note: 1. Figures in brackets indicate the percentage of total production.

2. Figures outside brackets indicate the total production.

3. BE means before electrification and AE means after electrification.

Prior to electrification total production of all crops was 40,944 quintals, out of which 45.80% production was under food crops and 54.20% production was under non-food crops. After electrification total production has increased up to 59,353 quintals. Out of these 39.35% production of all crops is under food crops and 60.65% production is under categories of non-food crops. As per expectation, it can be seen that production of food crops has decreased whereas non-food crops has increased before electrification and after electrification. This may be due to the fact that area under non-food crops has gone up before electrification and after electrification.

In this section, an attempt has been made to find out how the factors have increased the productivity of the crops in the selected area of this study. The productivity of all crops has been calculated on the basis of the following definition. Productivity is equal to total production divided by the total area under cultivation. The productivity of all crops is presented in the following Table 3.14.

Table 3.14: Agricultural Productivity (Per Acre Productivity in Quintals)

S. No.	Crops	Marginal Farmers		Small Farmers		Semi-medium Farmers	
		BE	AE	BE	AE	BE	AE
1	Rice	5.4	8.0	5.9	8.7	7.2	9.1
2	Maize	16.0	19.0	17.0	21.0	15.7	20.9
3	Plantain tree	00	45.0	43.0	48.5	43.0	51.2
4	Mango tree	00	00	00	00	91.0	102.6
5	Vegetables	3.0	5.0	4.0	5.5	3.8	6.1
6	Total Food (1 to 5)	14.0	17.0	14.3	17.3	15.4	19.6
7	Coconut tree	117.0	135.0	106.3	132.2	112.0	135.1
8	Turmeric	7.3	8.4	6.6	7.5	7.2	8.7
9	Sugarcane	75.0	85.3	78.2	89.4	110.2	135.6
10	Cotton	3.6	4.2	3.8	4.4	3.5	4.8
11	Flowers	00	00	00	00	00	5.5
12	Total Non-food (7 to 11)	22.9	39.3	53.4	59.3	45.0	54.7
13	Total (6 & 12)	17.2	24.2	30.8	35.4	27.0	33.7

(Per Acre Productivity in Quintals)

S. No.	Crops	Medium Farmers		Large Farmers		Total Farmers	
		BE	AE	BE	AE	BE	AE
1	Rice	8.8	10.2	8.9	11.0	8.4	10.2
2	Maize	18.3	21.3	18.5	23.7	18.0	22.2
3	Plantain tree	49.3	56.7	48.5	70.2	47.3	58.4
4	Mango tree	92.3	105.8	96.6	110.2	94.1	106.4
5	Vegetables	4.5	8.5	6.2	11.3	4.8	8.3
6	Total Food (1 to 5)	17.1	20.7	17.8	22.5	17.0	21.0
7	Coconut tree	121.5	148.2	135.1	170.5	124.2	151.2
8	Turmeric	8.2	10.5	7.6	13.3	7.7	11.0
9	Sugarcane	170.3	225.6	190.5	300.7	125.7	206.4
10	Cotton	4.5	6.1	4.8	7.5	3.9	5.4
11	Flowers	3.0	6.0	6.0	7.3	5.3	6.5
12	Total Non-food (7 to 11)	62.7	79.2	59.2	115.1	55.2	81.4
13	Total (6 & 12)	27.6	35.7	27.0	44.3	27.2	38.2

Note: 1. BE means before electrification and AE means after electrification.

From the above Table 3.14, it can be observed that, per acre productivity of all crops has increased from 27.2 quintals per acre to 38.2 quintals per acre in selected area of this study. With the electrification farmers have at least started thinking about changing traditional crops and in reality they have also started experimenting with various kinds of crops, which obviously require irrigation. Hence, pump sets brought significant change in the cropping pattern has increase the use of fertilizers. However, there has been an amazing increase in the production and productivity of crops. The use of electricity in various activities in agricultural sector resulted in increase of agricultural production and productivity. The all sample farmers answered positively that electricity has definitely proved beneficial for increasing agricultural production and productivity.

3.8. Conclusion

In this chapter, the impact of electrification on cropping pattern, production and productivity of crops have been analyzed. Due to electrification more number of farmers is inclined towards non-food crops from food crops. The area under food crops has decreased and area under non-food crops has increased due to electrification. Now a days, number of farmers have started cultivation of coconut tree, flowers and other commercial crops. The use of electrification for the various activities in agricultural sector has helped in shifting the cropping pattern from traditional to commercial one. The production and productivity of non-food crops has increased significantly in comparison with the food crops. Hence, electricity has played an important role in shifting cropping pattern, increasing production and improving productivity.

CHAPTER IV

4. Electrification on Problems Relating to its Regular Supply

4.1. Introduction

Agriculture sector of Erode district is mainly depending on natural factors to a great extent. The fluctuations in climate obviously affect the agricultural production. The fertility of land cannot be maintained for a long time when farmers take repeated cultivation on the same area of land. The price of agricultural production also fluctuates according to seasonal variations. Therefore, in Erode district, sample farmers in general have to face many difficulties relating to price and non-price factors. Farmers have been facing the problems of availability of finance, marketing, irrigation, fertility of soil, seasonal fluctuations in the level of prices, climate and so forth. The sample farmers are also facing difficulties relating to the electricity. These difficulties or problems are, related to delay in obtaining electric connection, repair of electric instruments, irregular electric supply, low voltage supply of electricity, load shedding etc. In recent times the major problems in rural economy of the Erode districts have been poverty, unemployment and burden of debt. Primary attention for creating employment opportunities for the rural people and electricity can play an important role in creating employment opportunities in rural areas. Increase in agriculture income is necessary in order to improve the status of farmers. Having irrigation facility itself may help them to implement modern farm techniques and can bring change in outlook of farmers to bring suitable changes in the agricultural sector.

4.2. Year Wise Use of Electricity by Farmers for Agricultural Sector

In Erode district, farmers have been using electricity for various agricultural activities in the different years. The use of electricity by various sample farmers for agricultural sector has been presented in the following Table 4.1.

Table 4.1: Use of Electricity by Sample Farmers for Agricultural Operations

S. No.	Year	No. of Sample Farmers	% of Total
1	1951-1960	1	00.83
2	1961-1970	3	02.50
3	1971-1980	46	38.33
4	1981-1990	54	45.00
5	1991-2000	16	13.33
Total		120	100.00

Out of 120 selected sample farmers, 54 sample farmers have started making use of electricity for farming operations during the period of 1981 to 1990. Maximum number of farmers has shown their inclination for the use of electricity. From the above Table 4.1 it can be seen that 1981 to 1990 is the period of turning point for use of electricity by farmers. Introduction of modern equipment's and sophisticated methods of agricultural production have helped in increasing use of electricity by the farmers. The change in the number of sample farmers using electricity has also been shown with the help of percentage of total over period of time i.e., 1951 to 2000. Percentage of total was the highest for the period of 1981 to 1990 and the increase in the number of farmers using electricity. Maximum number of farmers has made use of electricity after the period of 1971 to 1980; however, after this period the number of farmers using electricity has not increased significantly.

4.3. Consumption Pattern of Electricity

Now a days, the demand of electricity has increased for different purposes. The modern gadgets require electricity at a very high level. Therefore, people are giving more importance to the demand of electricity. The electricity has played an important role in different sectors. In India, consumption pattern of electricity is divided into following sectors:

1. Industrial sector
2. Agricultural sector
3. Domestic sector
4. Commercial sector
5. Railway traction
6. Other sector

The consumption pattern of electricity in India is presented in the following Table 4.2.

Table 4.2: Consumption Pattern of Electricity in India (Figures in KWh)

Sectors	**2012-2013**	**2013-2014**
Industrial	352291(44.87)	382670(45.52)
Agricultural	140960(17.95)	140960(16.77)
Domestic	171104(21.79)	185858(22.11)
Commercial	65381(08.33)	71019(08.45)
Rail Traction	14206(01.81)	15431(01.84)
Others	41252(05.25)	44809(05.33)
Total	785194(100)	840747(100)

Note: 1. Government of India (2013-2014), Central Electricity Authority Ministry of Power, New Delhi.

2. Figures in bracket shows percentage to total electricity consumption.

3. KWh means Kilowatt hour.

From the above Table 4.2 it can be seen that energy consumption in terms of actual figures has gone up in all sectors. In the year 2012-13 and 2013-14, consumption of electricity has gone up to 785194 and 840747 respectively. The share of electricity consumption in terms of percentage has gone down for the agricultural sector. However, in recent times the electricity consumption in industrial and domestic sectors of the economy has started picking up and this has reduced the proportion of electricity consumption of agricultural sector. In the recent times it has been observed that the consumption of electricity for domestic purpose, due to frequent use of modern machines has been increasing day by day.

The consumption pattern of electricity of Tamil Nadu is presented in the following Table 4.3.

Table 4.3: Consumption Pattern of Electricity IN Tamil Nadu (2013-2014) (Figures in KWh)

Items	**Electricity Consumption**
Industries (including Traction)	19238(32.71)
Agriculture	10091(17.16)
Domestic	18231(31.00)
Commercial	6851(11.65)
Public Lighting & Water works	1711(02.91)
Sales to other States	188(00.32)
Miscellaneous	2500(04.25)
Total	58810(100)

Note: 1. The Chief Engineer (Planning), Tamil Nadu Generation and Distribution Corporation Ltd, Chennai-2.

2. Figures in bracket shows percentage to total electricity consumption.

3. KWh means Kilowatt hour.

From the above Table 4.3 it can be seen that the consumption of electricity in Tamil Nadu is more for the industrial sector (including Traction) as compared to the other sectors of the economy. In the year 2013-2014, the percentage wise consumption of electricity was 32.71% for the industrial purposes. The consumption of electricity for domestic purpose or household purpose comes next, which is about 31.00% of the total consumption of electricity.

The consumption pattern of electricity of Erode District is presented in the following Table 4.4.

Table 4.4: Consumption Pattern of Electricity in Erode District (2013-2014) (Figures in KWh)

Items	Electricity Consumption
Industry	664.20(22.73)
Agriculture	386.55(13.23)
Domestic	1258.37(43.06)
Commercial	448.32(15.34)
Public Lighting & Water Works	98.67(03.38)
Miscellaneous	66.38(02.27)
Total	2922.49(100)

Note: 1. The Chief Engineer (Planning), Tamil Nadu Generation and Distribution Corporation Ltd, Chennai-2.

2. Figures in bracket shows percentage to total electricity consumption.

3. KWh means Kilowatt hour.

The consumption of electricity in Erode district for the year 2013-2014 is 2922.49. Out of the total electricity consumption, the highest consumption of electricity for the domestic purpose is found to be 1258.37(43.06), which are the highest amongst all the sectors of the economy. In the field of agriculture the consumption of electrification is too low. i.e., only 13.23%. If the electricity is properly utilized for agricultural purposes it can lead to increase in agricultural production, which in turn will help to increase the income of farmers and the agro-based industries, can also automatically be developed. In Erode district, there is a wide scope of using electricity in agricultural sector for the purpose of rural development. With this background about the electricity consumption and its importance in bringing suitable changes in agrarian economy, it would be interesting and useful to analyze the rural electrification on agricultural development in selected area of this study.

4.4. Use of Electricity by Sample Farmers for different Kinds of Activities in Agricultural Sector

The sample farmers make use of electricity for different kinds of agricultural activities such as irrigation, green house, cattle-shed, poultry house etc. The use of electricity for different purposes in the agricultural sector has contributed significantly for the overall development of the primary sector. Due to utilization of electricity for irrigation activities, area under irrigation has increased. Therefore, farmers have started cultivating crops twice or even thrice in a year. Regarding the poultry houses and poultry products, the use of electricity has increased for their development. The use of electricity for different kinds of agricultural activities has been presented in the following Table 4.5.

Table 4.5: Use of Electricity by Sample Farmers for different Kinds of Activities in Agricultural Sector

Items	No. of Farmers	% of Total
Irrigation	120	100
Green House	01	0.83
Poultry House	18	15.00
Cattle Shed	84	70.00
Rest House	13	10.83

Note: 1. Total sample farmers are 120.

The use of electricity by sample farmers for different kinds of agricultural activities has been presented in the above Table 4.5. All different kinds of agricultural activities are analyzed considering the total sample size. Out of 120 sample farmers, all farmers used electricity for the purpose of irrigation. Sample farmers have started making use of electricity for irrigation activities in farm. Regular supply of water provided for their crops by electric pumps. Electric pump sets are also helpful for lifting water from wells and other sources of irrigation. Therefore, it is helpful for increasing production and improving productivity.

Out of total selected sample farmers, 0.83% of them have used electricity for the purpose of green house. In recent times electricity has proved to be helpful in development of green house. Electricity has also helped in lighting the green house, supply of water for their crops and also for maintaining temperature of the green house. Out of the total farmers, 15.00% of them have started making use of electricity for poultry product or poultry house. Electricity can also be helpful for the poultry and poultry product. Out of total selected sample farmers, 70.00% of farmers make use of electricity for the purpose of cattle shed. Sample farmers also use of electricity for lighting purpose in the cattle shed. Out of the total selected farmers, 10.83% of farmers make use of electricity for the purpose of rest house. The large number of sample farmers is making use of electricity for irrigating their own area of land. The farmers are using electricity for electric pump sets, lifting water from wells, canals, ponds, tanks, lakes, rivers etc. this has contributed in increasing the total area under irrigation. It is helpful in increasing production and improving productivity. Therefore, it automatically improves the level of income and standard of living of farmers.

4.5. Benefits Arising from the use of Electricity

In this section, benefits arising from the use of electrification have been discussed. Due to electrification, cropping pattern has changed from subsistence to commercial one, area under

irrigation has increased, production of all commodities has increased, sample farmers income has increased and farmers have also started using equipment's like TV, refrigerators, iron etc. Therefore, electricity has been playing a lead role in the rural economy as well as overall development of agricultural sector. Some benefits derived from electricity in agriculture sector listed in the following Table 4.6.

Table 4.6: Benefits derived from the use of Electricity

Items	**No. of Farmers**	**% of Total**
Improvement in Water Supply	85	70.83
Use of Modern Inputs	79	65.83
Improvement in Land	96	80.00
Increase in Irrigated Area	83	69.17
Increase in Area Under Non-food Crops	102	85.00
Increase in Production	109	90.83
Increase in Income	105	87.50

Note: 1. Total sample farmers are 120.

The benefits derived from the use of electricity are presented in the above Table 4.6. All benefits are analyzed considering the total sample size. Out of 120 selected sample farmers 70.83% were of the opinion that due to electrification for agriculture purpose water supply has improved. Due to the improved facilities of water supply, area under irrigation has increased and it has helped to increase in the level of income, production and productivity. About 65.83% of farmers pointed out that the use of modern inputs has increased for agricultural sector after electrification. The use of modern inputs in agriculture has helped in increasing the quality of agricultural product and productivity also. Selected sample farmers are used modern agricultural inputs such as high yielding varieties of seeds, fertilizers, pesticides and machinery (tractor, thresher, cutter etc.) in their farm after electrification. Out of 120 sample farmers, 80.00% of them were of the opinion that because of the use of electricity there is an improvement in fertility of land. About 69.17% of farmers were of the opinion that because of the use of electricity area under irrigation has increased. Out of total sample farmers, 85.00% of farmers opined that supply of electricity has helped in increasing area under non-food crops. Therefore, farmers have changed their life style and are earning more money from their farms. About 90.83% of farmers were of the opinion that production of the all commodities has increased because of use of the electricity. According to 87.50% of farmers viewed that because of the use of electricity income has increased consequently their consumption expenditure have gone up.

4.6. Problems and Negative Aspects Arising from the Use of Electricity

The benefits arising out of use of electricity in agricultural activities have been explained in the preceding paragraph. In this section, the problems arising out of use of electricity by the sample farmers are analyzed. The sample farmers have already been facing some of the common problems relating to rural sector, such as inadequate irrigation facilities, fluctuation in climate, lack of knowledge about farm management, shortage of storage facilities, fertility of land, prices of agriculture product, finance, transportation, lack of market knowledge and many more.

Electrification has further aggravated some difficulties faced by sample farmers in Erode district, such as misuse of water, increase salinity, theft of electricity etc. Out of total 120 selected sample farmers, 13.33% of them were of the opinion that there is misuse of water due to electrification. About 21% of farmers were of the opinion that the use of electricity in the agriculture sector has increased salinity of land and have adversely affected level of production. Out of total sample farmers, 5.26% of them were of the opinion that the use of electricity has increased theft of electricity. The electric pump sets can run on well but the main requirement for that is adequate availability of water in well. If the water level decreases the use of electricity ultimately affects the agricultural production. Erode district lies in the dry region; as such availability of water in an adequate amount is a very important for the farmers.

Now-a-days, farmers have to face many problems related to the electricity such as the irregular and discrete electric supply, maintenance of electric equipments, frequent faults in the electric instruments, power thefts and thefts of the electric pump sets, low voltage supply of power, damage of the electric pump sets etc. Now, the load shedding is one of the problems faced by sample farmers in Erode district. The load shedding has brought inverse impact on production of farms. The problems arising from the use of electricity in Erode district are shown in the following Table 4.7.

Table 4.7: Problems Faced by the Farmers Relating to Electricity

Items	**No. of Farmers**	**% of Total**
Difficulties in Taking Connection	45	37.50
Irregular and Discrete Electric Supply	93	77.50
Difficulties in Maintaining of Electric equipment	37	30.83
Low Voltage Supply of electricity	89	74.17
Load Shedding	120	100.00

Note: 1. Total sample farmers are 120.

The problems indicated by sample farmers arising from electrification presented in the above Table 4.7. All problems are analyzed considering the total sample size. Out of 120 selected sample farmers, 37.50% of them pointed out that taking connection for the electric pump sets itself becomes the major problem. According to 77.50% of farmers irregular and discrete supply of electricity in the agriculture sector also creating obstacle in increasing the level of production. About 30.83% of farmers were of the opinion that there is a difficulty in maintaining electric equipments. Out of total sample farmers, 74.17% expressed their view that low voltage supply of electric power is also a major problem which many times spoil their agriculture equipments. Low voltage of power supply creates major problem in the irrigation, as it becomes difficult to run the electric pump sets and this ultimately affects the irrigation and crop production. All the farmers pointed out that load shedding is now the new problem creating hindrance in the development of agriculture sector. Large number of the farmers depend on the electricity for the purpose of irrigation.

4.7. Farmers Expectations from Government and TNEB

The expectations of sample farmers from government and TNEB for solving their problems are to reduce house charges for marginal and small farmers, there should be no charges in natural calamity, TNEB employees should improve their approach, regular electric supply should be made, to inform well in advance about the discrete supply of electricity etc. The expectations expressed by sample farmers from government and TNEB are listed in the following Table 4.8.

Table 4.8: Expectations Expressed by Farmers from Government and TNEB

Items	**No. of Farmers**	**% of Total**
Bringing reduction in house bill for marginal and small farmers	102	85.00
No charges in natural calamity	93	77.50
Good behaviour from the TNEB employees	97	80.83
To provide regular electric supply	120	100.00
To provide information before discrete supply of electricity	52	43.33

Note: 1. Total sample farmers are 120.

2. TNEB means Tamil Nadu Electricity Board.

The farmers expectation presented in the above Table 4.8. All expectations are analyzed considering the total sample size. Out of total sample farmers, 85.00% of them were of the opinion that there is a need to reduce electric house bill for the marginal and small farmers because the income of these farmers is very less as compared to other farmers. About 77.50%

of sample farmers were of the opinion that no charges should be imposed in natural calamity. Out of total sample farmers, 80.83% of farmers expect good behaviour from TNEB employees. All sample farmers demanded the provision of regular electric supply. Out of 120 selected sample farmers, 43.33% of them suggested that TNEB should provide information in advance regarding electric supply.

4.8. Conclusion

In this chapter, electrification and its problems relating to regular supply has been explained. The farmers are facing many difficulties and problems related to regular supply of electricity. These are delay in connection, repair of electric instruments, low voltage of electric supply, load shedding etc. The Government and TNEB have not able to provide regular supply of electricity to the energized agricultural pump sets. Therefore, sample farmers have faced problem that is load shedding. Due to load shedding farmers are unable to provide water to their crops regularly and the time lag between two turns of watering has caused adverse effect on agricultural production. Thus sample farmers are the worst sufferers of load shedding and are losing crops productivity and income also.

CHAPTER V

5. A Summary of Findings, Suggestions and Conclusion

5.1. Introduction

Agriculture forms the backbone of the Indian economy. A strong foundation of the agriculture is necessary condition for sustained and rapid economic and development in India. Without this, it will be impossible to accelerate growth and ensure sustained improvement of the economy of the people. Agriculture can contribute substantially to the improvement of the rural as well as the overall economy and has the potential to become the leading sector in development. It provides food security, generates significantly to country's exports.

One of the important objectives of this study is to find out the rural electrification on agricultural development in Erode district in terms of living standard of farmers, cropping pattern, production and productivity. In pursuance of this objective, an attempt has been made in this study to examine various characteristics of the standard of living of farmers, production, productivity and cropping pattern.

In this chapter, the main findings of the study are summarized and suggestions are made. The data were collected from primary and secondary sources. The present study is limited to the survey of Erode district. An attempt is made to find out the electrification on agricultural development in the rural areas of Erode district. It also throws light on the various causes of backwardness of agrarian economy of Erode district.

5.2. Objectives of the Study

The specific objectives of this study are as follows:

1. To study the impact of electrification on living standard of farmers in Erode district.
2. To analyse the pattern of consumption of electricity in Erode district.
3. To find out the rural electrification on agricultural development in Erode district in terms of production, productivity and cropping pattern.
4. To study the problems of availability and regular supply of rural electricity in Erode district.
5. To suggest the remedial measures for tackling the problems of electrification in Erode district.

5.3. Hypotheses of the Study

The specific hypotheses of this study are as follows:

1. There is no significant relationship between electrification and the living standard of farmers.
2. There is no significant contribution of electrification on cropping pattern.
3. There is no significant relationship between production and productivity of agriculture in Erode district depends on the degree of electrification.

5.4. Methodology

The present study is limited to Erode district and it is based on survey method. The research is restricted only to study the electrification on agricultural development in the rural areas of Erode district. The study attempts to throw light on the various causes of backwardness of agrarian economy of Erode district. The lack of electrification in the field of agriculture is hypothetically granted as prime reason of this backwardness.

Erode district comprises of 6 Taluks. For the purpose of this study the district has been divided into three different groups. The first group consists of Erode and Bhavani. Second group is Anthiyur and Perundurai. Third group consists of Sathyamangalam and Gobichettipalayam. The irrigated level is measured through the number of kilometers of canal. The first group includes both irrigated and non-irrigated area when compare with other two groups. Second group includes lowest non irrigated area when compare with other two groups. Third group includes highest irrigated area in the selected group. For analysing the impact of electrification on agricultural development, selection of the Taluks has been made to represent the whole district.

5.5. Sampling Scheme

The research method followed for this research work can be described in short as below. Out of total 6 Taluks in the first stage selection of 3 Taluks have been made. Utmost care has been taken to see that these Taluks would be the true representative of all the Taluks of the district. In the second stage of the sampling, out of the sample villages, 6 villages have been selected. The objective of this study was to collect first-hand information from the local people and therefore 10% of total farmers from each selected villages were interviewed. Stratified Random Sampling technique is the method of sampling adopted for the purpose of this study. These selected samples were later on classified on the basis of the size of landholding to analyse the impact of rural electrification on agricultural development.

5.6. Field Work and Collection of Data

Before the exact process of data collection, a predicted interview schedule was used for the purpose of pilot study. The interview schedule was pre-tested with the response obtained from 30 farmers. The feedback of the farmers was useful in carrying out a few corrections/modifications in the items included earlier in the interview schedule. The final interview schedule was again subjected to further improvement, confirming that the instrument is fully reliable and internally consistent, thus paving the way for designing the final interview schedule. After the preliminary modifications, the actual data collections were carried on with farmers by frequent visits.

5.7. Analysis of Data and Tools

The analysis presented in this study is mainly based on primary as well as secondary sources of data. The statistical data on relevant information is collected from the farmers with the help of Interview Schedule. The relevant information is collected from farmers prior to electrification and after electrification. The data collected from all groups of sample farmers after electrification has been considered for the year 2000. The time period for the use of electricity for the purpose of agriculture differ from farmer to farmer. The sample farmers have made the use of electricity for various agricultural activities at different points of time. Therefore, before electrification the data collected from sample farmers are for different time periods. Hence, in order to standardize the data, the average time lag between before electrification and after electrification has been worked out.

The average time lag between non-electrification and electrification has been calculated with the help of following methodology. The year prior to the year of the installation of pump sets has been taken into consideration of each and every sample farmers for calculating the average year before electrification. The average year has been calculated by considering the years between the actual year (year before electrification) and the year 2000 (year after electrification). The average year before electrification was calculated by dividing the total time lag between prior to electrification and after electrification by total number of sample farmers.

The average time lag between before electrification and after electrification for the marginal farmers worked out to 7 years (base year of prior to electrification data is of 1993), for small farmers 11 years (base year selected for data regarding before electrification is of 1989), for semi-medium farmers 14 years (base year of prior to electrification data is of 1986), for medium farmers is calculated as 20 years (the base year for the data prior to electrification

is of 1980) and for large farmers 23 years (the base year for the data prior to electrification is of 1977).

The average time lag between non-electrification and electrification for all sample farmers worked out to 15 years. The variations in lag period as per the different size of landholding may be due to various changes introduced by sample farmers in their farms after taking electric power. The changes brought by the large sample farmers could be more than the other categories of farmers, which probably must have taken some more time to derive the benefits for electrification.

Secondary data and additional information have been collected from the Agricultural Census Report, District Census Handbook and Report Relating to Rural Electrification, Government Publications Library and Internet, etc.

Keeping in view the objectives of the study, some appropriate statistical techniques such as percentages, average, standard deviation and co-efficient of variation have been used in this study.

5.8. Findings of the Study

The following are the findings of the study:

5.8.1. Impact of Electrification on Living Standard of Farmers

This study clearly brings out the inequalities in the literacy level of the households of farmers. In the electrified households of farmers, the literacy level is 68.83% and the illiteracy level is 31.17%. In the non- electrified households of farmers, the literacy level is 54.35% and the illiteracy level is 45.65%. The literacy level is higher in electrified households in comparison with the non- electrified households of farmers.

In the case of large sample farmers all selected households were found to be electrified. The percentage of electrified households in total sample was low in the case of marginal farmers i.e., 61.90%. If the size of landholding increases, the proportion of electrified houses also increases. The variation in the level of income and expenditure of all sample farmers has decreased after electrification.

5.8.2. Impact of Electrification on Cropping Pattern, Production and Productivity

The total number of farmers having their own pump sets are 107 and the number of pumps possess by them are 135. Out of total pumps, 109(80.74%) pumps are of 5HP and 26 (19.26%) pumps are of 10HP. By and large, it has been observed that mostly semi-medium, medium and

large sample farmers possess pump sets of 10HP. Total 10HP pump sets are 26, out of which semi-medium sample farmers possess 2 (07.69%), out of which medium sample farmers possess 20 (76.92%) pump sets of 10HP whereas large farmers are having 04 (15.38%) pump sets of 10 HP.

The total sample farmers are 120, out of which 70.83% of farmers are dependent on wells for irrigation, 15.00% of farmers are depending on government canals, 08.33% of farmers are using rivers as a major source of irrigation, 05.83% of farmers are irrigating their land area with the help of tanks. Domestic wells seem to be the most popular source of irrigation in the area selected for the study. Out of the total selected sample farmers majority of them are depending on wells for source of irrigation. All types of farmers are using wells for the purpose of irrigation. Water from canals is also another source of irrigation which is quite popular. Tanks, rivers etc. are not being extensively used for the purpose of irrigation by the selected sample farmers. This may be due to the fact that well irrigation doesn't need any price for lifting water except in terms of electricity charges which are incurred for the use of pumping water but no charges are involved in terms of water rates. This aspect needs to be considered for management of water. Government can seriously think about bringing some degree of regulation on private wells in order to manage scarce water resources. In certain cases establishment of canal helps to increase the water level of domestic wells but this aspect is neglected while developing the scheme of water management.

The farmers of the Erode district have largely using electric pump sets for irrigation. The area under irrigation has increased due to rural electrification. The total cultivated area of sample farmers prior to electrification was 1,506.05 acres. Due to electrification though there is a change in total cultivated area after electrification, it is increased up to 1,553.05 acre. There is a change in the area under irrigation also. Out of total cultivated area (1,506.05 acre), before electrification 15.80% area was irrigated and 84.20% area was non-irrigated but after electrification irrigated area has increased up to 18.47% and non-irrigated area has gone down to 81.53%. Per acre productivity of all crops has increased from 27.2 quintals per acre to 38.2 quintals per acre.

5.8.3. Electrification on Problems Relating to its Regular Supply

The consumption of electricity in Erode district for the year 2013-2014 is 2922.49. Out of the total electricity consumption, the highest consumption of electricity for the domestic purpose is found to be 1258.37(43.06), which are the highest amongst all the sectors of the economy. In the field of agriculture the consumption of electrification is too low. i.e., only

13.23%. If the electricity is properly utilized for agricultural purposes it can lead to increase in agricultural production, which in turn will help to increase the income of farmers and the agro-based industries, can also automatically be developed. In Erode district, there is a wide scope of using electricity in agricultural sector for the purpose of rural development.

The sample farmers make use of electricity for different kinds of agricultural activities such as irrigation, green house, cattle-shed, poultry house etc. The use of electricity for different purposes in the agricultural sector has contributed significantly for the overall development of the primary sector. Out of 120 sample farmers, all farmers used electricity for the purpose of irrigation. Sample farmers have started making use of electricity for irrigation activities in farm. Regular supply of water provided for their crops by electric pumps. Electric pump sets are also helpful for lifting water from wells and other sources of irrigation. Therefore, it is helpful for increasing production and improving productivity. Out of total selected sample farmers, 0.83% of them have used electricity for the purpose of green house. In recent times electricity has proved to be helpful in development of green house. Electricity has also helped in lighting the green house, supply of water for their crops and also for maintaining temperature of the green house. Out of the total farmers, 15.00% of them have started making use of electricity for poultry product or poultry house. Electricity can also be helpful for the poultry and poultry product. Out of total selected sample farmers, 70.00% of farmers make use of electricity for the purpose of cattle shed. Sample farmers also use of electricity for lighting purpose in the cattle shed. Out of the total selected farmers, 10.83% of farmers make use of electricity for the purpose of rest house. The large number of sample farmers is making use of electricity for irrigating their own area of land. The farmers are using electricity for electric pump sets, lifting water from wells, canals, ponds, tanks, lakes, rivers etc. this has contributed in increasing the total area under irrigation. It is helpful in increasing production and improving productivity. Therefore, it automatically improves the level of income and standard of living of farmers.

5.9. Suggestions

It is difficult to generalize on the basis of the results from the analysis of the sample of about 120 farmers. This is a study at micro level. These results are indicative of the situation prevailing in the rural sector of India. Rural electrification contributes to bridge the gap between urban and rural life. In advanced regions, it soon became the chief power source for the farm. The following measures are recommended as mere guidelines for improving the standard of agricultural sector.

1. In the rural area, it is essential, to reduce accidents and short circuits regarding the electric pump sets and household uses. The regional office of State Electricity Board for Erode district should provide facilities for training which would be of great help for documentation, information, demonstration and mass communication.
2. Majority of sample farmers in the selected study area of the Erode district were found to be facing the problems of indebtness, credit supply, marketing of agriculture goods, maintaining the electric equipments etc. The main objective of loan facility is to give incentive to produce more with better quality on one hand and on the other hand it helps to minimize the burden of debt on the farmers. It is equally important for efficient marketing of agricultural commodities in the farm of storage facilities, cooling facilities, processing facilities etc. All these measures are necessary to give better remuneration to the farmers. Therefore, to provide all these above marketing facilities the better supply of electricity must be made available. Most of the time farmers from rural area face the problem relating to the maintenance of farm equipments. This unique type of problem will be solved if the agro-service sectors are established in every village for repairing and maintaining all types of agricultural equipments such as machineries, tractors, electric pump sets etc.
3. It is generally found that there is a close relationship between use of electricity and modern agricultural equipments. The modern agricultural equipments or inputs greatly influence agricultural production. If the farmers use the modern agricultural inputs at greater extent such as drip irrigation, sprinkling irrigation, threshing units, pump sets etc. The agricultural production will increase at faster rate. In the other words the use of electricity for the modern agricultural equipments will create a huge marketable surplus of agricultural production such as Rice, Sugarcane, Turmeric etc. But it will be possible when the sufficient and regular electricity supply is maintained by the electricity board.
4. The burden of population on agricultural sector has been rising in our country and the demand for food crops and non-food crops have been increasing continuously, therefore, the intensive cultivation is the need of the agricultural development. The intensive cultivation, for example, sowing at proper time, application of fertilizers and other inputs is not possible without the sufficient irrigation. The multiple cropping patterns can only be possible if there are sufficient irrigation facilities. The sufficient water obtains with the help of water management; therefore there is a need to develop the water harvesting and watershed schemes. This type of programme will help to

maintain the sufficient level of ground water. Therefore, above mentioned programme should be implemented efficiently by the rural community to solve the problem of water.

5.10. Suggestions for Further Research

The following lines of research are suggested for the further researchers on improving the standard of agricultural sector.

1. This study is confined to Erode district only. Hence, further research could be undertaken even with the same objectives in the different ecological zone.
2. Comparative study on rural area and urban area could also be done.
3. Farmer's awareness may be analysed by Taluk wise, District wise and State wise comparison.

5.11. Conclusion

The findings and suggestions of this study are likely to be useful in many ways. The analysis presented in this study may help the authorities to formulate plans for improving the standard of living of the farmers in our country. The study would also be helpful in asserting the relative effects of different types of farmer's characteristics of consumption. The role and importance of electrification have also been analyzed, which would probably be useful for framing suitable energy policy for rural electrification. In India, it is necessary to develop the technology to generate power from agricultural wastes. The nations like Canada, Japan and USA have already set up few large plants for generation of energy from agricultural wastes. In India, a lot of research needs to be done for this development. The government should make sufficient funds and subsidies for this activity.

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