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.

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[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

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[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.

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[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.