CHAPTER - 11

REVIEW
OF
LITERATURE
CHAPTER II

REVIEW OF LITERATURE

It is recognised that a massive programme of rural electrification is essential for rural industrialisation, modernisation of agriculture and for rural development. Development of agriculture and decentralised industries for rural development. Rural electrification is considered as a major impact for stimulating agricultural development and inducing decentralise development of industries. Research studies on impact assessment of rural electrification are of recent origin. While some studies have revealed that rural electrification has had a positive impact on agricultural production and dispersal of small industries in rural areas.

In this chapter, a review of the past studies on resource productivity and scale returns and the impact of rural electrification is presented. The review of literature presented under the following.

2.1. Impact on agricultural development.
2.2. Impact on small and dispersed industries in rural areas.
2.3. Impact on rural Artisans trade.
2.4. Studies on resource productivity, scale return and profitability.

2.5. Studies on co-ordination among various development agencies.

2.1. Impact studies on agricultural development:

An important aspect of rural electrification that engaged the attention of researchers most was the economics of different types of lifts, viz: electric pumps, oil engines, charas, persian wheel and mhote.

Programme Evaluation Organisation (PEO) of Planning Commission in (1965), stated that the average area per household, about 27 per cent of the sample respondent reported the release of some family labour and in an average 36 bullocks labour days were also estimated to have been released per month per household as a consequence of switch over to electric lift irrigation.

Suryanarayana (1966) observed that the component of hired labour was higher in the farm using electric motor pumps and oil engines compared to piccithas and mhotes. He further estimated that the output of paddy per rupee spent on irrigation was the highest in electric motor pumps as compared to other types of lifts.
National Council of applied economic Research (1967) in their study on increase of 7.63 acres of gross irrigated area per user of pumpsets/tube wells. The additional income realised by the pumpset/tube well users, worked out to Rs.237 per cultivated acre. The study further pointed out that, on an average, a pumpset/tubewell user saved Rs.354, bullock labour days valued at Rs.712 per crop per year and 357 family or hired labour days valued at Rs.1017 per crop per year and where absorbed in other agricultural operations or transferred to business.

Agarwal et al (1969) stated that electric pumpsets were more economical and more efficient mode of lifting water compared to mhote for all crop operations, other than irrigation, was more, in the case of farmers using electric pumps than those using mhote or Rahat.

Alok Kumar et al (1969) observed that provision of irrigation facility after the installation of the tube well had brought significant changes in cropping pattern, cropping intensity and input use.

Bore et al (1969) stated that there was a reduction in per acre expenditure for maintenance
and running charges in banana production with the use of electric pumps instead of oil engine. The labour requirement was reduced by 28 percent compared to oil engine. There was significant savings in family labour which can very well be diverted to other operations. There was an increase in net earnings up to the extent of Rs.745/- per acre to the electric pump users over oil engine pump users. The impact output ratio was also relatively more on the farms where electric pumpsets were used.

Chauhan et al (1969) observed that the cost of irrigation per acre for wheat crop by electric motor was Rs.844/- which was about 1/6 of charas 1/5 of persian wheel and half of the diesel oil engines. The study further revealed a reduction of human and bullock labour requirements. By utilising them for transportation, farmers got extra income. Introduction of electric pumpset has also induced the farmers income the area under Rabi crops by 25-30 percent.

Dhondyal and Singh (1969) stated that an increase in cropping intensity and net income per hectare by 17.75 per cent and 98.85 per cent respectively in the electrified villages than in
the unelectrified villages. The input and output ratio showed that the increase in productivity has resulted in a of Rs.0.38 per rupee spent in electrified villages. The irrigation development caused by electrification resulted in higher availability of marketable surplus. They further found that running cost of irrigation per hectare by electric power was 40-45 percent less than that generated by diesel engine.

Garg and Bhatia (1969) obtained higher (140%) cropping intensity for the electrified villages when compared to that of non-electrified villages (111.5%). The study also indicated that while electrified village had 76% percent of the cultivated area under irrigation, only 24 percent of cultivated area was under irrigation in the non-electrified village. The area under high yielding varieties was also more in the electrified village.

Maji and Srohi (1969) observed the farm data of irrigated and unirrigated farms and irrigation was being made available from energisation of wells. They concluded that there were complete changes in cropping pattern and income due to irrigation. The intensity of cropping increased by 57 per cent in irrigated farms over unirrigated farms.
Patil (1969) pointed out that electricity in rural areas for lift irrigation has resulted in increased income, reduction in cost as compared with other modes of irrigation.

Patil and Hinge (1969) stated that the use of electricity had brought about nearly 22500 acres additional area under irrigation. It has brought significant change in cropping pattern intensive cultivation and adoption of high yielding varieties which resulted in the creation of new employment opportunities, increased growth and net income.

Patel (1969) found that electrified pumpsets are cheaper than the dieselised pumps for operation at any level.

Shaw and Singh (1969) indicated that the cost of an acre-inch of water even with under utilisation for electric tube was 48 percent less than that for a diesel engine.

Rao (1969) observed that maintenance of electric motor was not only cheaper but also lead to increase in irrigated area per well cropping intensity, in income tax over other types of water lifts.
Garg and Bhatta (1969) studied the impact of electricity on agricultural development over a period of time in two villages in Uttar Pradesh, one electrified and another non-electrified. Their results showed that percentage of irrigated area to the total cultivated area in the electrified village had increased from 42.60 in 1964 to 76.07 in 1969 as against 18.87 and 25.39 in the nonelectrified villages during the same time. The greater increase in the irrigated area in electrified village was due to an increase in the number of tube wells from (4) 1965 to 93 (1969). There was a substantial increase in the use of chemical fertilizers (in terms of nitrogen) from 1 kg (1964-65) to 23.18 kg per hectare (1968-69). The area under high yielding varieties of different crops was also more in the electrified village. The cropped area of the electrified village had steadily increased. The cultivators had thus resorted to intensive cultivation in the electrified village and their income also had steadily increased, due to increased supply of water by tube wells.

Ross (1971) found that electrification permitted even distribution of labour and use of elderly and partially in capacitated family
workers. He further observed that proper management of water resources facilitated by the use of electric motor pumps could greatly increase the agricultural productivity.

Shukla (1973) stated that the cost of operating electric pumps was (Rs.475) almost half of the cost of diesel pump (Rs.975). Irrigation resulted in higher incomes both from the traditional and advanced farms. He concluded that well irrigation through electric pump was a profitable proposition specially when combined with the advanced technology in agriculture.

The study conducted by the evaluation wing of the planning and co-operation in Andhra Pradesh (1974) stated that energised pumpsets have resulted in both intensive and extensive irrigation of area. Electrification of wells resulted in a change in cropping pattern and reduction of running expenses for the cultivators when compared to the earlier mode of operation either with bullocks and amhota or with a diesel engine.

Roy (1975) revealed that a radical change in cropping pattern was a consequence of dug well programme. The study also revealed that the adoption of new crops not only ensured better
utilisation of land and labour but also had a great effect in income generation. The average income per house hold increased by Rs. 230 and cropping intensity increased by 46 points after dug well.

Swaminathan (1975) observed that energisation of wells, increased area under irrigated crops by 2.2 acres over old well and 4.34 acres per new well in Dhona taluk and it was 1.0 acre per old well and 2.70 acres per new well in Pattikonda taluka of Andhra Pradesh. In Dhona taluka, the value of additional output through energisation was Rs.6000 per well as against Rs.4,500 per well in Pattikonda taluka.

Parthasarathy (1976) revealed that the additional area brought under irrigation due to energisation of wells varied from 0.12 acres to 3.22 acres. Except in Prakasham District, radical change in cropping of various crops and total production has increased considerably. On an average the additional gross returns per energised well varied from Rs.2,094 to Rs.11,130. The same varied from Rs.2,094 to Rs.10,046 in the case of old wells converted to power. With respect of newly dug and energised it varied from Rs. 4,240 to Rs. 13,430.
Abdul Thah (1976) observed the following changes after rural electrification:

1. **Net Area Sown:**

   After rural electrification 11 per cent increase in net area sown was noted as a consequence of energisation of wells. Inspite of increase in net area sown there was an overall decline in the double crop area due to low price of the paddy, in paddy growing belts during their data collection. He concluded that favourable price situation would improve farm production intensifying the cultivation.

2. **Changes in cropping pattern:**

   In the four project areas paddy accounted for about 30 per cent of gross cropped area after electrification, next important crop was groundnut which accounted for 24 per cent of the gross cropped area, followed by chillies, wheat and vegetables while substantial decrease was observed in maize, grams, rage and castor groups.

3. **Changes in production:**

   Increased use of fertilizers addition of modern techniques and other efforts were responsible for increased returns. It is
quite interesting that small farmers got better yields over medium and large farmers, by utilising hundred per cent capacity of the available irrigation facilities.

4. Agricultural inputs:

25-70 per cent, 5.40 per cent, 35.20 per cent of fertilizers increase was observed in paddy, sugarcane, maize respectively after electrification.

5. Returns on Agricultural Investment:

Inspite of increased yield (per acre) there was no proportionate increase in income due to a rise in the prices of fertilizers. Only 5.29 per cent increase of income was observed in paddy. In sugarcane it was 37 per cent and in chillies it was 6 per cent.

Swaminathan (1977) found that the area irrigated under old wells has increased by 5.6 acres per well as against 10.0 acres under new wells as result of energisation. The cropping pattern has changed in favour of irrigated crops. The gross value of additional output per well under old wells was Rs.3,500 while under new wells it was
only Rs.613 per well. The smallness of the grain under new wells was due to displacement of high value crop viz. potato.

Parthasarathy and Ramkumar (1978) studied that the impact of rural electrification on farm production according to farm size group of 0-4 hectares, 4-8 hectares and 8 hectares and above and observed that rural electrification has helped farmers of all categories in energising their wells. The average additional gross irrigated area brought under wells in medium farm size group was highest (0.78 hectares) followed by 0.62 hectares and 0.51 hectares under larger and smaller groups respectively. Under old and new wells in all size groups, there was a change in the cropping pattern due to energisation. Production of all crops has increased under both old and new wells. The highest additional gross income per hectares was obtained by the larger farm size groups. Additional income per hectares on an average varied from Rs.3,199 to Rs.3,972.

Parthasarathy (1978) noted that in Uttarpradesh that the additional area brought under irrigation was 5.54 acres per energised new well as against 2.29 acres per energised old well. As a
consequence of energisation and additional area brought under irrigation, the overall production on farms had increased. It was observed that the energisation has not resulted much in changing cropping pattern. Energisation of wells helped the farmers to obtain an additional average gross income of Rs.5,437 per new well and Rs.3,146 per old well. The same per cropped acre was Rs.1929 for new wells and Rs.1,374 for old wells. The study further revealed that there was no displacement of labour on the farms as a consequence of energisation of wells. In fact, energisation of wells had helped the farmers in creating more employment potential. Energisation had resulted in an additional utilisation of 4428 mandays of human labour and 567 pair days of cattle labour in the area.

Parthasarathy (1979) studied the impact of rural electrification in Orissa and concluded that energisation of wells resulted in radical changes in cropping pattern. As many as eight new crops were introduced. The additional area brought under irrigation has varied from 2.02 hectares under old wells connected to power to 105.89 hectares under government lift irrigation points. The same was 24.71 hectares for new wells dug and energised
simultaneously. In general, the productivity of all crops has increased and has resulted in additional production. Additional gross return per well varied from Rs. 6068 in newly energised wells to Rs. 2,914 in old wells energised. The per hectare additional gross returns, as a consequence irrigation points, varied from Rs. 2,957 in Government lift irrigation points to Rs. 5,419 under old wells converted to electricity. The same was 3,117 for newly energised wells.

Parthasarathy (1979) concluded that rural electrification in Nowgong District of Assam has not made any appreciable impact on agricultural production. There was no significant change in the cropping pattern or productivity of crops. This was due to failure of co-operative lift irrigation scheme.

Raghupathi (1979) stated that the additional area brought under irrigation was 3.7 acres per energised well. Energisation of wells has also increased incomes of agricultural families. He further found that there was no significant change in cropping pattern as a consequence of energisation.
Vishwa Ballabh and Sharma (1980) stated that the investment in pumpsets and persian wheels were profitable on small and marginal farmers respectively. The cropping pattern changed in favour of groundnut, paddy, wheat and vegetables and cropping intensity increased by 41.12 per cent and 43.77 per cent on pumpset and persian wheel farms. Increases in productivity of crops was more on pumpset farms when compared to persian wheel farms.

SIET study team (1979) observed that the energisation of wells and the increase in the irrigated area has not significantly changed the cropping pattern under the wells. Bajra, Wheat, Barely and Maize one the most important crops accounting for nearly 94 per cent of the irrigated area by sample wells before and energisation.

The REC study on costs and benefits of pumpset energisation (1980), in the South Arcot District of Tamil Nadu revealed that the net additional returns from irrigated farming worked out to Rs.635 per hectares or Rs.2,470 per pumpset per annum.

Singh (1981) observed that the aggregate level of human labour employment days per hectare
and per farm were higher by 13.91 and 62.80 percent respectively on electrified farms as compared to non-electrified farms. The study also showed that the increase in labour employment per hectare in small, medium and large holdings in the electrified category was 18.8, 11.55, and 8.8 per cent respectively over the corresponding size groups of non-electrified farms. The labour displacement effect of electrification of such operations as pumping water, threshing, etc., was more than offset by the additional employment, generated from increased cropping intensity on the users farms and from off-farms use of electricity. On an average rural electrification generated 18.36 human labour days per hectare.

Mishra et al (1981) observed the impact of minor irrigation scheme on employment pattern of selected farmers who were using the loan for electric pumpset and concluded that the borrowing of loan has increased total family labour days to 397.50 as against 380.50 days before borrowing the loan. Total hired labour has increased from 1060 days to 1452.50 days.

Umrariya and Arora (1981) stated that farmers were able to increase the net irrigated area by
about 80 per cent as a result of installation of pumpsets. Consequently, they were put on a higher technological plan. The cropping pattern was changed in favour of high yielding varieties of different crops and other remunerative crops. Significant increase in yield of crops was also reported.

Andersen and Hazell (1981) found the view even if the new technologies have increased yield risks at the farm level, the other factors affecting aggregate supply include changes in inter year variability in crop areas shown, change in yield co-relations between farms and crops, production expansion in risky areas, and increase in average yields and areas shown.

Sathyanarayana (1981) found that the additional area brought under irrigation by beneficiaries was more than 50 per cent of the holding area and cropping intensity was more by 60 per cent as compared to non-beneficiaries, because of rural electrification. As a consequence of energisation of wells, the cropping pattern was changed favourably and the human labour employment was increased by slightly less than 100 per cent in beneficiaries than non-beneficiary farms.
Reddy (1981) observed that the impact of financing electric pumpset has brought a significant increase (29.5%) in the area cultivated with respect to farmers belonging to size group of 10-20 acres followed by size group of 5-10 acres (25%) and below 5 acres land (22.2%). The study further revealed that cropping intensity increased from 119.53 per cent to 147.35 percent gross cropped area increased from 15.13 to 18.64 acres per holding. An additional expenditure of one rupee on the installation on pumpsets has yielded an income of Rs.3.38, Rs.5.13 and Rs.8.32 in paddy, groundnut and Jowar respectively.

Sudershan Reddy (1982) stated that farm electrification has favourable impact on such factors as intensity of cropping intensity of irrigation, proportion of irrigated area in the cultivated area and shifts in the cropping pattern in favour of water-intensive and cash crops. Farm electrification has resulted in an increase in output per acre and reduction in the units cost of production. Electrification of farms not only resulted in higher employment of hired human labour but also in reducing the seasonal variations in its employment. So far as the bullock labour employment is concerned, the study clearly revealed
its displacement to the extent of 55 per cent on account of farm electrification.

REC study (1983) revealed that net area irrigated by various sources of irrigation before electrification reported by 817 electric pumpset owners was 761.0 hectares in selected villages of Assam, Jammu and Kashmir, Meghalaya and Nagaland. After electrification the net area irrigated in 1977-78 by the same beneficiaries was reported to be 1869.6 hectares, showing there by an increase of 145.7 per cent.

After electrification, there was decrease in area irrigated by diesel pumpset-wells and by the other sources. Excepting for a very small increase in Bihar and Uttar Pradesh decrease in net area irrigated by diesel pumpsets was reported by the beneficiaries in all the states.

The above study team has studied the impact of Rural Electrification on Agriculture under the following heads.

1. Augmentation Land Holdings:
(a). It was found that the land holdings were not augmented by the beneficiaries in the states of Himachal Pradesh, Rajasthan and Orissa. The augmentation of land holding was
done either by purchasing of the land or reclamation of uncultivable land or by other means like bringing old fallows under cultivation. Of 817 beneficiaries owning energised pumpsets, 63 beneficiaries (7.7%) augmented their land to the extent of 68.6 hectares which worked out to an average of 1.09 hectares per beneficiary.

(b) Adoption of improved Agricultural Practices (HYV) improved seeds chemicals fertilisers etc., were after electrification by the beneficiaries were adopted of (75.4%) pumpsets.

(c) Before electrification sprayers were used by 145 (17.7%) beneficiaries while after electrification they are being used by 331 (40.5%) beneficiaries giving an increase of 128.3 per cent, in case of mechanisation.

(d) Changes in the area irrigated and cropping pattern of the same beneficiaries was 31.0 per cent as against 51.8 per cent after energisation. Increase in the percentage of area irrigated was reported by the beneficiaries from all the stakes after energisation. The gross area sown under
various crops by the above beneficiaries before and after energisation. Among the cereals, there was an increase in area sown under paddy and wheat. The area under paddy had increased by 191.62 hectares giving an increase of 25.1 per cent while area sown under wheat had increased from 779.88 hectares to 1241.52 hectares after electrification. It was also observed that there was a decline in area under pulses, oil seeds, fibres and fodder crops during 1977-78, whereas increase in area was reported by the beneficiaries in crops like sugarcane plantations, condiments, vegetables and fruits. The increase in area under vegetables was more than five fold; under plantations was 60.5 per cent, sugarcane 53.7 per cent, condiments 33.3 per cent and fruits 98.4 per cent. Due to the assured supply of water after energisation, the farmers switched on to more remunerative crops like sugarcane, vegetables plantation and fruits etc.

(e) Employment. The changes in employment in Agriculture, due to rural electrification on Agricultural operations like ploughing, sowing, transplantation etc.; Out of 797
beneficiaries 635 (79.7%) reported increase in employment after electrification. 94 (11.8%) reported decrease, while the remaining (68.5%) reported no change in employment.

2.2. Impact studies in small industries in rural areas:

The programme evaluation organisation (1965) stated that more than three-fourth of the industrial units were started after electrification and only less than one-fourth switched over to electricity from traditional methods of operation. It was observed that the average number of hired persons employed whole time, decreased from 4.0 to 3.6 persons per unit and the hired part-time labour decreased from 1.6 to 1.5 per unit. The average annual profit per unit has increased by 11 per cent. As a consequence of electrification the working time schedule was increased by 2.17 hours per respondent but the working hours of industrial units has reduced by about 9 per cent.

The National Council of Applied Economic Research (1967) noticed that 68 per cent of industries came into existence as a result of electrification. About 6 per cent of the industrial units reported that there was a reduction in the
use of Kerosene oil. 1.2 per cent reported reduction in the use of high speed diesel oil, and eight per cent reported the release of family or hired labour after they started using electricity on an average, the net income of an industrial unit has increased by Rs.1,602 per annum after electrification.

Dhondyal and Singh (1969) noticed that electrification resulted in an interaction between farm and non-farm sectors in the development of farm productivity and expansion of industries related to agricultural production.

Evaluation study conducted by the evaluation wing of Planning and Co-operation in Andhra Pradesh (1974) observed that the rice and flour mills were the only types of small industries that have come up in rural areas due to village electrification.

Parthasarathy (1976) found that rural electrification has expanded, diversified and decentralised the industrial structure in rural areas. The number of industrial units rose from 53 to 208. Eighty per cent of total industries were agricultural processing units with rice milling predominating. The capital investment increased from Rs.11.01 lakhs to Rs.58.35 lakhs in industries
after electrification. Gross value of output has increased by about 500 per cent. It was further noticed that rural electrification has provided opportunities to cultivators, traders and artisans to turn into industrial entrepreneurs. He further stated that electrification has helped in generation of employment to 517 additional persons in the area.

Swaminathan (1976) revealed that electrification in Kurnool District of Andhra Pradesh increased the value of industrial output from Rs.82.32 lakhs to Rs.237.79 lakhs in Dhone Taluk and Rs.4.25 lakhs in Pattikonda taluka. Electric Power reduced the fuel cost. It provided employment to 331 more persons in Dhone Taluka and 76 more persons in Pattikonda Taluka.

In another study, Swaminathan (1977) noticed that the number of industries have risen from 13 before electrification to 62 after electrification. The horse power of industries has increased from 35 to 474, employment rose from 64 to 222. Capital investment increased from Rs.0.27 lakhs to Rs.5.68 lakhs and gross value of output increased from Rs.0.60 lakhs to 9.92 lakhs as a consequence of electrification.
A study conducted by the institute of Regional Development planning (1977) revealed that there were 3,110 industrial connections in the 1,332 electrified villages of Vidharbha region, of which 2,645 connections were for four mills. The rural industrial units have generated 3,110 units in these villages was about Rs.420 lakhs.

Parthasarathy (1978) noticed that rural electrification has helped to set up 108 new units in three districts of Uttar Pradesh. Besides this, 27 diesel units were converted to power. It was found that majority of units were of job work type. The study further revealed that all the units together generated an out turn of Rs.33.45 lakhs which indicated an average of Rs.24,780 per unit. Every unit, on an average, created employment to Rs.2.34 persons.

In another study, Parthasarathy (1979) noted that 20 industrial units have been started after electrification and 10 units switched over to power, in the sample villages of Nowgong district of Assam. About 7 per cent of industries were processing units. Each unit, on an average provided employment to 3 persons. On an average each unit has invested about Rs.42,800 as fixed capital and Rs.6,322 as working capital which
resulted in turnover of Rs.1.3 lakhs per annum. Thus rural electrification has resulted in a fresh fixed capital investment of Rs.8.56 lakhs and Rs.1.26 lakhs on working capital in a production of Rs.26.03 lakhs. It was further noticed that the units which were converted from diesel to electricity brought about an increase in employment by 43 per cent, fixed capital by 53 per cent and working capital by 73 per cent when compared with previous situation.

Raghupathi (1979) observed that there was a nine fold increase in number of industries and 12 fold increase in the employment after electrification. About 80 per cent of the power using industries were agricultural processing units. The capital employed in these industries has increased from Rs.41,000 to Rs.7,16,000.

Parthasarathy (1979) opined that rural electrification has not resulted in high degree of rural industrialisation in Dhenkanal District of Orissa. Consequent to the electrification of villages, 21 new units have come into study area and five units which were run on diesel, were converted to electricity. The 21 new units have investee Rs.3.36 lakhs on fixed capital and Rs.2.02
lakhs on working capital. These units provided employment to 67 persons. The turnover of these units was Rs.7.05 lakhs per annum.

Singh (1981) found that rural electrification has created the possibility of starting agro-based industries such as flour mills, rice millers, oil expellers etc., and generated employment in agro-based industries. It was found that the non-agricultural business provided employment of 434 days per annum.

2.3. Impact studies on rural artisan trades:

A study conducted by Parthasarathy (1976) in Andhra Pradesh has found positive impact of electricity on rural artisan categories of weavers and carpenters. The income of those taking to use of power have increased substantially. Power operated tools or machine were not adopted in any other trades of artisans. The artisans felt that there was no scope at all to introduce power driven tools in their avocation. It was also found that the absence of impact was also partly due to lack of efforts on the part of extension agencies to identify suitable power driven tools and partly on the development agencies to explore markets.
Swaminathan (1976) noticed that there was no transformation of technology in traditional trades and occupations. The artisans did not find any scope for power driven tools and did not show any awareness of either the improved tools or use of power in their trades.

In another study of Swaminathan (1977) on the impact of electrification on 27 artisans in the study area in Patna District, 17 were power users. A comparison of artisans using and not using power showed that the employment, fixed capital, working capital and earnings were more among power users than others.

Parthasarathy (1978) observed that majority of artisans in the three selected districts of Uttar Pradesh were not aware of power driven tools that could be used in their trades. Out of 38 contacted, only about one-fourth of them were aware of some sort of power driven tools. But all the artisans who were aware of power driven tools were unwilling to use power driven tools even if they were supplied free of cost. It was observed that they had a feeling that power driven tools in their trades would create unemployment to their family member and would also create marketing problems.
Swaminathan (1978) found that in West Bengal that none of the sample artisans were among power driven tools. The size scale of operation was small as indicated by the scale of tools used and the level of employment provided. A detailed study of the north trade indicated that productivity and quality can be improved through power operated tools.

Raghupathi (1979) concluded that majority of the artisans in the study area of have explained their willingness to obtain over to modern technology and power. It was found that finance was the main constraint to switch over to power tools, carpenters and blacksmiths were found to have started saw mills and general engineering workshops meeting local demand for agricultural implements and servicing of agricultural machinery.

Parthasarathy (1979) reported that rural electrification in Nowgong District of Assam has not made any significant impact on transformation of technology in rural artisan trades. No power operated tools has been seen in the study area operated by any artisan. The survey revealed that most of the artisans were not in favour of using any power driven tools. They felt that there was no scope at all.
In an other study Parthasarathy, stated that in Orissa, rural electrification has not made any impact on modernisation of artisan trades in the study area. None of the artisans was using power driven tools. The study indicated a good scope for the introduction of power driven tools since many artisans were willing to switch over to these power driven tools provided they were given the necessary training and financial assistance to procure them.

2.4. Studies on Resource Productivity, Scale Return and Profitability:

Suryanarayana (1958) noticed that decreasing returns to scale were prevailing with respect to land, labour and capital services on the Telangana farms.

Agarwal and Foreman (1959), informed that diminishing marginal returns for each of the three resources viz. land, human labour and bullock pair days and constant returns to scale in West Uttar Pradesh.

Tonbary (1960) stated that the efficiency in case of labour tends to increase farm per larger and animal power performance.
Khusro (1964) observed that constant returns to scale in Indian agricultural, farmer's efficiency judged by their success in maximising farm business income per acre or minimum paid out cost per acre did not decrease by size.

Rajkrishna (1964) stated that the constant returns to scale were prevailing in the agriculture in Punjab and further stated that there were no definite size cost or size productivity relations have emerged in the agriculture in Punjab.

Naik (1965) stated that constant returns to scale was prevailing on farms in Ankodis village.

Acharya (1965) observed the constant returns to scale on Queens land sugarcane farms and also diminishing marginal returns to individual factors of production viz: Land, Labour, Fertilizer and Plant and Machinery.

Kahlon (1967) observed severe decreasing returns to scale was operating with respect to land, labour operating capital and capital investment on the sample farms.

Saini (1969) found constant returns to scale in agriculture. Regression co-efficient in respect of various input factors indicated that land and
human about were the important inputs to which output was highly responsive in the agriculture. The ratios of HVPs to factor costs indicated that farmers were quite rational in terms of their response to economic opportunities and make adjustment in resources use.

Sankkayan (1971) concluded that constant returns to scale operated in case of seed potato farms. In case of maize diminishing returns to scale was observed.

Nageshwar Rao (1973) stated that constant returns to scale were prevailing on all size group of farms in all types with the exemption of small size farms in irrigated holdings and medium size farms in irrigated dry type of holdings and large size farms in dry type holdings where increasing returns to scale were observed.

Rajveersingh and Patel (1973) observed the increasing returns to scale on the selected farms of Merrut District. It was further obtained that there was no inverse relationship between per hectares productivity and farm size under the new agricultural technology in the area under study.
Singh and Kahlon (1973) compared marginal value productivities of different resources used on farms at varying levels of technology. They fitted cobb-douglas functions and concluded that the marginal value productivities of almost all the resources categories were higher on the farms with higher levels of technology, thereby indicating their inefficiencies in using resources to the optimum levels.

Parthasarathy and Suryanarayana (1974) noted in Andhra Pradesh that diminishing factor returns were operating for land, human labour, cattle labour, seed and manures and fertilizers in all the regions for the totality of farms and in respect of all the size group of sugarcane farms. Constant scale returns were found to exist and MVP to opportunity cost ratios indicated in-efficient use of resources in respect of all the regions and size classes of sugarcane farms.

Singh (1975) observed constant returns to scale in the agriculture of Eastern Uttar Pradesh. The HYV to factor cost for all individual inputs (fixed capital, human labour, bullock labour, manures and fertilizers) excepting the one for land were not significantly different from unity and
indicated that all the inputs, except land, have been used efficiency on the average farm.

Ravi and Tiwari (1978) stated resource use productivity according to farm size; category - A below 2.12 hectares and category B-2.12 hectares and more in M.P. and it was found that the magnitude of elasticity co-efficient of land was greater for category-A farms than for category-B. This indicated that land has been cultivated more intensively on A farms than on B. The higher marginal productivity on A farms was due to the higher use of bullock labour per hectare of land input. Production co-efficient of human labour indicated excessive use of labour on category A farms.

Bharadwaj etal (1978) observed constant and diminishing returns to scale under the present level of technology for HYV and local varieties of wheat respectively but diminishing constant returns to scale for HYV and local varieties were observed in case of maize. The HYV or manures and fertilisers and bullock labour were higher in case of HYVs over local varieties of wheat. It was also noticed that MVP of all the inputs which were included in the model, were higher in the case of
local varieties of maize as compared to HYVs. The bullock labour showed a negative MVP in case of HYVs of maize, indicated an excess use of this input.

Chadha (1979) analysed the production gains of new agricultural technology in Punjab. The production function analysis based on the farm level data, revealed that the differences between small, medium and large farms with respect to efficiency parameters as well as output elasticities of almost all the inputs were non-significant. Even with respect to some of the major indicators of adoption of new technology, the small farms did not lag behind the medium and large ones. New technology has, generated positive gains to all types of farms by increasing the marginal productivities not only of non-traditional resources, but also of traditional resources, like human labour and bullock labour.

Suryanarayana (1980) found significant constant returns to scale in all the selected districts of Andhra Pradesh on rice, Jowar and Maize farms; He stated that though for certain inputs increasing factor returns were prevailing, in general, diminishing factor returns were in
operation. On all farms and for all the three crops, there was inefficient use of resources. The analysis further indicated wide scope for readjustment of resources based on the ratio of marginal value product to opportunity cost.

Dasgupta (1980) stated that the class relations in the context of technical change in agriculture on the basis of the microlevel data obtained at two points of time from the sample families of agricultural labourers, small farmers and large farmers from the IADP and adjoining non-IADP districts in the wheat and rice zones. It was revealed that in spite of a relatively much smaller proportion of house holds belonging to the category of big farmers, their holds belonging to the category of big farmers, their hold over the total land resources and agricultural surplus were so large that their decision played a major role with regard to technological change, input-mix in agriculture and output-mix in capital goods sector. The use of new inputs did not increase the yield variability. On the contrary, new inputs raised the yield levels of crops in many areas.

On the whole, it may be said that there existed wide inter-farm variabilities with regard
to level of adoption of new technology and its impact on the resource productivity. A detailed analysis in this sphere is, therefore, necessary to understand the process of agricultural transformation over a period of time.

Mahesh Kumar Singh (1982) observed the operation of diminishing factor returns and prevalence of constant returns to scale in vegetable farming. MVP to opportunity cost ratios revealed high degree of resource use inefficiency and indicated the scope for adjustment of resources so as to obtain higher returns in vegetable cultivation.

Sudarshan Reddy (1982) observed diminishing factor returns and constant returns to scale in both the electrified and the non-electrified farms. He further pointed out the inefficient resource use in respect of both the groups of farms based on the ratio of HVP to opportunity.

2.5. Studies on Co-ordination Among Various Development Agencies.

Patil et al (1975) pointed out, the District Planning Boards have not succeeded in integrating rural electrification net work with their proposals of development in other sectors. It was observed
that rural electrification was an inseparable part of the total development programme and it emphasised the need for inter departmental co-ordination even at the formulation stage.

The symposium (1976) discussed at Srinagar and Hyderabad also noted that in the field of co-ordination much was left to be desired and they stressed the need for an effective dialogue and co-ordination between all the concerned departments, agencies and institutions.

Parthasarathy (1976) observed that in Andhra Pradesh co-ordination in Development Programmes was found to be inadequate due to lack of sufficient appreciation of linkages between sectors as well as the absence of integrated district planning. Also lack of advance preparation and poor synchronisation of efforts have contributed to delays in development programme.

The symposium (1976) discussed at Aurangabad emphasised the need for suitable machinery at appropriate levels for institutional and administrative co-ordination in the implementation of rural electrification programmes in general and REC and bank financed project in particular. In the latter case it was felt that co-ordination and
can cover co-ordination of resources through consortium finances.

An another symposium (1976) held at Shillong, it was underlined that there was an imperative need to ensure very close co-ordination between state electricity boards and concerned departments of developments.

Swaminathan (1976) revealed that the co-ordination between rural electrification programmes and industrial or other development programmes was inadequate either at the time of project formulation or at subsequent stages.

In another study conducted by Swaminathan (1977), it was observed that there was inadequate co-ordination at village and beneficiary levels between the various development departments, financial institutions etc. It was emphasised the need for constant dialogue at the higher levels of the supply under taking and the district Administration to obtain greater involvement of the later in the problems of the electric supply undertakings.

Pai (1977) stated that lack of co-ordination between Load Promotion authority and State
Electricity Board was the real limiting factor for speedy implementation of the programme of energisation of dugwells in Dhenkanal District of Orissa.

Swaminathan (1978) observed that the project formulation cell in West Bengal was devoid of expertise from discipline other than electrical engineering. It was stated that institutional arrangements for co-ordination seem to have broken down totally in the state. Some of the other development agencies at the district and block level seem to be led by temporary problems in electricity supply into encouraging diesel motors even in electrified villages. There have been a few instances of extremely good co-ordination such as that obtaining between the comprehensive area Development Corporation and SEB.

Parthasarathy (1978) revealed that in Uttar Pradesh there was lack of co-ordination among various agencies functioning in the district. It was found that there was no follow up action after the Co-ordination committee meeting.

The three studies conducted by CSID in Thane (1977), Kulb (1979) and Ratnagiri (1980) districts of Maharastra reported that there was not much co-
ordination between the rural electrification scheme and other development schemes. The integrated area planning has not attached adequate attention of the planning authorities and electrification authorities in particular. The studies suggested a package of development scheme cutting across the jurisdiction of a number of development and other agencies and Government Departments.

Parthasarathy (1979) revealed either absence of co-ordination or inadequate degree of co-ordination among existing development organisations in Nowgong District of Assam. He has pointed out lack of co-ordination between electricity department, industry department and financial institutions; electricity department and agricultural department irrigation department. There was no followup action immediately after co-ordination committee meeting. But another study conducted by the same author in Orissa (1979) revealed a well knit co-ordination among the existing rural development agencies in the promotion of rural electrification schemes, with special reference to the development of agricultural loads.
Raghupathi[1979] concluded that there was coordination to some extent between officials of electricity board and minor irrigation department. But the programmes of rural electrification and industrial development were not coordinated. The need was stressed for integrated planning of minor irrigation, rural electrification, industries and communications at the micro level.

Muranjan and Mitra [1980] felt in Maharashtra state that there is need for co-ordination among the different rural development agencies, Rural Electrification Corporation, Credit agency State Electricity Board, Agricultural Development Agencies and Minor Irrigation schemes etc., for successful implementation of rural electrification schemes.
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* Original not seen.