# A STUDY OF THE LINKAGES OF ELECTRICAL MACHINERY INDUSTRY IN KERALA

**Thesis Submitted to the Cochin University of Science and Technology for the award of the degree of**

DOCTOR OF PHILOSOPHY

In Economics under the Facaulty of Social Sciences

**By**

USHAKUMARY. K.

**Under the Supervision of**

Dr. M. K. SUKUMARAN NAIR

DEPARTMENT OF APPLIED ECONOMICS
COCHIN UNIVERSITY OF SCIENCE AND TECHNOLOGY
KOCHI-682022
**1992**

# COCHIN UNIVERSITY OF SCIENCE AND TECHNOLOGY

## DEPARTMENT OF APPLIED ECONOMICS

No. AE

Telephone : 85-6030
KOCHI - 682 022
KERALA, INDIA

Dr. M.K. Sukumaran Nair,
Reader,
Department of Applied Economics.

## C E R T I F I C A T E

Certified that the thesis, "A Study of the Linkages of Electrical Machinery Industry in Kerala", is the record of bonafide research carried out by Ms. **Ushakumari. K.** under my supervision. The Thesis is worth submitting for the degree of Doctor of Philosophy in Economics.

29.6.1992.
KOCHI.

Dr. M.K. Sukumaran Nair.

# C O N T E N T S


| | | |
|---|---|---|
| CHAPTER I | INTRODUCTION | 1 - 20 |
| CHAPTER II | INDUSTRIAL STRUCTURE OF KERALA | 21 - 39 |
| CHAPTER III | GROWTH, STRUCTURE AND PROBLEMS OF ELECTRICAL MACHINERY INDUSTRY | 40 - 65 |
| CHAPTER IV | LINKAGES OF ELECTRICAL MACHINERY INDUSTRY AN ANALYSIS OF THE SAMPLE UNITS | 66 - 113 |
| CHAPTER V | AN ALTERNATIVE EXPLANATION IN TERMS OF LOCATION THEORY | 114 - 127 |
| CHAPTER VI | CONCLUSION | 128 - 131 |
| BIBLIOGRAPHY | | 132 - 137 |


* * * * * *

# L I S T  O F  T A B L E S


| Table No. | | Page No. |
|---|---|---|
| 2.1 | Number of Registered Factories in Kerala | 24 |
| 2.2 | Employment Position in the Industrial Sector of Kerala | 26 |
| 2.3 | Structural Ratios and Technical Co-efficients in Major states - (ASI) Census Sector | 27 |
| 2.4 | Some Structural Ratios and Technical Co-efficients in Major States - (SSI Sector) | 28 |
| 2.5 | Growth of per capita State Income (Net Domestic Product) | 30 |
| 2.6 | Kerala's Industrial Base, 1980 - 81 | 31 |
| 2.7 | Kerala's Industrial Base, 1985 - 86 | 33 |
| 2.8 | Growth of State Domestic Product (At 1970 -71 prices) | 35 |
| 2.9 | Statewise changes in Wages per worker and Value Added per worker in Small Scale Sector | 37 |
| 3.1 | Annual Survey of Industries - Major Characteristics of Electrical Industry group 1976 - 77 to 1984 - 85 | 56 |
| 3.2 | United Electrical Industries Limited | 57 |
| 3.3 | The Premier Cable Company Limited | 58 |
| 3.4 | Aluminium Industries Limited | 59 |
| 3.5 | Transformers and Electricals, Kerala Limited | 60 |
| 3.6 | Structural Ratios and Technical Co-efficients of Industries for Factory Sector and Electrical Machinery Industry in Kerala (1976 - 77 - 1984 - 85) | 61 |
| 4.1 | Regional Pattern of purchase of Rawmaterials and Components (All Sample Factories) 1977 - 1986 | 68 |
| 4.2a | Percentage Distribution of Industrial Items of Rawmaterials - Aluminium Industries Limited 1977 1986 | 69 |

| | | |
|---|---|---|
| 4.2b | Percentage Distribution of Individual Items of Rawmaterials - Transformers and Electricals, Kerala Limited 1977 - 1986 | 70 |
| 4.2c | Percentage Distribution of Individual Items of Rawmaterials - United Electrical Industries Limited 1977 - 1986 | 71 |
| 4.2d | Percentage Distribution of Individual Items of Rawmaterials The Premier Cable Company Limited 1977 - 86 | 72 |
| 4.3a | Percentage Distribution of Percentage of Rawmaterials According to Regions - The Transformers and Electricals Kerala Limited 1977 - 86 | 74 |
| 4.3b | Percentage Distribution of Purchase of Rawmaterials According to Region The Premier Cable Company Limited 1977 - 1986 | 75 |
| 4.3c | Percentage Distribution of Purchase of Rawmaterials According to Regions - The Aluminium Industries Limited - 1977 - 1986 | 76 |
| 4.3d | Percentage Distribution of Purchase of Rawmaterisl According to Regions - The United Electrical Industries Limited 1977 - 1986 | 77 |
| 4.4 | Percentage Distribution of Input Purchase According to Regions - Transformers and Electricals Kerala Limited, 1977 - 1986 | 78 |
| 4.5 | Percentage Distribution of Input Purchase According to Region-The Aluminium Industries Limited 1977 - 1986 | 82 |
| 4.6 | Percentage Distribution of Input Purchase According to Regions-United Electrical Industries Limited 1977 - 1986 | 85 |
| 4.7 | Percentage Distribution of Input Purchase According to Region - The Premier Cable Company Limited 1977 - 1986 | 88 |
| 4.8 | Regional Pattern of Distribution of output (All Sample Factories 1977 - 86) | 92 |
| 4.9 | Percentage Distribution of Output According to Regions and Firms-wise, 1977 - '86 | 93 |

| | | |
|---|---|---|
| 4.10 | Percentage Distribution of Important Items of Output Sold - The United Electrical Industries Limited 1977 - 86 | 98 |
| 4.11 | Percentage Distribution of Important Items of Output Sold - Transformers and Electricals (Kerala) Limited | 101 |
| 4.12 | Percentage Distribution of Important Items of Output Sold - The Aluminium Industries Limited, 1977 - ;86 | 104 |
| 4.13 | Percentage Distribution of Important Items of Output Sold - The Premier Cable Company Limited - 1977 - 86 | 108 |
| 5.1 | Electricity Statistics at a glance | 121 |
| 5.2 | Levels of Industrial Development | 126 |


* * *

# CHAPTER I

## I N T R O D U C T I O N

Development literature is replete with studies on the process of industrialisation in backward economies. The focus of most such studies is formulation of appropriate strategies to enable less developed economies to achieve rapid industrial growth. The strategies thus suggested fall into basically two categories, viz., balanced growth strategy and un balanced growth strategy. Whichever be the type of the strategy, one thing is clear. They emphasise on growth processes which operate through the generation of economic linkages. Some times, a leading sector emerges in an economy and it helps the setting up of a number of other industries by generating demand for raw materials and other inputs and also by supplying semi-finished products for further processing. Alternatively, different sectors may emerge simultaneously and there arises a great deal of transactions of inputs and outputs amongst them. Irrespective of the nature of strategies, industrial growth takes place through the creation of supply and demand on an ever increasing scale. In less developed economies, the creation of such supplies and demand are important. It is, infact, the magnitude of these that determines the pace and pattern of industrialisation in such economies. If such a 'give and take' becomes lackadaisical, the economy tends to stagnate and if it becomes active, the economy grows. This is known as linkage effect. Thus, an economy grows through the generation of forward (creating demand for the output of industries) and backward (generating demand for various inputs) linkages.

A clear knowledge of the nature and magnitude of linkages generated by an industry is necessary to understand the growth process in an economy. Generally, industries can be grouped into two; (a) great growth industries having very high linkages and (b) essential industries which are absolutely necessary for the social and economic welfare of a nation, though generating only low linkages. Industries of the second type such as food processing industries are necessary in any economy to meet the primary requirements of human beings. But, as development proceeds, the importance of the first type increases. Then, industrial growth takes place as a chain reaction. The interdependence of economic activity arises from the fact that each production activity or sector demands input supplies from one or more other production activities. A sector is linked with the other sectors which supply inputs to it and also with those which use its output as their own inputs. As a matter of fact, the expansion of a sector induces larger demand for inputs from its input supplying sectors and also provides larger input supply to other sectors using its output. The former type of inducement is called backward linkage effect and the latter forward linkage effect.

Historically speaking, industrialisation through creating linkages has been a natural, but time consuming process, spreading over centuries as was manifested in the developed countries of today. But, under developed countries aim at achieving rapid industrialisation through deliberate intervention in their economies by planning. In other words, the strategy of planning for industrialisation emphasises a great deal on the setting up of industries which have high growth linkages keeping in mind the requirements of the nation.

A perusal of the available literature on planning reveals that rapid industrialisation is one of the major objectives of Indian development strategy. This is quite true of Kerala. But, Kerala is one of the most industrially backward states in the country. The contribution of the industrial sector of Kerala to the State Domestic Product has been always below the national average and almost stagnant too. Many reasons are adduced to the industrial backwardness of Kerala. One of the various explanations offered is that the industries that got established in Kerala have failed to generate adequate forward and backward linkages with the local economy. As this fact is going to be the major burden of the present study, it need not detain us here.

So far India had a highly centralised planning system giving inadequate attention to regional dimensions. When industries are established in the centre sector, the major considerations have not been the utilisation of local resources and exploitation of the local market of the total centre sector investments in Kerala, nearly 28 per cent has been in forest based industries and another 48 per cent in chemical industries (K.K. George; 1988 ). These industries and the gigantic engineering enterprises such as the Cochin Shipyard and the Cochin Refineries are by nature having low forward and backward linkages. The forest based industries though generate some backward linkages do so at the expense of the agricultural sector and ecological balance of the state. There is a good degree of complementarity between the centre sector industries and the state sector and private sector enterprises. As a consequence, Kerala has developed an industrial structure which does not generate significant regional multipliers. Apart from the fact that the industries that came up in Kerala have weak linkages, some of them are

highly capital intensive also. Such industries have an adverse effect on employment in the state which accounts for the largest proportion of the unemployed in the country.

It is generally argued that the size of the market is one of the factors that induces industrialisation. In this context, it is worthnoting that, Kerala provides a very large consumer market. The fact that, per capita expenditure in Kerala exceeds per capita income points to this[1] strongly enough even consumption goods industries did not come up in Kerala.

A recent study by P.P. Pillai also makes the point that the industries in Kerala have very low backward and forward linkages. (P.P. Pillai; 1987). A similiar line of arguement could be seen in a study by Rajat Roy also (Rajat K. Roy; 1979). This lack of linkages has developed certain structural bottlenecks in the process of industrialisation in the state. Therefore, there is a need to look at the industrial structure of Kerala with a view to studying the nature of linkages generated by the industrial sector. This will not only help to understand why there is industrial stagnation in Kerala, but also to develop an appropriate industrial strategy for the state.

As has been pointed out, several attempts have been made to study the pattern of industrialisation in Kerala especially in the context of Kerala's persistent industrial backwardness. The reasons for the backwardness are many and varied. While some emphasised high wage rate as the chief cause of industrial stagnation (High level committee Report, 1984), some others have refuted this (K. K. Subrahmanian and P. M. Pillai; 1985). Some attribute this to industrial unrest in the state .

---

F.N.[1] The estimated percapita consumer expenditure of Rs.2,436 in 1986-87 was higher than the estimated percapita State Domestic Product of Rs.2,371. (T.N. Krishnan; 1991).

(Subrahmanian.K.K.'90) There is yet another point of view which highlights the declining central sector investment in the state. (K.K. George 1988 ). But no serious effort has so far been made to study the process of industrialisation in the growth linkages generated by the industries. The present study is a modest attempt in this direction.

The essence of the arguement is that many of the modern industries set up in Kerala do not have any strong linkages with the local economy. They either cater to the needs of an external market or are of a foot-loose type in terms of the use of locally available resources including manpower. In order to demonstrate the salience of this line of reasoning, we have chosen the electrical machinery industry in Kerala for indepth analysis. Thus, the chief concern of the present study is to analyse the linkages generated by the electrical machinery industry in Kerala.

## STATEMENT OF THE PROBLEM

The chief concern of the study is to understand the extent to which the electrical machinery industry has contributed to the industrialisation of Kerala. A related question concerns linkage effects of these industries in the state. The importance of such a question arises because though the industry for sec may have considerable backward and forward linkages, it does not appear to have much linkages with the domestic economy of the state. This way of looking at the problem is further important because of a general belief that the large scale modern industries in Kerala are by and large foot-loose in their nature without having much regional linkages.

The electrical machinery industry is generally characterised by high linkage effects. It generates subsidiary industries and there by helps the growth of the industrial sector as a whole and also diversification of its structure.

Though certain large scale industries have been set up in Kerala and efforts have been made by the different Governments that have come to power from time to time for the rapid industrialisation of the state, the industrial sector continues to be sluggish. A look at the industrial sector shows that many of the industries set up here do not have any significant relationship with the resource base of the state. These industries are not in a position to make use of the available raw materials and natural resources nor are they able to find market for their products within the state. This is to say that economic linkages generated by these industries are rather weak and hence they are not able to produce sufficient growth impulses necessary for a take off in the industrial sector. The electrical machinery industry, historically an industry with great growth linkages has been selected for our study to investigate the problem posed above in greater detail.

Objectives of the study:

The study has the following major objectives (i) To examine the structure of electrical machinery industry in Kerala with a view to understanding the nature and magnitude of the forward and backward linkages generated by the industry.

(ii) To explore the reasons for the setting up of such industries having weak linkages in the context of the larger question of the industrial backwardness of the state. This includes an enquiry into alternative explanations based on location analysis, political feasibility, regional balance etc.

(iii) To examine the policy implications of the existing strategy of industrialisation in the state, at least in so far as electrical machinery industry is concerned; and suggest an alternative policy frame work.

Hypotheses:

The electrical machinery industry is capital and technology intensive by nature. It attracted considerable investment as many other large scale industries did in Kerala. But the large scale industries in general, and the electrical machinery industry in particular, with high potential for the development of ancillary industries did not generate much linkages with the domestic economy of Kerala. Whatever linkages they have generated have not been helpful in boosting up the regional income multiplier in the state. These industries came into existence on certain other considerations. Instead of generating the much needed growth impulses they contribute to the stagnation of the industrial sector and the distortion of its structure. It is difficult even to build a case of any locational advantages for the electrical machinery industry in Kerala. It is perhaps the availability of cheap electricity and the expectation of the establishment of new power generating stations and politically motivated policies which led to the setting up of such industries in Kerala.

Linkage Analysis in Theory:

Attempts have been made by economists all over the world to develop tools to analyse the contribution of a particular industry to the industrialisation process of a nation or region. Among these linkage analysis is quite a powerful one. Linkage analysis is a technique developed by Hirschman, (A.O. Hirschman; 1968) to understand

inter-industry relationship. Linkages are of two types, forward and backward. The forward linkage is established by

(i) Sale of output

(ii) Subcontracting and

iii) Marketing of its product

The backward linkages may be through the purchase of inputs and rawmaterials, acquisition of skill and technology, procurement of credit etc.

The concept of linkages has often been suggested as a criterion for selecting key sectors. Hirschman made a significant contribution by distinguishing between backward and forward linkages, and by suggesting methods for measuring them for each industrial activity. According to him countries or regions which have assigned high priority to high linkage industries would have generally higher growth rate than those which have not given attention to the linkage aspects in selecting industries. Chenery and Watanabe compared the structure of linkages for a large number of countries and provided operational interpretations for the different linkage classes (Chenery and Watanabe, 1958).

Linkages arise on account of the technological relationship among the various producing sectors. When a sector with high linkage is recommended as a priority sector, the basic assumption is that it induces growth in many other sectors rather than the low priority sectors. There exists a relationship between technology based linkage co-efficients and demand inducements. The basis question is whether these linkages necessarily imply growth or not?

If the linkages should provide necessary inducements certain basic conditions should be satisfied (Panchamukhi, 1975). First of all, whether demand or supply induced by linkages should be large enough to corespond to the minimum economic size? whether the establishment of a new firm or the expansion of an existing one becomes economically viable is decided by this. Secondly, there should be skilful entrepreneurs with right vision and foresight, who are able to respond to these pressures at right time. Thirdly, the complementary resources such as skilled manpower, land and raw materials should be readily available. Fourthly, necessary credit for starting a new firm or expanding an existing firm should also be readily available. Finally, policies of the Government towards income distribution should also be taken into consideration because the final demand depends upon the pattern of income distribution existing in an economy.

The realisation of technological linkages depends on certain institutional and policy factors. The nature of these factors play a significant role in converting these linkages into growth impulses (Panchankhi, 1975). It can not be easily carried out in the early stages of development. In underdeveloped countries linkages based on demand pressures (backward linkages) are more prominent than those based on supply pressures (forward linkages)

The first serious attempt in studying the structure of a national economy through input-output relations was made by Wassiley Leontief in 1930's (W.W. Leontief, 1936). The input - output technique was developed by him using matrix algebra. If the input need of the 'i th' commodity for the production of one unit of the commodity may be denoted as aij., for an n-industry economy, the input co-efficients can be arranged into a matrix A = [aij], which is called the technological co-efficient matrix.

Besides, the 'n' industries, the model also contains an 'open' sector, (Say, households) which exogeneously determines a final demand (non-input demand) for the product of each industry and which supplies a primary input (Say, labour service) not produced by the 'n' industries themselves. In a closed world, the final demand sector is endogenised.

The open static model may be summarised in the following matrix operation.

$$\bar{X} - \overline{AX} = \bar{Y} \quad - \quad (1)$$

Where $\bar{X}$ is the total output vector

'A' the technological co-efficient matrix and '$\bar{Y}$' the final demand vector.

From this equation it is possible to derive the following equation.

$$\bar{X} = (1-A)^{-1} \bar{Y} \quad - \quad (2)$$

Here, $(1-A)^{-1}$ is called the Leontief Inverse which is the crucial matrix in Input - output Analysis. An export vector (E) and an import vector (M) may be added to it to obtain the complete picture of the national economy.

Leontief's pioneering effort paved the way for numerous other national level studies in the United States of America and several other countries including India in the early fifties. The first attempt in India was made by Mony Mukerjee, who prepared a four sector model for the year 1949-50 (Mukerjee, M., 1954) following this; atempts to construct input-output tables of the national economy were made by several individual scholars and institutions like the Planning Commission and Indian Statistical Institute.

Attempts to construct input-output tables of regional economies perhaps started with the pioneering contribution of Walter Isarad, 1957 (W. Isarad, 1957). In India, a beginning in the regional level input-output analysis was made by Ranjit Dhar (1965) with his input-output tables for West Bengal and Calcutta Metropolitan District (Ranjit Dhar, 1965). This was followed by several state level studies during late sixties and seventies.

Input-output tables are available now for different states. West Bengal, Bihar, Uttar Pradesh, Haryana, Himachal Pradesh, Punjab, Rajasthan, Karnataka, Gujarat, Maharashtra and Kerala[2].

In addition to these Venkitaramaih, Kulkarni and Angade (1979) derived 21 regional level tables from the National Table of 1965 for 15 states and 6 union teritories of India[3] .

The first attempt to construct an input-output table for the regional economy of Kerala was made by P.P. Pillai in 1987 (P.P. Pillai, 1987). Kerala's Regional Economy presents several unique features and the structure of this regional economy is believed to be different from those of the other regions in the country in many respects.

---

F.N.2.

(i) Dhar, Ranjit," An input output table for West Bengal and Calcutta metropoliton District", Calcutta Research studies, No.13 Institute of Public Administration New York 1965.

(ii) Dhar, Ranjit," The study of Inter - regional Inter - sectoral Relations of the Indian Economy", 1953 - 54", An Economic Analysis in input - output frame work, Vol. 1, Input - output Research Association, 1967.

(iii) Dhar, Ranjit, "Input - output and Regional plan formulation; A case study of the Economy of West Bengal during the fourth five year plan, ((Mimeographed) government of West Bengal, 1965.

(iv) Singh, Bhangwar; " West Bengal's Industrial Economy; An Analysis in Input - output frame work", Anvesak, Vol.II, No, 1972.

(v) Koti, R.K. "Input - output Table for Maharashtra", Tata Economic Consultancy Services", Bombay, (mimeo) 1973.

(vi) Algah, Y.K., and Kashyap, S.P;" structure of Gujarat's Industrial Economy - some experiments with the Input - output Approach", presented at the third conference of Input - output Research Association, 1970.

(vii) Alagh, R.K.; "Structure of Gujarat's Economy, Inter - industry flows at producer's prices, 1964 - 65", Sardar Patel Institute of Economic and Social Research, Ahmedabad, 1971.

(viii) Bhalla, G.S.; "Structure of Haryana Economy, Inter - industrial flows and patterns of final demand 1968 - 70, 1974.

(ix) Ghosh, P.P.; "A Regional Planning Moder for Bihar in an Input - output frame work", A.N. Sinha Institute of Social Studies, 1977.

(x) R.C. Mehta; "STructure of Rajasthan Economy", An Input - output Analysis, 1970 - 71," 1977.

(xi) Sri. Prakash and Parnaik, "STructure of the Industrial Economy of Madhya Pradesh", fifth All India Input - output conference, Ahamedabad, 1975.

(xii) V.R. Panchamukhi; structure of the Industrial Economy of Karnataka, "Fifth All India Input - output Conference, Ahmedabad 1975.

(xiii) State planning Institute, U.P.; Structure of the Economy of Utter Pradesh, 1970 - 71", Lucknow, 1976.

(xiv) Bhanwar Siingh "West Bengal's Industrial Economy; An Analysis in input - output frame work, Anvesak, 1972 (December)

(xv) Sri Prakash and Parnakar, P.K.; Inter - industry structure of the Economy of Madhya Pradesh, 1965." Sixth Input - Output Conference, Bomaby, 1978.

(xvi) Panchamukhi, V.R., "Input - Output Study of Karnataka STate, 1977 - 78", Report to Planning Department Government of Karnataka.

---

F.N.3

(i) Venkataramaiah, P.; Kulkarni, A.R., Angade, L; "Regional Input - Output Matrics, India, 1965." Arthavijnana, Sep - Dec.1979.

Hazari attempted to measure indirectness of the methods of production for the Indian economy on the pattern followed for Italy, Norway, Japan, and the United States (Hazari, 1970). He presents results obtained for the strength of backward and forward linkages based on the Leontief Inverse $(I-A)^{-1}$. Hazari introduced spread effects and suggests indices of co-efficient of variation, and he used different weights of final demand to bring about the relative significance of different sectors in the economy. Acharya and Hazari, however, distinguish between 'gross linkages' computed on $(I-A)^{-1}$ and net linkages computed on the inverse net of imports. $(I-A-M)^{-1}$. This model was applied to the economies of India, East Pakistan, (New Bangladesh) and west Pakisthan.

The focus of Panchamukhi's study (Panchamukhi, 1975) is on an internaional comparison of linkage co-efficients of six Asian countries - India, Pakisthan, Indonesia, Malaysia, Philippines. The Republic of Korea and Srilanka. Chenery and Watanabe, (Chenery and Watanabe, 1958) have computed the average degree of interdependence of economic sectors in Japan, U.S.A. and Norway (taking consolidated data for the four countries together).

The Gokhale Institute of Politics and Economics compiled certain input output tables. The first one was complied for the year 1963 and consisted of 32 sectors. The second table relates to the same year and consists of 85 sectors (Mathur, P.N. et. al, 1969, 72)

Analysing a state economy in India was first systematically attempted by G.S. Bhalla, (Bhalla, G.S. 1969). Using a 17 sector input - output model for the Punjab economy for 1959 constructed by S.B. Ragnekkar, he computed sectoral income multipliers for Punjab and argued that the total effect of investment of different sectors were very different from the initial direct effects.

Location Theory:

Some times linkage analysis fails to explain the growth of industries in certain regions. Since, regional disparities arise due to the even distribution of industrial investment and industrial employment and the concentration of the above in few developed centres, the regional disparities, can be thought of as a cause of industrial location.

Location theory were originally developed to examine the underlying logic of the location decision of the firm and thus sought to explain the relative influences of the factors exerting on the choice of particular location of an individual firm which seeks to maximise profits under free market conditions. 'Location theories' therefore, help us to understand the 'pre-requsite which are considered to be important and necessary for a profit maximising firm to locate its plant in any particular region or particular location.

But in recent years, location theory has been extended beyond the classical freemarket paradigm of profit maximisation of firm. Location theory is being utilised for Regional Development Planning. In this context it is worthnoting what William Alonso says; "increasingly the question of location of a factor is being considered as a 'Project' by a government agency rather than as a profit making venture by a private corporation. . . . . In this case, theory of location of the firm extends to project planning but anteceds regional and national planning." (Alonso William; 1969). Industrial location can therefore, be considered as an important aspect of industrial development in a backward region.

Location theories developed in Western Countries are based on the assumptions of perfect competition and free market economy. But developing countries like India are characterised by imperfect competition and often controlled markets. No doubt, labour is an important location

factor, but not only the quantum of labour but the quality should also be considered. Backward regions in India have abundant labour, but they are mostly unskilled. Hence the availability of labour alone is not a very strong factor for industrial location in backward regions. Transportation is another important location factor. Though, still this is one of the important considerations of location decision, it is gradually loosing its importance due to a faster growth of 'foot - loose' industries, ie. industries which are not located in their source of rawmaterials but are tied to their markets. These foot-loose industries have freedom of choice of location and can be established anywhere with minimum necessary infrastructure. But the 'rooted' and linked localised industries, ie. industries that have localised raw materials or supply products localised industries are subject to Hober's law that the location of industries will be such as to make the total low-miles of transport to and from the industry to a minimum (Sargent Florence, 1972) However, in developing countries like India, transport cost will still occupy an important position in the list of location factors. Distant backward areas are usually avoided by industries due to higher transportation cost, among other things The North Eastern Region of India is a case in points.

Another important factor considered by the Location Economists is market for the products. However, in a backward region demand is generally low due to lower percapita income. Lack of demand can not create sufficient inducement for industries to go to backward regions. In addition to the above, there are two more factors, one is the psychological factor influencing location decision of the entrepreneurs which Richardson calls 'habit' (Richardson, 1976). According to Richardson, "central location may be chosen out of habit rather than reasons". The other is social and family ties, because of which firms are reluctant to leave the present location and to move to any other

location and thereby choosing to expand at the urban location they belong. As K.J. Button says, "Many firms are inert and once they are established at a certain place, a decision frequently taken in the distant past when location provided necessary raw materials or was an important link in the communication system of the day they expand (or stagnate) rather than move to another city which may offer a financial return". (Button, K.J. 1976)

Literature available on location analysis is useful in understanding the theory well. "Theory of Location of Industries" by Alfred Weber (Alfred Weber,) deals with the theory of Least Cost Approach. According to this theory, the optimum location is determined by three principal costs, viz. transport cost, labour cost and cost due to excessive agglomeration. He assumes that under perfect competition the plants at the lowest location will achieve highest profits.

'The Economics of Location" by August Lousch (August Lousch,) deals with the Market Area Approach in Location Theory. According to this theory demand varies from place to place and market for the product is scattered. Through large sales of products, sufficient profits can be generated to neutralise high transport costs. He stressed the importance of the accessibility to the maximum share of the market in deciding upon the location.

Green Kut Melvin, in his work " Plant, Location In Theory And Practice" (Green Kut Melvin; 1957 ) tried to synthesise the idea of profit maximising approach of location by intergrating the theories of cost and demand. He believes that transportation cost will be the determining factor in industrial location if it constitutes the major portion of costs. In this case, production will be located near the rawmaterial sources.

"The Logic of British and American Industries" by Sargent Florence (Sargent Florence, 1972) is an important contribution to location analysis.

It deals with the transportation costs proving that it is an important location factor. Regional economics by Richardson throws light on another important factor namely psychological factor in determining location. His ideas are supported by Button, through his work "Urban Economies; Theory and policy". (Button, K.J.)

## M E T H O D O L O G Y

As narrated above, the most effective tool to study the linkages of electrical machinery industry in Kerala, no doubt, is the Leontief input-output analysis. But owning to the following reasons, We are not in a position to make use of this technique in analysing the problem at hand. Firstly, we do not have adequate information regarding the firms/industries which supply the inputs to the sample units under study. Secondly, the output is mostly purchased by a single industry viz; the power generating industry owned by the state Electricity Boards. Thirdly, as our focus is the regional economy of Kerala, visa-ais the rest of India and inter-national market, there can be only a maximum of three input supplying and output absorbing sectors. They are the domestic market of the state economy, the rest of India and the international market. In this context, it was decided to use the share of the different markets in both input supplying and output absorption as indicators of the linkages of electrical machinery industry. This is basically an intermediate goods industry, it does not have a significant final demand vector.

Both primary and secondary data have been used for the analysis. The secondary data available with the Annual Survey of Industries, Bureau of Economics and Statistics, Government of Kerala, state Planning Board, publications of the Central Statistical Organisation (CSO), CMIE etc. have been used to analyse the economic structure of the state economy and also to describe the broad features of the electrical machinery industry in Kerala. For detailed investigation into the linkages generated by the electrical machinery industry, primary data have been collected. There are seven large factories producing electrical machinery in Kerala. Out of these four have been selected at random for detailed study. The factories,

selected are Transformers and Electricals Kerala, Limited, (TELK), Angamaly, Aluminium Industries Limited (ALIND), Kundara and Mannar Premier cable company Limited (PCC) Cochin; and United Electrical industries (UEI) Quilon. Data relating to output, rawmaterials, components, Sales etc. Within the state, outside the state and abroad have been collected by directly visiting the factories and also from the balance sheets made available. Data for a 10 years period from 1976 to 1986 have been used for the study.

## C H A P T E R  S C H E M E

The study altogether consists of six chapters. The introductory chapter highlights the problems, objectives and methodology of the study.

The second chapter sketches briefly the industrial sector of Kerala. This details with the causes of persistent industrial backwardness in the state. In chapter three, we describe the chief characteristics of the electrical machinery industry in Kerala as thrown up by the secondary data. It also gives a brief account of the performance of the sample units.

Chapter four is a detailed analysis of the data collected from the factories selected for the study. It analysis the backward and forward linkages generated by the electrical machinery industry. Balance sheet collected from the factories together with the purchase and sales data and ASI data are mainly used in this sector for detailed analysis.

An alternate explanation in terms of the location theory is attempted in chapter five. Location theory does not seem to be having much significance in the context of Kerala economy. The availability of power and mineral resources is also taken to explore the causes for the existence of the industry in Kerala. Finally, an attempt is made to justify the existence of the industry in terms of the policy of regional balance and certain regional specific factor relevant for the growth of the industry during a particular period.

The last chapter presents the findings of the study.

* * * * *

# CHAPTER II

## INDUSTRIAL STRUCTURE OF KERALA

It was pointed out in the last chapter that the major objectives of the present study is to understand the dynamics of industrial growth in Kerala - in terms of the linkage effect of the large scale industries taking the electrical machinery industry as a case study. The growth of an industry depends on a host of factors, the most importnt being the general industrial climate is a fall out of the industrial structure in the state. Therefore, it is necessary to take a brief look at the evolution of the idustrial structure of Kerala and the characteristics it has come to acquire.

### Brief History of the Industrial Scene:

Industrial development activities in the state of Travancore and Cochin and the districts of Malabar of Madras Presidency started in the middle of the 19th century with the pioneering efforts of missionaries and planters[1]. A Textile Factory constituted the first industry in Kerala. This was followed by the establishment of the first Coir factory in Alleppey. Certain tile manufacturing units were established in Palghat and Calicut of the Malabar districts towards the end of the 19th century. Perhaps the only industry that could be called modern in the 18th and 19th centuries was the Tea Plantation Industry. This industry thrived under the support of the British. The state was soon "converted into an export-oriented primary producer with colonial capital as a major claimant on the surplus either directly through the ownership of the plantations or monopoly over major sectors of import-export trade" (Thomas Issac and Michael Tharakan, 1986). In the beginning of the 20th century a number

---

1. Travancore, Cochin & Malabar came to constitute Kerala after the reorganisation of states in 1956.

of factories came up that primarily catered to the needs of the traditional industries like coir, rubber etc. Tea plantation industries also came up during the 19th century and early 20th century due to the pioneering efforts of the British planters. Fertilisers and Chemicals in Alwaye was the first fertiliser factory started in the country for the production of nitrogenous fertilisers. Other important units registered during the pre-plan period were the Rare-Earth Division of Indian Rare-Earth Limited, in the central sector, Travancore Sugars and Chemicals Limited, Kerala Ceramics Ltd., Forest Industries (Travancore) Ltd., United Electrical Industries Ltd. etc. which are now in the state sector. Travancore Electro Chemical Industries Ltd., Travancore Cements Ltd., Indian Aluminium Company Ltd., Western India Plywood Ltd., etc. also came into existence during the pre-plan period. During 1920-21, an Economic Development Board was constituted with the objective of developing the economic resources of the state, establishing new industries and expanding the old ones. In Cochin state a stoneware factory was started in Chalakudy in 1924-25. During this time, the industrial pattern was mostly confirmed to coir, yarn, spinning, handloom weaving, fibre extraction and such other cottage industries.

With the organisation of the Industries Department in Travancore under Dr. S. Baker, the industrial climate underwent a great change. Many new schemes were taken up and encouraged by the Economic Development Board. A large number of industries were started in the subsequent years. The period 1935-'47 saw the establishment of a number of factories engaged in the production of rayons, titanium dioxide, ammonium sulphate, ammonium phosphate etc. Preliminary work on the Travancore Rubber Works was completed in 1934-37. The Sri Chitra Mills at Alwaye, Government Ceramic Factory at Kundara, Indian Aluminium

Company at Alwaye, Travancore Plywood Industries at Punalur, Travancore Ogale Glass Manufacturing Factory and the Travancore Rayons were some of the major factories installed in this decade.

The most important landmark in the industrial development of Kerala was 1947-48 when the F.A.C.T. was commissioned. Preliminary works on the Alind Works, Forest Industries at Alwaye, and West Coast Industries in Cochin were started. Travancore Electro Chemical Industries Ltd., Travancore Cements Ltd., Indian Aluminium Company Ltd., Western India Plywood Ltd. etc. also came into existence during the pre-plan period.

Inspite of the existence of an initial sahibrious industrial climate, the state of Kerala failed to partake in the general buoyancy of the Indian economy during the first two five year plan periods. In fact, the share of Kerala in the State Domestic Product declined during this period. Though, the state possesses certain basic requirements of industrial growth, it was yet to pick up the momentum in the field of industrial development. Compared to many other states of India, Kerala has fairly developed overhead facilities. The agricultural sector is also relatively developed. But, the industrial sector has not shown any signs of adequate development (K.C. Shankaranarayan and V. Karunakaran, 1985).

Industrial Sector of Kerala:

Inorder to get a clear picture of the pace of industrial development in Kerala, it is necessary to take into account the magnitude and intensity of industrialisation in the state. Table 2.1 presents the position of registered working factories in Kerala. The number of factories registered in the census sector upto 1970-71 was 672. The rate of increase in the number of factories under the census sector has been only moderate. The Small Scale Sector also showed a similar trend. However, its growth in the early 80's was insignificant.

Table - 2.1

**Number of Registered Factories in Kerala**

| Year | Census Sector | SSI Sector |
|---|---|---|
| 1970-71 | 672 | 5632 |
| 1972-73 | 707 | 6391 |
| 1975-76 | 808 | 9986 |
| 1979-80 | 711 | 15974 |
| 1980-81 | 703 | 18954 |
| 1981-82 | 719 | 22977 |
| 1982-83 | 768 | 24884 |
| 1983-84 | 781 | 28117 |
| 1984-85 | 793 | 31499 |

Source: Annual Survey of Industries, (various years) Central Sector and the 'Basic data on Registered small scale Industrial Undertaking in Kerala 'Directorate of Industries and Commerce, Government of Kerala, Thiruvananthapuram, 1987.

Note : Census Sector is taken as per definition in the ASI ie. employing 50 people or more. All the other registered industrial units coming under the '50 employees level' are taken as small scale sector, SSI.

The comparative picture of the census sector and the Small Scale Sector with regard to the number of factories registered gives us an idea about the nature of industrialisation in the state. Though, both the large scale and small scale units in the state increased in number during the period 1970-'85, the rate of increase was higher in the case of the latter than the former. This throws light on the fact that as far as Kerala's Industrial sector is concerned, the small sector occupies a prominent place. In the case of employment also, the small scale sector dominates the entire factory sector. This can be guaged from Table 2.2. It is clear from the table that Small Scale Sector plays a vital part in the industrial scene of the Kerala economy. Employment in the census sector shows a tendency to decline. On the contrary, the small scale sector presents a picture of an increasing trend in employment.

A comparative analysis of the structural ratios and technical co-efficients of all industries in the Factory Sector as well as SSI sector is given in Tables 2.3 and 2.4. In terms of industrialisation, Kerala is way behind many other states. Its rank in terms of value added is 10 in the factory sector. Among the major states, Kerala ranks high in terms of both capital and labour productivity. However, it presents poor picture in terms of capital productivity which is reflected in its lower rank in capital-output ratio. In terms of wage-productivity relationship Kerala's position is not very encouraging as it ranks fourth in wages but only tenth in net value-added.

The industrial sector in Kerala seems to have behaved at variance with that in the country as a whole. Though, there has been significant slowdown in the growth of the industrial sector in India after the mid-sixties (K.N. Raj, 1970; I.J. Ahluwalia, 1985), it did not happen so in Kerala (K.K.Subrahmanian and P.M. Pillai, 1986) during this period.

Table - 2.2

**Employment position in the Industrial sector of Kerala**

| Year | Workers in the census sector | Percentage to total industrial employment | Workers in small scale sector | Percentage to total industrial employment |
|---|---|---|---|---|
| 1970-71 | 137759 | 80.00 | 3,3792 | 20.00 |
| 1972-73 | 155108 | 78.95 | 4,1346 | 21.05 |
| 1975-76 | 190675 | 76.09 | 5,9916 | 23.91 |
| 1979-80 | 184590 | 65.82 | 9,5844 | 34.18 |
| 1980-81 | 182029 | 61.54 | 11,3704 | 38.46 |
| 1981-82 | 197720 | 59.99 | 13,1862 | 40.01 |
| 1982-83 | 167160 | 52.82 | 14,9304 | 47.18 |
| 1983-84 | 170321 | 50.23 | 16,8720 | 49.77 |
| 1984-85 | 178031 | 48.50 | 18,8994 | 51.50 |

Source : Annual Survey of industries (ASI) and the 'Basic Data on Registered Small Scale industrial Undertaking in Kerala'. Directorate of Industries and Commerce, Govt. of Kerala, Thiruvananthapuram, 1987.

Table 2.3

STRUCTURAL RATIOS AND TECHNICAL CO-EFFICIENTS IN MAJOR STATES (AST CENSUS SECTOR)

| States | Rank in terms of value added | Fixed capital per employee Rs. | Rank | Net value added/ employee Rs. | Rank | Wages per worker Rs. | Rank | Fixed Capital/ value added Ratio | Rank | Emoluments/ value added Ratio | Rank |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) |
| Andhra Pradesh | 8 | 38,736 | 10 | 4,187 | 15 | 4,421 | 14 | 3.46 | 7 | 0.50 | 5 |
| Assam | 15 | 16,159 | 15 | 9,463 | 14 | 2,901 | 15 | 2.64 | 9 | 0.40 | 12 |
| Bihar | 9 | 97,560 | 1 | 13,638 | 12 | 9,297 | 2 | 7.15 | 1 | 0.75 | 1 |
| Gujarat | 4 | 45,617 | 7 | 17,905 | 6 | 7,029 | 8 | 2.54 | 10 | 0.47 | 7 |
| Haryana | 12 | 66,140 | 5 | 22,290 | 2 | 6,532 | 10 | 2.96 | 8 | 0.35 | 14 |
| Karnataka | 6 | 37,999 | 11 | 15,724 | 9 | 6,673 | 9 | 2.41 | 11 | 0.12 | 15 |
| Kerala | 10 | 33,976 | 12 | 15,342 | 10 | 5,394 | 12 | 2.21 | 12 | 0.42 | 10 |
| Madhya Pradesh | 7 | 77,310 | 4 | 21,181 | 3 | 8,011 | 5 | 3.64 | 6 | 0.41 | 11 |
| Maharashtra | 1 | 41,202 | 9 | 24,622 | 1 | 9,551 | 1 | 1.68 | 14 | 0.46 | 8 |
| Orissa | 14 | 61,986 | 6 | 15,771 | 8 | 8,934 | 4 | 3.93 | 5 | 0.63 | 3 |
| Punjab | 11 | 77,917 | 3 | 18,272 | 5 | 4,986 | 13 | 4.26 | 4 | 0.39 | 13 |
| Rajastan | 13 | 85,046 | 2 | 19,758 | 4 | 7,258 | 6 | 4.30 | 3 | 0.43 | 9 |
| Tamil Nadu | 3 | 30,165 | 13 | 17,664 | 7 | 7,066 | 7 | 1.70 | 13 | 0.48 | 6 |
| Utter Pradesh | 5 | 44,254 | 8 | 9,960 | 13 | 5,450 | 11 | 4.44 | 02 | 0.62 | 4 |
| West Bengal | 2 | 23,835 | 14 | 15,094 | 11 | 9,050 | 3 | 1.57 | 15 | 0.67 | 2 |
| All India | | 45,563 | | 16,932 | | 7,388 | | 2.69 | | 0.52 | |

Source : Subrahmanian, K.K. and Mohanan Pillai, P.,"Kerala's Industrial Backwardness : Exploration of Alternative Hypothesis ". Economic and Political weekly Vol. XXI, No.14, April 5, 1986 P/ 585.

Note : Calculation based on ASI data relating to the factory sector.

Table : 2.4

**SOME STRUCTURAL RATIOS AND TECHNICAL COEFFICIENTS IN MAJOR STATES (SSI SECTOR)**

| States | Fixed capital per employee | | Net value added per employee | | Emoluments per employee | | Fixed capital/ Value Added | | Emoluments/Value Added | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Rs. | Rank | Rs. | Rank | Rs. | Rank | Ratio | Rank | Ratio | Rank |
| Andhra Pradesh | 05320 | 15 | 04562 | 15 | 5281 | 09 | 1.25 | 06 | 1.23 | 01 |
| Assam | 13381 | 08 | 12156 | 05 | 3712 | 13 | 1.10 | 08 | 0.30 | 05 |
| Bihar | 11548 | 10 | 17324 | 01 | 7242 | 03 | 0.66 | 15 | 0.41 | 13 |
| Gujarat | 17762 | 02 | 11822 | 06 | 5683 | 06 | 1.50 | 04 | 0.48 | 08 |
| Haryana | 17439 | 03 | 14242 | 03 | 9037 | 01 | 1.22 | 07 | 0.63 | 02 |
| Karnataka | 14857 | 06 | 11592 | 07 | 5013 | 11 | 1.28 | 05 | 0.43 | 12 |
| Kerala | 09527 | 13 | 10227 | 10 | 6050 | 04 | 0.93 | 13 | 0.60 | 03 |
| Madhya Pradesh | 06585 | 14 | 8375 | 14 | 3597 | 15 | 0.78 | 14 | 0.42 | 11 |
| Maharashtra | 15942 | 04 | 17068 | 02 | 7686 | 02 | 1.01 | 11 | 0.45 | 10 |
| Orissa | 10127 | 12 | 09463 | 12 | 3673 | 14 | 1.07 | 09 | 0.38 | 14 |
| Punjab | 13289 | 09 | 12918 | 04 | 5914 | 05 | 1.02 | 10 | 0.46 | 09 |
| Rajasthan | 22230 | 01 | 10600 | 08 | 5282 | 08 | 2.09 | 01 | 0.49 | 07 |
| Tamil Nadu | 13691 | 07 | 08728 | 13 | 4422 | 12 | 1.56 | 02 | 0.50 | 06 |
| Utter Pradesh | 15092 | 05 | 9831 | 11 | 5062 | 10 | 1.53 | 03 | 0.51 | 05 |
| West Bengal | 10371 | 11 | 10489 | 09 | 5553 | 07 | 0.98 | 12 | 0.52 | 04 |
| All India | 13144 | -- | 11273 | -- | 5547 | -- | 1.19 | -- | 0.51 | -- |

Source : Based on ASI Data for Factory and Census Sectors in 1982 - 83.

Reference : M.M. Thampy, Wage-Cost and Kerala's Industrial Stagnation - Study of organised Small Scale Sector. Economic and Political Weekly, Vol. XXV, No.37, Sep.1990 p. 2078.

Similarly, when in the 80's growth picked up in the industrial sector for the country as a whole, Kerala's industrial sector showed only a dismal picture. We can observe stagnancy in Kerala's industrial economy. The stagnancy is explained in the latter period of the analysis.

Contribution to State Domestic Product:

The overall growth achievement by Kerala is relatively poor compared to many other states. Between 1971 and 1981 the annual growth rate of per capita State Domestic Product in Kerala at constant prices was only 0.4 percent as against one percent for all India. The poor performance of the agricultural sector especially in the 70's along with the stagnated growth in industries in Kerala seem to explain, in general, the main causative factors responsible for the low growth of the Kerala economy. Agricultural sector alone canot be expected to provide the growth dynamism; an industrial base is needed to stimulate and sustain the growth process. It will also provide the base for diversifying the economic structure and developing forces of production within the region. Table 2.5 gives the picture of growth of per capita state income (Net Domestic product) in Kerala and other Southern States. The per capita State Domestic Product (S.D.P.) in Kerala both at current and constant prices has been consistently below the national average.

Industrial Base of Kerala:

A study of the various trends of Kerala's industrial growth requires a systematic analysis of the state's industrial base and its exact position in the industrial map of India. In Tables 2-6 and 2.7, an analysis of Kerala's industrial base is carried out in comparison with that of all India.

It can be seen from the tables that Kerala has a lop-sided industrial structure with its base consisting of a set of resource based

Table - 2.5

**Growth of per Capita State Income (Net Domestic Product)**

(Rupees)

| States | At current price | | | At constant price | | |
|---|---|---|---|---|---|---|
| | 1970-71 | 1980-81 | Annual Rate of Growth (%) | 1970-71 | 1980-81 | Annual Rate of Growth (%) |
| Andhra Pradesh | 586 | 1313 | 08.4 | 586 | 649 | 1.0 |
| Assam | 535 | 1221 | 08.6 | 535 | 538 | 0.4 |
| Bihar | 403 | 0927 | 08.7 | 402 | 447 | 1.1 |
| Gujarat | 828 | 1828 | 08.2 | 828 | 861 | 0.4 |
| Haryana | 877 | 2331 | 10.3 | 877 | 1061 | 1.9 |
| Karnataka | 865 | 1314 | 16.7 | 865 | 637 | 0.8 |
| Kerala | 594 | 1379 | 08.8 | 594 | 619 | 0.4 |
| Madhya Pradesh | 484 | 1331 | 08.9 | 484 | 493 | 0.2 |
| Maharashtra | 783 | 2261 | 11.2 | 783 | 980 | 2.3 |
| Orissa | 478 | 1101 | 08.7 | 478 | 529 | 1.1 |
| Punjab | 1070 | 2771 | 10.0 | 1070 | 1380 | 2.6 |
| Rajasthan | 620 | 1238 | 07.2 | 620 | 542 | -1.3 |
| Tamil Nadu | 581 | 1197 | 07.5 | 581 | 615 | 0.6 |
| Utter Pradesh | 486 | 1280 | 10.1 | 486 | 518 | 0.7 |
| West Bengal | 722 | 1553 | 07.9 | 722 | 761 | 0.5 |
| All India | 633 | 1559 | 09.4 | 633 | 697 | 1.0 |

Source : CSO Estimates of State Domestic Product, 1960-61 to 1982 - 83, New Delhi, January 1984.

KERALA'S INDUSTRIAL BASE, 1980-81

| Industry group | Percent share in Kerala's aggregate factory sector | Percent share in all India total for industry | Percent share in Kerala's aggregate Factory sector | Percent share in all India total for Industry |
|---|---|---|---|---|
| Food Products | 38.96 | 8.34 | 9.39 | 5.19 |
| Beverages | 7.16 | 5.92 | 3.17 | 5.35 |
| Textiles | 6.66 | 1.63 | 7.16 | 2.11 |
| Wool,Silk, synthetics | 0.73 | 0.92 | 1.05 | 1.09 |
| Jute textiles | - | - | - | - |
| Textiles & Products | 2.04 | 5.66 | 3.40 | 11.73 |
| Wood & products | 5.14 | 17.47 | 2.61 | 15.97 |
| Paper & Products | 3.5.4 | 3.60 | 4.99 | 4.49 |
| Leather & Leather products | - | - | - | - |
| Rubber, Petroleum etc. | 2.94 | 3.50 | 9.92 | 6.41 |
| Chemicals & products | 5.89 | 3.36 | 17.62 | 4.76 |
| Non-metalic minerals | 5.25 | 4.08 | 3.83 | 3.71 |
| Basic metal & Alloy | 1.30 | 0.62 | 2.82 | 0.89 |
| Metal products | 1.21 | 1.70 | 0.92 | 1.06 |
| Non-metalic machinery | 1.33 | 0.91 | 1.16 | 0.51 |
| Electrical machinery | 2.77 | 2.43 | 7.08 | 3.32 |
| Transport equipment | 1.77 | 1.63 | 2.31 | 1.05 |
| Other manufacturers | 0.62 | 2.52 | 1.27 | 3.84 |
| Electricity | 10.32 | 3.89 | 18.39 | 5.02 |
| Repair services | 2.26 | 3.99 | 2.19 | 4.45 |

Source : Subrahmanian K.K. and P. Mohanan Pillai (1985); op.cit P. 19.

Industries; demand based (foot-loose) and capital goods related (eg. engineering) industries not having a 'fair share' (K.K. Subrahmanian and P.M. Pillai, 1986). The study also notes that Kerala tends to specialise in resource-based industries like food-processing, wood and wood products, paper and paper products, rubber and rubber products, and non-metalic mineral industries. The analysis of recent ASI data (Table 2.7) did not show any significant change in the industrial base of Kerala. The industrial structure remained too lop-sided to ensure inter-sectoral linkages and agglomeration economies for the overall industrial progress (K.K. Subrahmanian, 1990).

From the above analysis, it is clear that Kerala lacks a balanced industrial base. The relative importance of some traditional industries like cashew, coir, tiles, printing etc. has reduced and that of modern industries like petroleum, ship building, electronics etc. has increased over a period of time. Still, major industries in Kerala are of a traditional variety and based on the region's natural resources. Hence, it may be argued that the overall industrial base of the state is still charcterised by concentration of food industries. A major drawback of these industries is that they have very little forward linkages.

Kerala has been occupying a very low position, ie. 14th among the different states in the matter of industrialisation explained in terms of value-added (See Table 2.8). The share in value-added in Kerala is comparatively low and is below the national average. Kerala's industrial stagnation again is evident from the low share of the industries in the (SDP) of the economy. The State Domestic Product Data (SDP) shows that Kerala's per capita manufacturing product was significantly higher (Rs.48) than all India (Rs.37) in 1950 (Tharakan and Issac, 1986). Further, Kerala was relatively more advanced and had a better industrial base than most regions (other than those around the

Table : 2.7

## KERALA'S INDUSTRIAL BASE, 1985-86

| 2 Digit NIC groups | | Percentage share in total Factory Employment | Value Added |
|---|---|---|---|
| 20-21 | Food Products | 30.06 | 8.78 |
| 22 | Beverages, tobaco | 7.96 | 3.00 |
| 23 | Cotton textiles | 7.75 | 5.08 |
| 24 | Wool, Silk, synthetic fibre | 0.34 | 0.27 |
| 25 | Textile products | 2.66 | 3.68 |
| 26 | Wood and Wood products | 5.36 | 1.57 |
| 28 | Paper & paper products | 3.80 | 5.38 |
| 29 | Leather, fur, etc. products | 0.05 | 0.02 |
| 30 | Rubber, Plastic, etc | 3.67 | 11.41 |
| 31 | Chemical & Chemical products | 7.26 | 15.35 |
| 32 | Non-metal mineral products | 6.56 | 3.97 |
| 33 | Basic metal and alloys | 1.88 | 2.69 |
| 34 | Metal products | 1.77 | 1.56 |
| 35 | Machinery, machine tools | 2.01 | 2.66 |
| 36 | Electrical machinery etc. | 4.20 | 6.05 |
| 37 | Transport equipments etc. | 2.03 | 2.33 |
| 38 | Other manufacturing industry | 0.85 | 0.86 |
| 40 | Electricity | 8.51 | 23.22 |
| 42 | Water works | 0.14 | 0.17 |
| 97 | Repair services | 3.11 | 1.90 |
| | Total | 100.00 | 100.00 |

Reference : Subrahmanian K.K., "Development Paradox in Kerala; Analysis of Industrial Stagnation EPW Vol.XXV, No.37, 1990; P.P. 2053.

metropolitan cities of Bombay, Calcutta and Madras) at the time of independence. Yet in 1960-61, after two Five year Plans, Kerala actually showed a fall in per capita manufacturing product. In the sixties and Seventies also the growth rate of per capita manufacturing output in Kerala was less than that of all India. Only in comparison with Andhra Pradesh does Kerala's manufacturing appear to be doing better.

What causes industrial backwardness in Kerala remains a complicated question. A close analysis of the causative factors clearly shows that apart from the general causes, some region specific factors are also responsible for the industrial stagnation in Kerala. The relatively low per capita State Domestic Product appears to make Kerala an unattractive location for industrial investment. But, what is to be noted is that Kerala accounts for a sizeable proportion of the remittances from abroad. Moreover, because of this reason, Kerala's per capita consumption is much higher than that of its per capita SDP. It indicates that Kerala has a very large consumer market. On supply side, the state is handicapped by geographical location for metallic mineral resources. There is adequate supply of skilled and semi-skilled labour, excellent educational base and above all a well-developed Social infrastructure. But the paradox is that Kerala is a state where industrial growth is constrained by a lack of entrepreneurship. Most investment in Kerala has come from outside. In Kerala's context of industrialization, the Government has got a key role to play. The level of private investment in the state remained very low and accounts for only about one-third of the total investment in large and medium industries. Ofcourse, the State Governments have made many attempts to boost up the levels of investment in the State. Joint production ventures with the private sector, industrial estates etc. are some of the notable examples. But, it could not effect noticeable progress within in the public sector or in the private.

Table : 2.8

## GROWTH OF STATE DOMESTIC PRODUCT (AT 1970-71 PRICES)

| States | Share in value Added (1980-81) (Percent) | 1970-71 to 1980-81 | 1980-81 1985-86 (Percent per annum) |
|---|---|---|---|
| Maharashtra | 13 | 5.4 | 3.1 |
| Punjab | 05 | 5.2 | 5.1 |
| Haryana | 03 | 4.9 | 5.1 |
| Gujarat | 07 | 4.7 | 1.1 |
| Karnataka | 06 | 4.0 | 3.1 |
| Andhra Pradesh | 08 | 3.3 | 4.1 |
| Bihar | 07 | 3.1 | 4.3 |
| Uttar Pradesh | 13 | 3.0 | 5.1 |
| West Bengal | 10 | 3.0 | 4.4 |
| Orissa | 03 | 2.8 | 1.2 |
| Tamil Nadu | 06 | 2.8 | 6.9 |
| Rajasthan | 04 | 2.6 | 7.8 |
| Madhya Pradesh | 06 | 1.9 | 6.0 |
| Kerala | 03 | 1.8 | 1.4 |
| All India (National Accounts) | | 3.7 | 5.0 |

Note : Compound Growth Rates based on semilog Trends.
Source : Ahluwalia and Srinivasan, "Income and Growth, A Regional Profile"; Economic Times, Feb-25.

In the context of Kerala, it has been viewed in certain circles that trade union movement backed by political parties have successfully pushed up the wages and other emoluments of the labour employed in the organised sector (Subrahmanian K.K., 1990). There is a strong feeling among entrepreneurs that labour is more restive in Kerala than elsewhere. So, they do perceive that Kerala is a region lacking industrial peace (K.K. Subrahmanian, 1990; P.M. Thampi, 1990). An inter-state comparison of wages and the value-added per worker in the small scale sector is shown in Table 2.9. Overtime, the wages and value-added per worker went up continuously in all states. But, while the wages per worker in Kerala increased by 244 percent between 1970-71 and 1982-83, the increase in value-added per worker was only 94 percent.

K.K. Subrahmanian and P.M. Pillai (1986) in their study questioned the validity of the wage cost hypothesis in the context of Kerala industries. They examined the emperical validity of the "alleged-inefficiency of Kerala's industrial system, in terms of labour militancy high wage cost and low productivity. The study mainly used ASI census sector data and examined the phenomenon in respect of large scale industries. They concluded that the high wage cost hypothesis to explain stagnation in industrial growth rate and its regional differentiation process is devoid of emperical support in the case of Kerala. If industrialisation in Kerala has not progressed, the root cause has to be searched not along the labour cost but in other dimensions (K.K. Subrahmanian and P.M. Pillai, 1986).

In Kerala, the traditional agro-processing industries are subject to seasonal fluctuations and hence the average number of working days in a year is relatively low which results in the average wage per worker for the factory sector as a whole in Kerala being low. The general pattern in

Table : 2.9



STATEWISE CHANGES IN WAGES PER WORKER AND VALUE ADDED PER WORKER IN SMALL SCALE SECTOR

| States | 1970 - 71 | | 1973 - 74 | | 1974 - 75 | | 1977 - 78 | | 1980 - 81 | | 1982 - 83 | | Percentage increase in '82-83 over 70-71 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | W/W | V/W | W/W | V/W | W/W | V/W | W/W | V/W | W/W | V/W | W/W | V/W | W/W | V/W |
| Andhra Pradesh | 1031 | 3536 | 1109 | 7210 | 1101 | 5760 | 1503 | 3416 | 2322 | 04107 | 2281 | 04460 | 122 | 032 |
| Assam | 1051 | 3078 | 1319 | 8749 | 1389 | 7012 | 1817 | 10704 | 2308 | 11307 | 2885 | 16000 | 175 | 355 |
| Bihar | 0991 | 1778 | 1313 | 5515 | 1533 | 5112 | 2330 | 7789 | 2926 | 10175 | 3456 | 21598 | 249 | 605 |
| Gujarat | 1306 | 5720 | 1813 | 6013 | 1892 | 6505 | 2337 | 8269 | 3304 | 12707 | 4177 | 14360 | 220 | 151 |
| Haryana | 1486 | 8412 | 2306 | 9112 | 2492 | 8891 | 2777 | 15233 | 3943 | 16897 | 4430 | 17871 | 198 | 112 |
| Karnataka | 1138 | 4287 | 1521 | 5113 | 1665 | 5721 | 2037 | 6945 | 2943 | 16282 | 3823 | 14549 | 236 | 239 |
| Kerala | 1315 | 6213 | 1763 | 4679 | 1905 | 5525 | 2474 | 8017 | 3684 | 10079 | 4528 | 12034 | 244 | 094 |
| Madhya Pradesh | 1131 | 5086 | 1139 | 4362 | 1252 | 4502 | 1701 | 7338 | 2882 | 08077 | 3096 | 10002 | 174 | 097 |
| Maharashtra | 1510 | 6557 | 2156 | 7736 | 2375 | 8259 | 2894 | 13595 | 4480 | 16482 | 6155 | 22041 | 308 | 236 |
| Orissa | 1115 | 10781 | 1316 | 5198 | 1414 | 5258 | 1311 | 13616 | 2705 | 10843 | 3079 | 11927 | 176 | 011 |
| Punjab | 1953 | 4282 | 2468 | 6769 | 2521 | 6992 | 3081 | 9481 | 4188 | 14318 | 5330 | 15273 | 173 | 257 |
| Rajastan | 1181 | 3564 | 1691 | 5259 | 1721 | 6539 | 2522 | 6040 | 3510 | 11500 | 4470 | 13333 | 295 | 274 |
| Tamil Nadu | 1194 | 2711 | 1554 | 5165 | 1692 | 5521 | 2010 | 5900 | 2912 | 10875 | 3441 | 10648 | 183 | 380 |
| Utter Pradesh | 1296 | 2549 | 1680 | 5007 | 1683 | 5075 | 2122 | 6054 | 2801 | 09726 | 3668 | 12237 | 341 | 194 |
| West Bengal | 1026 | 4934 | 2570 | 7033 | 2492 | 7213 | 2610 | 1107 | 3852 | 12377 | 4525 | 14512 | 204 | 194 |
| All India | 1313 | 4783 | 1670 | 5977 | 1809 | 6266 | 2192 | 9045 | 3291 | 11403 | 3990 | 14069 | 304 | 294 |

Note : W/W Wages per worker; V/W = value added per worker

Source : Computed from ASI Factory and Census Sectors

Reference : M.M. Thampi (1990) op. cit.

Kerala observed at the disaggregated level is a mix of industries that pay higher wages with higher productivity and lower wages with lower productivity as compared to all India (K.K. Subrahmanian, 1990). Therefore, any explanation of industrial backwardness based on labour militancy and high wages in Kerala would be analytically unsound and for policy purposes unhelpful..

# C O N C L U S I O N

The industrial sector has been quite sluggish in Kerala. It never fulfilled the role of a catalyst of economic development of the state. It is true that Kerala has no natural resources like Bihar, and Orissa which could be exploited with advantage to set-up industries. It has also locational disadvantages even for foot-loose-industries. Political stability is also at a discount in Kerala. Of late, its claims of availability of cheap power is also becoming doubtful. But, a major advantage is literate labour force which is considered to be a very valuable asset for industrial development. So, it is possible to set up industries which need skill and technology. Therefore, there is scope for high tech industries to develop in Kerala.

Lack of industrial dynamism is also said to be an important factor contributing to the industrial backwardness of the state. It is true that Kerala is not as fortunate in this respect as states like Gujarat, Maharashtra and Tamil Nadu, which have a more than proportionate share in the Industrial map of India. But, unfortunately, many of the entrepreneurs of Kerala have not found their homestate as attractive for industrial ventures as neighbouring states like Tamil Nadu and Karnataka (Issac and Tharakan, 1986).

* * * * *

## CHAPTER - III

## GROWTH, STRUCTURE AND PROBLEMS OF ELECTRICAL MACHINERY INDUSTRY

Having noted in the previous chapter, the lop-sided structure of the Industrial sector in Kerala, we may now proceed to an analysis of the growth, structure and development of electrical machinery industry and also to situate it against the background of industrial stagnation in the state. It is one of the great growth industries generating linkages - both forward and backward - and thus giving impetus to the development of industries. But this sector is yet to make its impact on Kerala's manufacturing sector which is dominated by process and traditional industries. This industry is expected to provide ample opportunities for the development of ancillary units. The value added by this industry to total industrial scene is around 8.9 percent (Report by the High Level Committee, 1984). This industry showed an annual growth rate of 1.58 percent during this period.

There is no single study which deals with any aspects of electrical machinery industry in Kerala. However, a few studies of electrical mahinery industry related to other countries are available.

'Economics of Electrical Machinery Industry' by Jules Backman, (1960) is a noted study available in this field. It deals with the classification of electrical machinery, pricing of the product, marketing and profit margin in the context of the American Economy.

Another important study is about Brazil's Electrical Industry, namely 'Transnational Conglomerates and the Economics of Dependent Development - A case study of International Electrical Oligopoly and Brazil's Electrical industry' by Richard New Farmer (1974). It discusses the origin and growth of the electrical industry in Brazil and also the technological advances

in this field. 'Manufacture of Heavy Electrical Equipment in Developing countries' by Ayhan Cili Ngiroeelu (1960) is another study. It deals mainly with the techniques used for the manufacture of heavy electrical equipments. 'The Power Sector in India by Dileep. M. Wage (1979). The Electrical Lamp Industry by Arthur Bright (1949) are the other studies worth mentioning.

## ELECTRICAL MACHINERY INDUSTRY IN KERALA:

The importance of electrical machinery industry lies in the fact that it is a major input to the power generating sector. Electricity can be broadly classified into four stages namely generation transmission, distribution and utilisation. The transmission of electricity assumes great importance due to the widely scattered generation stations and load centres. For transmission of electric power transformers are the most important electrical equipment.

The electrical industry shouldered the responsibility of achieving self-sufficiency in electrical equipments and machinery essential for maintaining the tempo of power development programmes. Since, power is the prime requirement for industrial and agricultural growth, top priority was given to generation, transmission and distribution of electricity in the state.

In Kerala, among the engineering industries the electrical industry has developed most significantly according to the High level Committee Report, 1984 (Report of the High Level Committee (1984).)

## PRODUCT STRUCTURE:

The product of this industry group consists of both industrial equipments and consumer products. Industrial equipments are widely used for further production in all sectors, primary, secondary and tertiary. The product of this industry is a basic necessity for the economic development of the region. These industries are widely related to other industries as users of raw-materials and components.

Power generating plants have enormously increased in size with their accompanying economies of scale. The Rural Electrification Programmes initiated by the state has also contributed to the growth of the industry. Rural electrification as a Planned Programme was initiated in the sixties with the formation of the Rural Electrification Corporation in 1969.

The industry group includes establishments engaged in manufacturing machinery appartus and supplies for generation, storage, transmission, transformation and utilisation of electrical energy generators, transformers, switch gears, distribution line equipments and related products are required for the production of electricity. The products using electricity include household appliances, elevators, escalators, factory machinery, light bulbs, radio and television receivers (Jules Backman, 1960).

The development of electrical industry has to be studied in the context of the development of electricity supply industry. The reasons for this approach is that the power plant industry was established during the third plan, the accent being on extending power supply to the rural areas. A significant development during this phase was the emergence of inter-state power grid system. Indian manufactures produce the entire range of electrical equipment required for power generation, transmission, distribution and utilisation of electrical energy. Large scale as well as small scale units are active in this sector.

## STRUCTURE OF ELECTRICAL MACHINERY INDUSTRY IN KERALA

**Power transmission and distribution equipment:**

| | | | |
|---|---|---|---|
| 1. | Transformers & Electricials Kerala Ltd. (TELK), Angamaly | : | Power transformers, instrument transformers, switch gears |
| 2. | Kerala Electricals Ltd. (KEL) Cochin | : | Power transformers, Transmission towers. |
| 3. | Aluminium Industries Ltd., (ALIND) Kundara & Mannar | : | Cables and conductors, Switch gears. |

| | | | |
|---|---|---|---|
| 4. | Premier cables (PCC) Cochin | : | Cables & conductors |
| 5. | Traco Cables (TCC) Cochin | : | Cables & Conductors |
| 6. | United Electrical Industries Ltd. (UEIL) Quilon | : : | Energy meters, 11 KV Switch gears |
| 7. | Power Systems and Projects, Palghat | : | Carrier communication equipment and other T and D Instrumentation. |

Industrial Machinery:-

| | | |
|---|---|---|
| KEL, Kundara | : | Electrical generators (for Railway) Motors, HRC, fuses, electrical wiring and other accessories. |
| UEIL, Quilon | : | Motor starters and control gears |

Consumer goods:-

| | | |
|---|---|---|
| Toshiba Lamps Cochin | : | Fluorescent lamps |

Electronics, Products, Components:-

| | | |
|---|---|---|
| KSEDC and its associate companies | : | All variety of electronic products and components |
| O/E/N Mulanthuruthy | : | Switches, relays potentio meters for electronic industry. |
| | | Computer peripherals. |
| UEIL, Quilon | : | Carbon film resistors, Plastic film capacitors. |

Four industries which produce electrical equipments for generation, distribution and transmission of electricity is taken for indepth analysis. Here an attempt is made to give a brief analysis of factories which are taken for detailed study.

1. Transformers and Electricals, Kerala Ltd. (TELK)

TELK, a Kerala Government undertaking, makes transformers for the production and distribution of electricity. It started production in the year 1963, it is functioning with the technical and financial collaboration,

from Hitachi Company, Japan. TELK tops the list in the production of transformers and related equipments in the state.

The Major products of this company are:

1) 400 K.V. Transformers

2) 600 K.V. Transformers Bank. (It is produced for the first 500 M.V. Thermal Power Station in India at Trombay)

3) 45 K.V. Sf-6 Gas circuit Breakers

4) 420 K.V current transformers

5) 400 K.V. Sf-6 Gas Circuit breakers

6) 420 K.V. Oil integrated paper condensor

7) 144 M.V. transformers

8) 315 MVA, 400 KV transformers for the National Thermal Power Corporation.

TELK's manufacturing facility for power transformers is the best in the country and its products enjoy a good reputation in the market. 400 KV transformers produced by TELK are mainly purchased by the Electricity Boards in Himachal Pradesh, Uttar Pradesh, Madhya Pradesh, Andhra and Maharashtra. Customers of the company are mainly State Electricity Boards, National Thermal Power Corporation, National Hydro Electric Power Corporation. There are five major companies in this field in the country in addition to more than 20 small units. It faces high competition from its competitors..

All the major raw materials and components are imported from the rest of India and abroad. So, production depends on the price, delivery etc. of imported items and other Governmental policies.

TELK has been incurring heavy losses since 1981. One of the reasons is said to be that TELK is not getting enough orders for its products to run at full capacity. The products are sold on credit basis and the customers are not showing any responsibility in paying the bills in time. The difficulty in securing rawmaterial in time adds to this situation. TELK has to depend mainly on imported raw materials.

## II. United Electrical Industries Ltd., (UEI):

UEI was registered as a Public Limited Company in 1950 at Quilon. It was established to produce electrical meters mainly for household use. It receives technical assistance from the Arol Meters Ltd. England.

UEI started production of single phase meters with the help of imported rawmaterials. The company was taken over by the Kerala Government in 1960. Then it started production of meter components also. It started production of motor control gear with the help of Mysore Electrical Industries Ltd., in 1965. In 1971, the company made an agreement with General Electric Company of India at Calcutta for technical assistance for the production of circuit breakers.

UEI has received wide technical assistance from foreign countries. In 1977, it started the production of Carbon Film Resistors with the technical assistance from Rubicon company Japan.

The total employment in the factory is 600. It has been running at loss since 1982. Lack of orders for running this factory at full capacity is considered to be the major reason for this.

## III The Premier Cable Company Ltd., (PCC):

The Premier Cable Company (PCC) commenced production in 1966 in technical collaboration with KOMBINT WEBKABEL WERK OBERSPREE (KWO), a combination of eleven large scale manufactures of the erst while German Democratic Republic.

With equity holding mainly from outside the state, PCC, is an example of well managed units in the state. The general crisis and uncertainities in the cable manufacturing sector in the country have no doubt adversely affected the operations of the company. The company has a good sales net work with branch offices at Bombay, Calcutta, New Delhi, Cochin etc.

PCC's range of production includes XLPE power cables of 11 KV and 132 KV for all sizes in copper and aluminium, PVC power control and signalling cables, AAC/ACSR and aluminium overhead conductors and cotton and paper covered wires and strips. PCC is equipped with the most modern machinery, testing equipment and special research and development facilities. The XLPE Plant has been set up in technical collaboration with NOIKA of Finland. PCC manufactures cables with the latest technology. In 1983, it began production of cross linked polythene (XLPE) cables. This particular type of cables is very advanced and hence is gradually replacing the earlier polyvaryl chloride (PVC) and paper insulated lead coated cables (PILC).

Regarding the working results of the company for the period of ten years from 1977-78 to 1985-86 is not fully satisfactory. In 1978-79 sales turnover reached a record level of - 9.92 crores despite scarcity of rawmaterials and shortage of working capital Labour relations were not satisfactory. In 1979-80 sales turnover further rose to Rs.14.06 crores and profits also showed an improvement. In 1980-81, sales declined by about 8 percent to Rs.14.35 crores. Lack of orders and abnormal delays in release of payments and lifting of ordered materials were some of the above factors. The unsatisfactory results continued till 1985-86 the period of analysis. Aluminium is the most important rawmaterial for cable manufactures and its price have shot up in the post decontrol period. Other important rawmaterials like copper or XLPC are also imported.

The main customers of the cable industry are State Electricity Boards. But, due to the perenial financial crisis, most of them have defaulted considerably on their payments. Infact, cable manufactures are forced to give long periods of credits to State Electricity Boards and this resulted in severe liquidity problems for the industry.

Major customers of cables in the international market is Russia. The inability to penetrate international markets can be attributed to the high costs of production. This has made it impossible to compete in the international market.

Soaring rawmaterial prices have become the bane of the cable industry in India. Among the rawmaterials used by the industry EC grade aluminium, copper, PVC and XLPE are the major ones. In the case of imported rawmaterials like XLPE, Indian manufacturers are at a distinct disadvantage price-wise. They lack the financial and bargaining power to compete on equal terms with large manufactures abroad. Following an increase in the price of copper, an effort is made to switchover to aluminium which is next to copper in conductivity. Though manufactured indegeniously, the availability of aluminium EC Grade does pose a problem for cable manufacturers. Its erratic supply coupled with spiralling prices have become a matter of concern for the industry. Prior to the decontrol, the production and distribution was controlled by the Government. Short falls in production were met by imports channelised through MMTC. The major types of cables manufactured by Premier Cable Company are, 1) Power cables 2) Control Cables 3) Screened Instrumentation cables 4) Special type of cables like fire resistant low smoke (FRLS) Navy/underwater cables, Moisture retardant - Moisture Barrier cables, Mining cables, Railway Signalling cables, Airport cables, Ariel Bunched cables as well as special cables made to customer specifications. It also manufacturers aluminium and copper conductors.

**IV) Aluminium Industries Ltd. (ALIND):**

This company was established on January IInd 1946 at Kundara under the initiative of Sr. C.P. Ramaswamy Iyer, the Divan, who played an active role in the industrial development of Travancore. C.P. had invited Sheshasai, a great industrialist from North India to start industrial

enterprises in the state. An enterprise namely Sheshasai Brothers (Travancore) Private Ltd., was established for the industrialisation of the state. This was responsible for the establishment of Aluminium Industries.

The company started production in 1950. The main product during the period was conductors. It has a production capacity of 1500 tonnes aluminium conductors annually.

The main products of the company are, Cable, Switch gear, Steel wire products, the machines necessary for producing conductors and static relay. It has established a consultancy Division and an Export Division. Its conductors and cables are widely used in the Idukki project, Sabarigiri project, Damodar Valley project, Bhakranangal project, and the super thermal power projects of National Thermal power corporation. Its products are also exported to Bangladesh, Itan, Iraq, Nepal, Srilanka, Thailand, Sambia, Allan Switzerland, Aluminium Development Laboratories England etc.

The switchgear division of ALIND was established at Mannar in 1970. The technical assistance for this is received from Alsthom Atlantic Company, France.

The products of Switchgear Division are conductors, Switch gears, Steel Wire products, the machines necessary for producing conductors and static relay.

ALIND has to face severe labour problems, which resulted in a loss of around Rs.36 crores. The company has been declared as sick on 2oth October 1987 by the Board of Industrial and Financial Reconstruction. A comprehencial rehabilitation package has been worked out for the revival of the company. As a pre-condition to any assistance the IDBI has insisted on some sacrifices on the part of the employees. Accordingly an agreement was signed on 27th June 1988. Among other things the trade union agreed

for freezing the wages including the Dearness Allowance for three years.

**Electrical Machinery Industry in the ASI framework:**

Here an attempt is made to analyse the growth, structure and value added by the electrical machinery industry on the basis of the summery results of the Annual Survey of Industries from 1965-66 to 1984-85, the latest year for which data are available.

**FIXED CAPITAL[1]**

The electrical machinery industry comprises of the groups which manufacture electrical machinery and apparatus and parts, insulated wires and cables, dry and wet batteries, electrical apparatus, appliances and their parts such as lamps, bulbs etc. (Sockers, Switches). This industry group shows an increase in fixed capital investment in general, but not free from declining trend in several years. A detailed analysis of the fixed capital investment in electrical machinery industry is given below.

For the entire electrical machinery industry, the value of fixed capital at current prices aggregated Rs.280.33 lakhs in 1965-66 showing an increase of 49.25 percent over the past three years. This tendency continued till 1970-71, but beyond that say 1970-71 to 1973-74, shows a decline in investment from Rs.692.93 lakhs to Rs.690.73 lakhs. Though this decliningtendency continued till 1975-76, the period 1976-77 to 1982-83

---

1. Fixed capital represents the depreciated value of fixed assets owned by the factory as on the closing day of the accounting year. Fixed assets are those which have normal productive life of more than one year. Fixed capital covers all types of assets new or used or own costructed or deployed for production, transportation living or recreational facility, hospital, schools etc. for factory personnel. It includes the fixed assets of the head office allocable to the factory and also the full value of assets taken on hire purchase basis (whether fully paid or not) including interest element.

witnessed significant increase of investment of about 21.98 percent. Eventhough fixed capital showed an increase of 10.28 percent in 1982-83 over 1981-82 in the factory sector the increase in fixed capital investment in the electrical machinery industry is only 1.43 percent. The investment in fixed assets in this industry group during 1983-84 is Rs. 2346.2 lakhs comprising 1.94 percent of the total investment in the entire factory sector.

**INVESTED CAPITAL:** [2]

The structural ratios as presented in the ASI for a period of time brings out in clear terms the persistent growth of capital intensity in the factory sector in Kerala. The total invested capital in the electrical machinery industry during the year 1973-74 to 1983-84 shows an increasing tendency in general. This increasing rate is estimated to be an overall increase during the period of analysis.

Manufacture of transformers and electricals is the group in the electrical industry showing higher rate of increase in invested capital, say, 11.36 per cent over the period of analysis. Investment in real terms increased from Rs.689.20 lakhs to Rs.2166.87 lakhs from 1973 - 74 to 1981 - 82. Invested capital in the manufacture of wires and cables also shows an increasing tendency in general but there are instances of decline too. The period 1974 - 75 and 1976 - 77 shows a declining trend from Rs.713.63 lakhs in 1973 - 74 to Rs.485.96 lakhs in 1974 - 75 and Rs.450.73 lakhs in 1976 - 77. But, this is only a short term tendency. Beyond that, the

---

2. Invested capital is defined as the total of fixed capital and physical working capital. Fixed capital is the depreciated value of the fixed assets owned by the factory as on the closing day of the accounting years. Physical working capital is defined to include all physical inventories owned, held and controlled by the factory as on the closing day of the accounting year, such as the materials, lubricants, fuels, stores etc. that enter into products manufactured by the company itself, is supplied by the factory to others for processing. Physical working capital also includes the stock of materials, fuels, stores etc purchased for resale, semi-finished goods, and work-in-process on account of others and goods made by the factory which are ready for sale at the end of the accounting year.

the industry is generally to increase at a rate of growth of 11.09 percent over the year 1977 - 78 to 1981 - 82 and this continues up to 1984 - 85, the period of analysis. Invested capital in the manufacture of dry and wet batteries and manufacture of electrical industrial apparatus and parts such as lamps, bulbs etc. show an increasing tendency, but the rate of growth is very slow.

## TOTAL INPUT[3]

The total inputs purchased by the electrical machinery industry generally shows an increase over the period of analysis and this is estimated to be 11.38 percent from 1965 - 66 to 1984 - 85. Among the electrical industry group, manufacture of transformers and electricals shows a noticeable increase in the purchase of inputs from Rs.804.80 lakhs in 1973 - 74 to Rs.1458.99 lakhs in 1984 - 85. The purchase of inputs of this group contributes 3.92 percent of the total purchase of inputs in the manufacturing sector as a whole.

---

3. Input in any industrial activity mainly consists of the values of fuels, materials etc, consumed most of non-industrial services received from others; 'cost of materials consumed for repair and maintenance of factory's fixed assets, including cost of work done by others on materials supplied by the factory, cost of office supplies and products reported for sale during last year and used for further production during the accounting year, purchase value of goods sold in the same condition as purchased, consumption of fixed capital (ie. depreciation) and the value of labour inputs (ie. payments made to various categories of employees).

VALUE ADDED:

The total value added by the electrical machinery industry (at current prices) rose from Rs.109 lakhs in 1965 - 66 to 1220.14 lakhs in 1984 - 85. The compound growth rate was around 11.84 percent. Value added and the emoluments paid to the employees have a correlation. But, the total emoluments paid to the employees rose at a slower rate than the value added and a declining trend was visible in between. The period from 1976 - 77 to 1982 - 83 shows an encouraging trend in value added by the electrical machinery industry. The increase was from Rs.722.98 lakhs in 1976 - 77 to 1104.81 lakhs in 1982 - 83.

A brief explanation of the relationship of total emoluments to value added is note worthy. The period 1976 - 77, shows an increasing trend in value added of about 11.7 percent over 1973 - 74, the total emoluments to the employees showing an encouraging trend. The emoluments witnessed an increase of 12.35 ie. more than one per cent rise in the value added. During 1977 - 78, the growth rate in value added was nearly 10.52 percent per annum. During the same period, the total emolument paid to the employees increased at 11.99 percent per annum and this increasing tendency is only a short term phenomenon and it starts declining after this period say, 1978 - 79, and declined up to the level of 8.98 percent in 1984 - 85 with some exceptions in between. The interesting factor is that the decline in the total emoluments paid to the workers is much lower than the decline in value added.

The data on ASI for the 1970's and early 1980's confirm the phenomenon noticed since the beginning of 1960's that the share of total emoluments paid to the employees in value added, has generally declines, ie. 'the share of wages' in value - added has declined almost persistently.

**VALUE - ADDED TO GROSS OUTPUT RATIO:**

In real terms with the growth in high value added industries, the ratio of value added to gross output should have been rising or the costs of input to output ratio should have been falling. As a contradition to this, it is found that in the ASI sector, the ratio of value added to gross output has been consistently on the decline. Electrical machinery industry is not an exception to this. The ratio had been generally at 0.17 percent for a number of years from 1965 - 66 to 1969 - 70. Since then, it showed very little increase to 0.21 in 1970 - 71 and then fluctuating on 0.17 to 0.21 till 1979 - 80. Two periods, 1980 - 81 and 1981 - 82 showed an encouraging trend 0.24 and 0.30 respectively and again it started declining to 0.18 and 0.19 in 1982 - 83 and 1983 - 84 respectively.

Another point which has to be mentioned in the analysis of data relating to electrical machinery industry is the relationship of outstanding loans to productive capital. Productive capital is the sum total of fixed capital and working capital. Figures of outstanding loans steadily increased from Rs.386.06 lakhs in 1970 - 71 to Rs.2587.27 lakhs in 1979-80, over a period of ten years. As the proportion of production loans had formed 26.24 percent in 1970 - 71, 1981 - 82, outstanding loans formed 81.56 percent of the productive capital. In the intervening years, the proportion has been fluctuating from 61.95 percent in 1973 - 74, it declined to 57.24 percent in 1974 - 75, 56.33 in 1976 - 77; again declined to 39.10 percent in 1977 - 78; and the phenomenon continued till 1981 - 82; in 1982 - 83, productive capital was Rs.3768.65 lakhs. In 1983 - 84 loans declined to Rs.5526.62 lakhs from the previous years. The decline is because of stiff interest rate on commercial loans prevailing then. The overall increase affected the financing of the industry group also. An important point is that nearly one third of the productive capital in the electrical machinery industry is formed from borrowed funds.

## CAPITAL OUTPUT CO-EFFICIENT:

Data on technical co-efficients at the aggregate level make certain interesting reading. For instance, the capital - output co-efficients measured by the ratio of fixed capital to value added has not shown any significant rise during the seventies or early eighties. The ratio was 2.31 at 1970 - 71 steadily declining to 1.79 in lowest since 1965 - 66. It rose to 2.12 in 1978 - 79, and again slipped to 1.04 in 1979 - 80. The ratio was 1.05 over the six years and out of fifteen years of analysis from 1970 - 71 to 1984 - 85. Despite the many limitations of the data, it could be argued that these results tend to contradict the generally accepted hypothesis that the Indian economy is experiencing a rising capital - output ratio. Among the many limitations, the first and foremost relates to value - added; while fixed capital must be at book - value, value - added is at current prices. Another major limitation is that fixed capital represents the depreciated value of all fixed assets and many fixed assets have probably longer life than that taken for depreciation purposes. (S.L. Shetty, 1978).

## EMPLOYMENT:

The employment shows an increase from 1965 - 66 to 1973 - 74, and beyond that period the rate of increase is moderate. During 1965 - 66 to 1970 - 71, the rate was 14.13 percent per annum from 386 in 1965 - 66 to 3,073 in 1970 -71. During 1970 - 71 to 1976 - 77 the total employment in the electrical industry declined from 3,073 to 1954 is showing a fall of about 10.67 percent per annum. From 1976 - 77, it has a tendency to increase, though from 1954 to 9201 in 1980 - 81. Beyond that period, it steadily declined to 5909 in 1981 - 82, 4465 in 1982 - 83 and then has a slight increase to 5357 and again declined to 4754 during the period of analysis.

Major characteristics of this industry group for a period from 1976 - 77 to 1984 - 85 is summarised in Table 3 - 1. A similar tendency of increase and decrease is also visible in the sample units selected for detailed study and is given in Tables 3 - 2; 3 - 3; 3 - 4; and 3 - 5. The structural ratios and technical co-efficients of all industries as well as the electrical machinery industry in Kerala is presented in Table 3 - 6. As may be seen from table 3 - 6 the fixed capital per worker was very much higher in all industries in Kerala than in the electrical machinery industry in 1976 - 77. By 1984 -85 this ratio fell considerably to all industries. But for electrical machinery industry it has not only increased but rose above that of all industries. But in terms of value added per employee the electrical machinery industry has a much better record. This is the case with wages per worker also. The fixed capital net value added ratio has always been higher in all industries. Similarly, fixed capital output ratio has been lower in electrical machinery industry. But net value added output ratio has been higher in electrical machinery industry. Thus we see that the capital intensity in the electrical machinery industry has increased overtime and also value added per worker. This indicates the increasing importance that is being acquired by the electrical machinery industry sector of Kerala.

## PROBLEMS OF ELECTRICAL MACHINERY INDUSTRY IN KERALA

### 1. RAWMATERIAL PROBLEM:

The major problems faced by the electrical machinery industry is with regard to rawmaterial. The state has not so far become self sufficient in respect of basic rawmaterials required for the manufacture of electrical equipment. Materials such as copper, colled rolled grain oriented silicon steel (CR GO) insulating paper etc are still imported or coming from the rest of India. Components for products such as high voltage transformers are also being imported. Inordinate delay is experienced in obtaining import licence for these items.

Table : 3.1.

**ANNUAL SURVEY OF INDUSTRIES - MAJOR CHARACTERISTICS OF ELECTRICAL INDUSTRY GROUP 1976 - '77 to 1984 '85 (Rs. Lakhs)**

| Year | Fixed Capital | Working Capital | Productive Capital | Invested Capital | Depre-ciation | Outstand-ing loans | Wages & Salaries | Employ-ment (Nos) | Total input | Total Output | Value Added |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1976-77 | 0778.69 | 0995.19 | 1773.88 | 1821.80 | 149.90 | 0999.36 | 254.79 | 1954 | 2055.20 | 2864.98 | 0722.98 |
| 1977-78 | 1212.44 | 1508.97 | 2721.41 | 2919.91 | 170.00 | 1391.58 | 367.16 | 2700 | 6623.01 | 5111.89 | 0799.92 |
| 1979-80 | 1275.37 | 1559.81 | 2835.18 | 3586.25 | 197.00 | 2587.27 | 567.31 | 5046 | 4342.24 | 5687.12 | 1221.65 |
| 1980-81 | 1457.60 | 1903.52 | 3361.12 | 3926.73 | 229.00 | 3005.35 | 705.10 | 9201 | 6135.52 | 8213.06 | 1936.35 |
| 1981-82 | 1823.84 | 2066.88 | 3890.72 | 4328.03 | 262.00 | 3172.35 | 912.60 | 5909 | 7223.79 | 9428.52 | 2067.42 |
| 1982-83 | 10672.49 | 2235.26 | 12907.75 | 4473.17 | 238.00 | 3888.26 | 717.51 | 4465 | 5075.60 | 9498.61 | 2178.87 |
| 1983-84 | 2122.56 | 2308.17 | 4430.73 | 2772.16 | 210.00 | 5226.62 | 630.84 | 5357 | 3937.66 | 4542.00 | 1890.28 |
| 1984-85 | 2981.75 | 2991.73 | 5973.48 | 5128.81 | 562.38 | 21157.72 | 1189.82 | 4754 | 4929.35 | 6397.70 | 1593.67 |

Note : This industry group consists of industries coming under classification 360,361,362, 363.

360 : Manufacture of Electrical Industrial Machinery and apparatus and parts.

361 : Manufacture of insulated wires and cables

362 : Manufacture of dry and wet batteries

363 : Manufacture of Electrical apparatus appliances and other parts

Source : Annual Survey of Industries, various years.

Table 3 - 2.

**UNITED ELECTRICAL INDUSTRIES LIMITED**

**(Rs. Lakhs**

| Year | Fixed Capital | Working Capital | Productive capital | Invested capital | Depreciation | Outstanding loans | Wages and Salaries | Employment (Nos) | Total inputs | Value added | Total output |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1977 | 91.09 | 68.18 | 159.27 | 198.13 | 4.00 | 5.98 | 59.91 | -- | 88.98 | 127.96 | 191.38 |
| 1978 | 89.18 | 69.96 | 159.14 | 201.37 | 4.96 | 6.04 | 60.73 | -- | 93.17 | 131.03 | 182.10 |
| 1979 | 93.27 | 73.61 | 166.88 | 216.11 | 5.03 | 6.48 | 63.09 | -- | 90.91 | 132.83 | 203.28 |
| 1980 | 98.27 | 76.50 | 174.77 | 200.70 | 4.02 | 6.52 | 65.22 | -- | 87.28 | 134.32 | 280.67 |
| 1981 | 97.13 | 81.88 | 174.09 | 231.83 | 5.01 | 7.17 | 71.38 | -- | 81.19 | 111.39 | 271.17 |
| 1982 | 101.08 | 73.01 | 174.09 | 194.17 | 5.38 | 7.89 | 68.09 | -- | 90.46 | 122.51 | 248.08 |
| 1983 | 104.34 | 63.46 | 167.80 | 134.62 | 5.47 | 8.37 | 83.28 | -- | 92.38 | 081.56 | 197.05 |
| 1984 | 99.03 | 56.39 | 155.42 | 130.48 | 5.47 | 7.99 | 100.62 | -- | 93.07 | 064.14 | 177.07 |
| 1985 | 94.18 | 61.88 | 156.06 | 127.56 | 5.65 | 7.67 | 105.16 | -- | 91.83 | 114.23 | 247.19 |
| 1986 | 88.99 | 60.64 | 149.63 | 122.82 | 5.24 | 10.52 | 100.82 | 600 | 92.88 | 081.12 | 199.38 |

Note : Employment data is available only for the year 1985-86

Source : Survey Data.

Table 3-3.

**THE PREMIER CABLE COMPANY LIMITED**

| Year | Fixed Capital | Working Capital | Productive Capital | Invested Capital | Depre-ciation | Outstand-ing loans | Wages & Salaries | Employ-ment (Nos) | Total Input | Value added | Total Output |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1977 | 089.18 | 128.01 | 217.19 | 1230.18 | 007.31 | 053.38 | 113.39 | -- | 130.31 | 301.93 | 140.28 |
| 1978 | 093.07 | 139.56 | 232.63 | 1187.38 | 009.13 | 061.17 | 129.18 | -- | 146.61 | 476.18 | 139.80 |
| 1979 | 100.01 | 287.17 | 387.18 | 1213.07 | 012.19 | 066.53 | 180.17 | -- | 173.86 | 417.07 | 140.17 |
| 1980 | 096.95 | 585.07 | 682.02 | 1109.83 | 014.76 | 067.18 | 181.73 | -- | 196.79 | 487.53 | 141.68 |
| 1981 | 199.95 | 760.03 | 959.98 | 1217.46 | 021.25 | 223.26 | 173.18 | -- | 199.03 | 564.78 | 157.85 |
| 1982 | 529.61 | 856.68 | 1386.29 | 1289.96 | 026.80 | 155.32 | 170.14 | -- | 213.18 | 641.86 | 160.51 |
| 1983 | 561.82 | 639.66 | 1201.48 | 1300.46 | 041.64 | 153.39 | 168.18 | -- | 207.37 | 186.96 | 364.96 |
| 1984 | 911.14 | 509.93 | 1421.07 | 1396.18 | 059.48 | 161.71 | 173.83 | -- | 217.93 | 072.22 | 456.75 |
| 1985 | 969.92 | 663.17 | 1533.09 | 1438.93 | 059.53 | 136.84 | 178.13 | -- | 213.96 | 150.75 | 593.42 |
| 1986 | 875.68 | 860.95 | 1736.63 | 1580.08 | 258.93 | 137.23 | 189.18 | 450 | 220.18 | 1105.62 | 2302.01 |

Note : Employment Data is available only for the year 1985-86.

Source : Survey Data.

Table 3 - 4.

**ALUMINIUM INDUSTRIES LIMITED**

**(Rs. Lakhs)**

| Year | Fixed Capital | Working Capital | Productive Capital | Invested Capital | Depre-ciation | Outstand-ing loans | Wages & salaries | Employ-ment | Total Inputs | Value added | Total Output |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1977 | 48.13 | 21.03 | 69.16 | 191.37 | 51.17 | 41.38 | 39.17 | -- | 61.17 | 59.38 | 960.98 |
| 1978 | 50.18 | 27.17 | 77.35 | 183.83 | 60.23 | 43.37 | 41.28 | -- | 73.98 | 51.17 | 1321.89 |
| 1979 | 52.37 | 31.07 | 83.84 | 397.28 | 59.28 | 50.40 | 40.37 | -- | 67.17 | 49.96 | 1197.30 |
| 1980 | 57.30 | 36.58 | 93.88 | 171.46 | 55.17 | 43.28 | 38.93 | -- | 63.40 | 61.20 | 2001.68 |
| 1981 | 56.73 | 28.13 | 84.86 | 183.29 | 56.93 | 51.87 | 39.51 | -- | 68.18 | 51.28 | 1916.17 |
| 1982 | 52.79 | 29.84 | 82.63 | 201.94 | 48.17 | 49.65 | 40.90 | -- | 63.79 | 53.89 | 2618.28 |
| 1983 | 55.48 | 30.26 | 85.74 | 227.57 | 41.67 | 48.48 | 41.55 | -- | 68.98 | 63.59 | 2791.52 |
| 1984 | 56.45 | 27.47 | 83.92 | 160.40 | 60.34 | 67.02 | 39.84 | -- | 73.04 | 134.39 | 3323.13 |
| 1985 | 53.31 | 29.23 | 82.54 | 157.23 | 60.64 | 59.51 | 46.08 | -- | 81.83 | 70.53 | 3460.36 |
| 1986 | 54.83 | 29.08 | 83.91 | 161.28 | 59.21 | 61.17 | 41.38 | 950 | 82.13 | 79.68 | 4156.85 |

Note : Employment data is available only for the year 1985-86

Source : Survey Data.

Table 3 - 5.

**TRANSFORMERS AND ELECTRICALS, KERALA LIMITED**

**(Rs. Lakh**

| Year | Fixed Capital | Working Capital | Productive Capital | Invested Capital | Depre-ciation | Outstand-ing loans | Wages & salaries | Employ-ment (Nos) | Total inputs | Value added | Total output |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1977 | 432.48 | 1274.87 | 1707.35 | 0667.84 | 048.64 | 089.85 | 099.31 | -- | 069.83 | 283.55 | 1242.85 |
| 1978 | 447.38 | 1138.81 | 1586.19 | 0783.18 | 049.37 | 100.31 | 101.37 | -- | 087.18 | 273.30 | 1371.20 |
| 1979 | 451.30 | 1044.17 | 1495.47 | 1198.30 | 050.83 | 128.83 | 187.03 | -- | 097.07 | 261.17 | 0867.38 |
| 1980 | 474.82 | 1063.55 | 1538.37 | 1403.63 | 051.98 | 146.18 | 220.17 | -- | 113.30 | 260.93 | 0941.07 |
| 1981 | 576.01 | 1240.08 | 1816.09 | 1262.74 | 054.39 | 161.17 | 230.35 | -- | 136.38 | 589.20 | 2064.29 |
| 1982 | 591.17 | 1003.48 | 1594.65 | 1300.41 | 059.38 | 080.17 | 239.17 | -- | 129.03 | 237.10 | 1387.30 |
| 1983 | 597.03 | 0896.57 | 1493.60 | 1487.18 | 113.17 | 087.38 | 307.40 | -- | 113.18 | 218.87 | 1991.17 |
| 1984 | 687.18 | 0513.17 | 1200.35 | 1593.38 | 125.57 | 092.18 | 348.17 | -- | 108.10 | 198.30 | 1618.37 |
| 1985 | 898.04 | 0495.95 | 1393.99 | 1817.11 | 145.51 | 095.06 | 369.07 | -- | 118.87 | 160.63 | 1737.26 |
| 1986 | 757.69 | 0703.89 | 1461.58 | 1498.50 | 149.51 | 123.07 | 393.01 | 700 | 139.08 | 314.80 | 1900.35 |

Note : Employment Data is available only for the year 1985-86

Source : Survey Data

Table 3.6

STRUCTURAL RATIOS AND TECHNICAL CO-EFFICIENTS OF INDUSTRIES

FOR FACTORY SECTOR AND ELECTRICAL MACHINARY INDUSTRY IN KERALA (1976 - 77 - 1984 - 85)

| | Fixed capital/ employee | | Net value added/employee | | Wages/ Worker | | Fixed capital Net value added ratio | | Fixed Capital output ratio | | Net value added output ratio | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Year | Kerala (All industries | Electrical machinary industry | All manufacturing industries | Electrical machinery industry | All manufacturing industry | Electrical machinery industry | All manufacturing industries | Electrical machinery industry | All manufacturing industry | Electrical machinery industry | All manufacturing industries | Electrical machinery industr |
| 1976-77 | 0.97 | 0.39 | 0.08 | 0.37 | 0.02 | 0.13 | 2.78 | 1.08 | 0.54 | 0.27 | 0.19 | 0.25 |
| 1977-78 | 0.25 | 0.44 | 0.10 | 0.29 | 0.29 | 0.14 | 2.51 | 1.51 | 0.50 | 0.23 | 0.20 | 0.15 |
| 1979-80 | 0.29 | 0.25 | 0.12 | 0.24 | 0.30 | 0.11 | 2.36 | 1.04 | 0.49 | 0.22 | 0.21 | 0.21 |
| 1980-81 | 0.28 | 0.15 | 0.14 | 0.21 | 0.04 | 0.08 | 2.04 | 0.75 | 0.38 | 0.17 | 0.19 | 0.23 |
| 1981-82 | 0.30 | 0.30 | 0.15 | 0.34 | 0.04 | 0.15 | 2.05 | 0.89 | 0.37 | 0.19 | 0.18 | 0.22 |
| 1982-83 | 0.41 | 2.39 | 0.18 | 0.49 | 0.07 | 0.16 | 2.26 | 1.01 | 0.48 | 1.12 | 1.94 | 0.23 |
| 1983-84 | 0.50 | 0.40 | 0.22 | 0.35 | 0.09 | 0.12 | 2.31 | 1.12 | 0.51 | 0.46 | 0.22 | 0.42 |
| 1984-85 | 0.51 | 6.62 | 0.23 | 0.33 | 0.06 | 0.25 | 2.23 | 1.87 | 0.52 | 0.47 | 0.24 | 0.25 |

Source : For All Manufacturing Industries Annual Survey of Industries 1976-77 to 1984 - 85

Electrical Machinery Industry : Survey Data

Another problem is that import licences for the current period are being issued on the basis of the value of materials consumed during the previous period. This will not be sufficient to step up production as more materials will be required for increasing the volume of output. However, the value of all rawmaterials and components is steadily going up, and therefore, for the same value of import licences manufacturers are able to produce only less quantities of these rawmaterials in the succeeding periods.

The prices of essential rawmaterials are going up steadily. This inflationary trend has its own impact on the prices of electrical machinery products also. Fresh levies and duties of Government every year add to this. Manufacturers are forced to increase prices substantially due to the impact of input price increase. Substantially due to the impact of input price increase, process time for electrical equipments like transformers is more than eighteen months including the design time. Transformers are manufactured only against firm orders. Even orders received at a good price will ultimately become a losing order due to the increase in the prices of rawmaterials. During the last decade, especially, the last five years, there has been an unprecedented rise in the prices of copper, silicon steel and also in the customs and excise duties. In many cases, the prices were not even sufficient to cover the material cost. The purchasers mainly the Government Departments and Electricity Boards were very much reluctant to accept price variation clauses to safeguard the interests of the suppliers in the event of rawmaterials and components.

Most important rawmaterials required for the manufacture of electrical equipments are copper, silicon and steel. As the production of copper in India is quite insignificant, the requirement is met by imports. There has been a very steep rise in the price of copper since 1971. The reasons for this increase are:-

a) increase in international prices b) increase in customs and excise duties
c) Canalisation of the export of copper through MMTC.

## 2. DEMAND FORCASTING:

Electricity Boards are the major purchasers of the products of electrical machinery industry, especially, the transformer products. About 90 percent of the entire production is purchased by the 20 Electricity Boards. Hence, the requirements of Electricity Boards influence the industry substantially. However, the manufacturers are not able to forcast the demand of the Electricity Boards due to various factors. The requirements of Electricity Boards are directly connected with Power Development Programmes. These programmes are influenced by various external factors like foreign aggression, shifting of priority etc. and these factors force the Electricity Boards to post pone purchase. This affects the manufacturers adversely as the manufacturers are making advance requirements of meet increased demand not envisaged in development plans.

The purchase of Electricity Boards is generally made by inviting tenders from manufacturers. Electricity Boards fail to plan their requirements in advance. This necessitates earlier deliveries, which the indigenous manufacturers may be unable to offer due to the procedural delay in obtaining import licences, designing and processing. This compels Electricity Boards to approach the Government for import licences for the import of these equipment alleging inability of the local manufacturers to deliver the products in time. This situation can be avoided, if the purchasers plan their actual requirements well in advance. This will also help the industry to plan their manufacturing schedules suitably staggered to keep their plant engaged throughout the period.

Financial problems faced by the Electricity Boards also contribute to the problem of instability in demands. Even firm orders placed are usually

Cancelled subsequently or deliveries postponed unilaterally. The manufacturers lose heavily in such case, as most of them will be unwilling to remedy in such cases, in the interest of the future business.

Past trends show that there is no uniformity in demand. Under such circumstances, manufacturers are not in a position to plan their activities properly. Only with an assurance of smooth flow of orders, the manufacturers can plan and deliver the equipments in time.

Frequent changes in the Power Development Programmes put the industry into difficulties. Only if a definite and achievable Power Developments Programme extending over a period of atleast 10 to 15 years is finalised the industry can plan its capacities properly.

3. **TRANSPORTATION :**

Transportation of the products manufactured is another major problem facing the industry. Since transformers are of very large size, special type well wagons are required for transportation. The railways have got only very few such wagons and hence allotment are normally delayed by two to three months. Advance registration of demands also is not possible as the delay could not exactly be anticipated. Representation have been made to the Ministry of Railways for improving the conditions. Movement of wagons are also delayed considerably. A consignment booked usually taken two to three months to reach destinations 2,000 to 3,000 kms. away from the despatching point. Railways have to work more efficiently to reduce the transit period.

. . . . .

## C O N C L U S I O N

Thus we see that the electrical machinery industry occupies a dominant position in the industrial map of Kerala. This justified our choice of this industry for indepth study in order to demonstrate the salience of our hypothesis that most of the large scale industries set up in Kerala failed to generate sufficient linkages with the local economy. This line of reasoning is examined in the next chapter more fully on the basis of fresh data collected from the sample units.

. . . . .

## CHAPTER - IV

## LINKAGES OF ELECTRICAL MACHINERY INDUSTRY : AN ANALYSIS OF THE SAMPLE UNITS

Theoretical and historical studies on industrialisation have shown in no uncertain terms that the pace and pattern of the process of industrialisation depends on the linkages, both forward and backward, generated by individual industries. The electrical industry is not an exception to this. Therefore, as discussed in Chapter III, efforts to study the process of industrialisation in a country or a region should necessarily take into account the linkage effects of industries.

As the major focus of this study is the linkages of electrical machinery industry in Kerala, this chapter primarily concerns a detailed analysis based on statistical data collected from both primary and secondary sources.

As we have seen in the previous chapter the electrical machinery industry accounts for 8.9 per cent of value-added and 4.5 percent of the employment in the manufacturing sector in Kerala. In this Chapter, we propose to analyse the linkages - both forward and backward generated by the electrical machinery industry and their contribution to the process of industrialisation in the state. The structure of the industry has already been analysed using the data thrown up by the Annual Survey of Industries for the period 1976-77 to 1984-85. As the ASI data are not organised in a manner to understand the linkages of the industrty under consideration, in the sense as the rawmaterials supplied by the various industries and the output absorbed by the different industries we are not in a position to carry the analysis further in this direction. Therefore, we are using the data collected by us from four sample units that represent electrical machinery industry in Kerala.

Even when we base our analysis on the primary data, we encounter a major problem. We have information about the quantity and value of the various inputs purchased by the units from Kerala, the rest of India and abroad. We also have data on the sales of the output within the state, the rest of India and outside India. But we do not have information regarding the different firms that supply raw materials and other inputs and their quantities and values and the firms and organisations that buy the output of the units under study. This limitation of the availablity of data render it difficult to make use of the technique of input output analysis to work out the linkages of the industry with other industries within the region as well as outside.

The analysis covers a period from 1977-86. In 1977 of the total purchase of inputs, Kerala accounted for only 2.66 percent. Nearly 88 percent of the inputs were purchased from the other states in the country while a little above 9 percent of the input requirements were met from imports (Table 4 - 1). The percentage of purchase from Kerala gradually loose and reached a little above 28 percent in 1985 while the proportion purchased from the rest of India showed a marked decline from about 88 percent in 1977 to 50 percent in 1988. The share of imports showed remarkable increase over the years.

When we examine the pattern of purchase of rawmaterials and components made by the individual units under onsideration, also the picture does not make any difference. The major raw inputs purchased by the industry are copper, Aluminium. Steel and Steel products and components and material of different types. (Table 4. 2 a, b, c and d) Copper, Aluminium and Steel jointly account for 50 to 60 percent of the total material inputs of the industry. While these three raw materials account for nearly 90 percent of the total inputs in the case of ALIND, the respective percentage for Premier cable, TELK and UEI are 70 percent, 60 percent and 30 percent. However except ALIND, all other companies have reduced the consumption of Copper over the years 1977 to 1986. This analysis shows that as the

Table 4.1

**Regional pattern of purchase of**

**Raw materials and Components (All Sample Factories) : 1977 - 1986**

| Year | Purchase from Kerala | Purchase from rest of India | Import | Total |
|---|---|---|---|---|
| 1977 | 109.04 | 3618.22 | 372.08 | 4121.23 |
| | (2.65) | (87.79) | (9.03) | (100) |
| 1978 | 513.97 | 3036.83 | 546.39 | 4101.66 |
| | (12.53) | (74.04) | (13.32) | (100) |
| 1979 | 622.88 | 2536.37 | 666.70 | 3825.95 |
| | (16.28) | (66.29) | (17.43) | (100) |
| 1980 | 526.62 | 2302.57 | 766.42 | 3597.13 |
| | (14.64) | (64.01) | (21.31) | (100) |
| 1981 | 608.93 | 2709.46 | 1097.87 | 4413.24 |
| | (13.77) | (61.38) | (24.87) | (100) |
| 1982 | 790.84 | 2586.41 | 1384.34 | 4761.61 |
| | (16.61) | (54.32) | 29.07) | (100) |
| 1983 | 1133.70 | 2227.99 | 967.75 | 4329.43 |
| | (26.19) | (51.46) | (22.35) | (100) |
| 1984 | 762.93 | 1585.00 | 971.68 | 3319.63 |
| | (22.98) | (47.75) | (29.27) | (100) |
| 1985 | 1356.30 | 2776.04 | 811.93 | 4945.70 |
| | (27.42) | (56.13) | (16.42) | (100) |
| 1986 | 1386.35 | 3044.75 | 1610.54 | 6039.72 |
| | (22.94) | (50.40) | (26.66) | (100) |

Note : Figures in the bracket indicate the percentages

Source : Survey Data.

Table 4.2a

## PERCENTAGE DISTRIBUTION OF INDIVIDUAL ITEMS OF RAWMATERIALS

## ALUMINIUM INDUSTRIES LIMITED (SWITCH GEAR DIVISION): 1977 - 1986

| Year | Copper | Steel | Aluminium | Brass | Trans-former Oil | Fibre Glass Cloth | Insulating paper & Other Items | Electrical Items | Other Components |
|---|---|---|---|---|---|---|---|---|---|
| 1977 | 28.17 | 32.48 | 27.89 | 1.28 | 1.89 | 2.38 | 3.08 | 2.18 | 0.65 |
| 1978 | 30.18 | 29.07 | 26.83 | 4.56 | 2.18 | 1.19 | 1.28 | 3.01 | 1.70 |
| 1979 | 26.48 | 31.20 | 24.82 | 3.38 | 1.92 | 1.07 | 4.01 | 3.49 | 2.78 |
| 1980 | 32.08 | 35.83 | 25.08 | 2.18 | 1.38 | 0.70 | 1.39 | 1.20 | 0.78 |
| 1981 | 31.09 | 32.89 | 24.70 | 4.87 | 2.88 | 1.93 | 0.38 | 0.23 | 1.03 |
| 1982 | 28.02 | 33.81 | 29.08 | 3.83 | 1.27 | 0.89 | 1.21 | Nil | 2.00 |
| 1983 | 25.87 | 35.93 | 23.60 | 5.89 | 2.38 | 1.87 | 2.38 | 1.90 | 0.28 |
| 1984 | 30.09 | 34.28 | 21.69 | 4.72 | 1.98 | 3.20 | 2.78 | 1.17 | 0.20 |
| 1985 | 28.97 | 38.08 | 19.27 | 5.61 | 4.23 | 3.28 | Nil | Nil | 0.56 |
| 1986 | 27.93 | 38.98 | 20.90 | 4.28 | 2.67 | 1.23 | 2.18 | 1.97 | Nil |

**Source** : Survey Data

Table 4.2 b.

**PERCENTAGE DISTRIBUTION OF INDIVIDUAL ITEMS OF RAWMATERIALS**

**TRANSFORMERS AND ELECTRICALS (KERALA LIMITED) 1977 - 1986**

| Year | Copper | Steel | Press Board | Transformer Oil | Intermediate Components and other materials | Total |
|---|---|---|---|---|---|---|
| 1977 | 27.19 | 32.01 | 5.20 | 13.32 | 22.28 | 100 |
| 1978 | 23.14 | 28.05 | 5.41 | 09.59 | 33.52 | 100 |
| 1979 | 17.54 | 26.76 | 4.43 | 13.97 | 37.29 | 100 |
| 1980 | 24.83 | 25.53 | 5.60 | 10.55 | 33.50 | 100 |
| 1981 | 24.53 | 28.28 | 5.61 | 10.68 | 30.90 | 100 |
| 1982 | 19.52 | 33.30 | 3.56 | 07.40 | 36.22 | 100 |
| 1983 | 20.30 | 28.71 | Nil | Nil | 50.98 | 100 |
| 1984 | 18.89 | 24.25 | Nil | Nil | 56.85 | 100 |
| 1985 | 19.13 | 29.21 | Nil | Nil | 51.66 | 100 |
| 1986 | 20.40 | 30.78 | Nil | Nil | 48.78 | 100 |

Source : Survey Data.

Table 4.2 c.

**PERCENTAGE DISTRIBUTION OF INDIVIDUAL ITEMS OF RAWMATERIALS**

**UNITED ELECTRICAL INDUSTRIES LIMITED - 1977 - 1986**

| Year | Copper | Steel | Brass | Aluminium | Meter components | Motor control gear components | 11.K.V components | Switch gear and other components | PEC items | GFR items | Others | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1977 | 14.62 | 12.97 | 6.87 | 2.47 | 28.68 | 7.57 | 4.47 | 2.01 | 9.62 | 2.60 | 8.11 | 100 |
| 1978 | 14.53 | 13.28 | 5.28 | 2.49 | 28.96 | 6.20 | 4.33 | 2.00 | 9.60 | 3.18 | 8.19 | 100 |
| 1979 | 14.28 | 14.96 | 4.83 | 2.53 | 29.13 | 5.98 | 4.37 | 1.83 | 9.84 | 4.27 | 8.77 | 100 |
| 1980 | 14.11 | 16.76 | 4.31 | 2.56 | 29.66 | 5.77 | 4.29 | 1.36 | 7.58 | 4.57 | 9.00 | 100 |
| 1981 | 15.08 | 13.69 | 5.37 | 3.21 | 26.70 | 7.70 | 3.72 | 1.64 | 10.36 | 4.35 | 8.18 | 100 |
| 1982 | 11.67 | 11.65 | 4.46 | 1.91 | 36.79 | 8.02 | 2.35 | 0.45 | 9.90 | 5.26 | 7.54 | 100 |
| 1983 | 11.60 | 08.89 | 4.19 | 1.73 | 37.65 | 8.69 | 3.70 | 1.88 | 8.03 | 5.72 | 5.93 | 100 |
| 1984 | 10.49 | 11.68 | 3.31 | 2.10 | 43.40 | 5.18 | 3.84 | 0.76 | 10.01 | 2.17 | 7.15 | 100 |
| 1985 | 12.44 | 13.21 | 3.80 | 2.02 | 49.70 | 2.14 | 2.45 | 0.22 | 6.55 | 1.20 | 6.26 | 100 |
| 1986 | 10.26 | 10.56 | 2.53 | 1.85 | 50.70 | 7.55 | Nil | 0.34 | 9.67 | 0.48 | 6.05 | 100 |

Source : Survey Data.

Table 4 - 2 d.

**PERCENTAGE DISTRIBUTION OF INDIVIDUAL ITEMS OF RAWMATERIALS**

**THE PREMIER CABLE COMPANY LIMITED : 1977 - 1986**

| Year | Copper | Aluminium | PVC and other Chemicals | Steel Wires Strips and tapes | Steel Bars | XLPE Compound | Others |
|---|---|---|---|---|---|---|---|
| 1977 | 20.38 | 34.17 | 32.23 | 09.38 | Nil | 3.21 | 0.63 |
| 1978 | 21.49 | 35.68 | 34.24 | 08.17 | Nil | Nil | 0.42 |
| 1979 | 18.48 | 30.73 | 32.80 | 12.89 | 5.01 | Nil | 0.09 |
| 1980 | 13.60 | 36.56 | 37.57 | 12.17 | Nil | Nil | 0.07 |
| 1981 | 17.52 | 38.83 | 30.44 | 12.88 | 0.08 | Nil | 0.22 |
| 1982 | 24.84 | 26.68 | 25.02 | 12.61 | 10.80 | Nil | 0.15 |
| 1983 | 22.38 | 29.82 | 27.52 | 11.35 | 8.75 | Nil | 0.20 |
| 1984 | 04.14 | 48.02 | 28.72 | 13.37 | 0.36 | 0.08 | 5.26 |
| 1985 | 06.12 | 40.38 | 29.30 | 10.28 | 5.95 | 0.11 | 7.82 |
| 1986 | 09.94 | 32.24 | 29.36 | 12.37 | 4.22 | 11.83 | 0.04 |

Source : Survey Data

industry uses mostly Copper, Aluminium and Steel, its backward linkages are very weak in general. However, TELK and UEL are exceptions to this. A substantial proportion of UEL's purchase is accounted for by manufactured items such as meter components, motor control gear components, switchgear and other components indicating a much larger backward linkage. About 40 to 50 percent of the purchase of TELK are also manufactured items such as intermediate components and materials suggesting a much larger backward linkage.

We have seen above that the electrical machinery industry in Kerala generates very little backward linkages. Now we turn to an analysis of the regional nature of these linkages, however, small they are. For this purpose, we take the major items of purchase made by the selected firms from Kerala, the rest of India and abroad (Table 4-3a, b, c and d). TELK used to purchase initially only a small percentage of their total requirements from Kerala, but this proportion has grown significantly over the years and settled down around 25 percent. With regard to imports also there has been considerable increase from a low initial position. This obviously implies that its purchases from the rest of India declined considerably from an initial high position. The trends and pattern of the regional distribution of purchase of inputs in respect of UEI, PCC and ALIND also are similar to that of TELK.

TELK buys nearly 15 percent of its steel requirements from Kerala (See Table 4 - 4). Most of the other inputs used by this firms are neither available in, nor purchased from Kerala. A notable aspects of TELK's purchase pattern is that it buys about 30 percent of its requirements of intermediate components, spares and other materials from Kerala. A number of items such as Copper, Steel, Press Board, Transformer oil and intermediate components and spares are purchased from the other states in India and that

Table : 4. 3a.

**PERCENTAGE DISTRIBUTION OF PURCHASE OF RAWMATERIALS ACCORDING TO REGIONS**

**THE TRANSFORMERS AND ELECTRICALS, KERALA LIMITED, 1977 TO 1986**

| Year | Purchase from Kerala | Purchase from outside Kerala | Import | Total |
|---|---|---|---|---|
| 1977 | 02.51 | 90.64 | 06.84 | 100 |
| 1978 | 11.07 | 65.05 | 23.87 | 100 |
| 1979 | 11.76 | 71.63 | 16.60 | 100 |
| 1980 | 13.18 | 47.03 | 39.81 | 100 |
| 1981 | 16.43 | 44.30 | 39.26 | 100 |
| 1982 | 09.03 | 44.32 | 46.65 | 100 |
| 1983 | 34.76 | 35.69 | 29.54 | 100 |
| 1984 | 25.67 | 48.34 | 25.95 | 100 |
| 1985 | 27.47 | 62.62 | 19.90 | 100 |
| 1986 | 24.07 | 49.20 | 26.72 | 100 |

Source : Survey Data

Table : 4.3b.

**PERCENTAGE DISTRIBUTION OF PURCHASE OF RAWMATERIALS ACCORDING TO REGIONS**

**THE PREMIER CABLE COMPANY LIMITED, 1977 -1986**

| Year | Purchase from Kerala | Purchase from Outside Kerala | Import | Total |
|---|---|---|---|---|
| 1977 | 01.98 | 85.36 | 12.66 | 100 |
| 1978 | 11.44 | 77.99 | 10.57 | 100 |
| 1979 | 13.05 | 69.04 | 17.91 | 100 |
| 1980 | 12.14 | 61.48 | 26.37 | 100 |
| 1981 | 14.01 | 66.32 | 19.66 | 100 |
| 1982 | 11.25 | 69.62 | 19.12 | 100 |
| 1983 | 21.18 | 66.28 | 12.53 | 100 |
| 1984 | 23.02 | 46.06 | 30.91 | 100 |
| 1985 | 26.31 | 55.78 | 17.91 | 100 |
| 1986 | 16.93 | 57.99 | 25.07 | 100 |

Source : Survey Data.

Table : 4.3c.

**PERCENTAGE DISTRIBUTION OF RAW MATERIALS ACCORDING TO REGIONS**

**THE ALUMINIUM INDUSTRIES LIMITED, 1977 - 1986**

| Year | Purchase from Kerala | Purchase from Outside Kerala | Import | Total |
|---|---|---|---|---|
| 1977 | 03.47 | 83.27 | 13.25 | 100 |
| 1978 | 12.04 | 71.24 | 16.24 | 100 |
| 1979 | 16.25 | 69.34 | 14.20 | 100 |
| 1980 | 17.37 | 65.06 | 17.56 | 100 |
| 1981 | 13.51 | 59.90 | 26.57 | 100 |
| 1982 | 14.97 | 63.24 | 21.77 | 100 |
| 1983 | 26.85 | 46.97 | 26.17 | 100 |
| 1984 | 24.00 | 41.86 | 34.12 | 100 |
| 1985 | 31.31 | 46.06 | 22.62 | 100 |
| 1986 | 26.38 | 44.22 | 29.39 | 100 |

Source : Survey Data

Table : 4.3d.

**PERCENTAGE DISTRIBUTION OF RAWMATERIALS ACCORDING TO REGIONS**

**THE UNITED ELECTRICAL INDUSTRIES LTD.**

1977 - 1986

| Year | Purchase from Kerala | Purchase from Outside Kerala | Import | Total |
|---|---|---|---|---|
| 1977 | 02.75 | 95.15 | 02.08 | 100 |
| 1978 | 16.07 | 81.65 | 02.27 | 100 |
| 1979 | 14.23 | 75.34 | 16.43 | 100 |
| 1980 | 15.22 | 73.57 | 11.20 | 100 |
| 1981 | 13.22 | 75.83 | 10.94 | 100 |
| 1982 | 12.74 | 77.27 | 09.97 | 100 |
| 1983 | 20.32 | 60.11 | 19.56 | 100 |
| 1984 | 19.70 | 55.72 | 24.58 | 100 |
| 1985 | 23.89 | 59.08 | 17.05 | 100 |
| 1986 | 22.42 | 52.96 | 24.61 | 100 |

Source : Survey Data.

Table : 4.4

**PERCENTAGE DISTRIBUTION OF INPUT PURCHASE ACCORDING TO REGIONS**

**TRANSFORMERS AND ELECTRICALS KERALA LIMITED, 1977 - 86.**

| Year | Purchase of Imported materials | | | | |
|---|---|---|---|---|---|
| | Copper | Steel | Press Board | Transformer Oil | Intermediate components, Spares and other materials |
| 1977 | 15.95 | 17.37 | 05.42 | 10.02 | 11.79 |
| 1978 | 17.81 | 19.77 | 05.03 | 22.87 | 15.57 |
| 1979 | 28.93 | 25.74 | 13.82 | 19.63 | 17.38 |
| 1980 | 23.80 | 31.78 | 12.17 | 30.82 | 24.24 |
| 1981 | 25.69 | 33.82 | 12.67 | 29.62 | 20.70 |
| 1982 | 34.04 | 26.46 | 20.82 | 40.91 | 22.65 |
| 1983 | 25.67 | 45.49 | Nil | Nil | 06.62 |
| 1984 | 27.10 | 62.58 | Nil | Nil | 03.76 |
| 1985 | 34.83 | 28.86 | Nil | Nil | 01.86 |
| 1986 | 31.07 | 24.56 | Nil | Nil | 10.79 |

**Purchase of materials from Kerala**

| Year | Copper | Steel | Press Board | Transformer Oil | Intermediate components, spares and other materials |
|---|---|---|---|---|---|
| 1977 | Nil | 16.26 | Nil | Nil | 28.53 |
| 1978 | Nil | 16.10 | Nil | Nil | 28.96 |
| 1979 | NIl | 15.27 | Nil | Nil | 27.19 |
| 1980 | Nil | 16.98 | Nil | Nil | 28.58 |
| 1981 | Nil | 14.32 | Nil | Nil | 29.17 |
| 1982 | Nil | 13.17 | Nil | Nil | 30.38 |
| 1983 | Nil | 13.33 | Nil | Nil | 33.11 |
| 1984 | Nil | 14.21 | Nil | Nil | 36.13 |
| 1985 | Nil | 14.17 | Nil | Nil | 38.17 |
| 1986 | NIl | 13.26 | Nil | Nil | 29.38 |

**Purchase of materials from outside Kerala (Percent)**

| Year | Copper | Steel | Press Board | Transformer Oil | Intermediate components, spares and other materials |
|---|---|---|---|---|---|
| 1977 | 84.05 | 66.37 | 94.58 | 89.98 | 59.68 |
| 1978 | 82.18 | 64.13 | 94.97 | 77.13 | 55.47 |
| 1979 | 71.07 | 58.98 | 86.18 | 80.37 | 55.43 |
| 1980 | 76.18 | 51.24 | 87.83 | 69.18 | 47.18 |
| 1981 | 74.31 | 51.86 | 87.33 | 70.38 | 50.13 |
| 1982 | 65.96 | 60.37 | 79.18 | 59.10 | 46.97 |
| 1983 | 74.33 | 41.18 | Nil | Nil | 60.27 |
| 1984 | 72.90 | 48.37 | Nil | Nil | 60.11 |
| 1985 | 65.17 | 56.97 | Nil | Nil | 59.97 |
| 1986 | 68.93 | 62.18 | Nil | Nil | 59.83 |

Source : Survey Data

too in very large proportions. All these items are imported also. Even imports account for a significantly high proportion in comparison with local purchase.

ALIND purchases about 40 percent of its Steel requirements and 40 percent of its Aluminium requirements from Kerala (Table 4.5). A very substantial proposition of its input requirements are met from the rest of India. Nearly 60 percent of steel and 90 per cent of Copper were purchased from the other states in India, during the late 70's but this proportion gradually plummeted to 30 per cent and 50 per cent respectively the late 80's . This decline was compensated by purchase from abroad. The story is same in the case of Aluminium also. Some other items such as Brass, Transformer oil, Film glass and other components are bought fully from the other states. Its imports are constituted primarily by Copper, Steel, and Aluminium the proportion of which increased considerably overtime.

UEI purchases only Steel from Kerala, and that too to the tune of 30 percent of its total requirements (Table 4-6). About 80 percent of a Copper, 50 percent of Steel 90 percent of Brass and 95 percent of Aluminium are brought from the rest of India. The remaining portion of its requirements is met through imports.

Though PCC purchases nearly 15 percent of its total input requirements from Kerala, it constitutes only of minor items (Table 4-7). A Major items of its input purchase from Kerala is electricity. All its major input requirements are met wholly either from the rest of India or abroad. Though purchase from the rest of India constitutes the bulk of its total input demand, imports also accounts for a no less significant proportion.

Our discussion so far has clearly shown that the type of electrical machinery industry established in Kerala does not have any significant backward linkages and whatever little linkages it generates do not benefit the regional economy of Kerala. Its linkages are either with the other states in India or foreign countries.

Table : 4.5

**PERCENTAGE DISTRIBUTION OF INPUT PURCHASE ACCORDING TO REGIONS**

**THE ALUMINIUM INDUSTRIES LIMITED**

1977 - 86

**Purchase of materials from Kerala**

| Year | Copper | Steel | Aluminium | Brass | Transformer Oil | Fibre glass cloth | Insulating paper | other items | Electrical items | Other components |
|---|---|---|---|---|---|---|---|---|---|---|
| 1977 | Nil | Nil | Nil | Nil | Nil | Nil | Nil | Nil | Nil | Nil |
| 1978 | Nil | 26.58 | 18.18 | Nil | Nil | Nil | Nil | Nil | Nil | Nil |
| 1979 | Nil | 30.87 | 34.26 | Nil | Nil | Nil | Nil | Nil | Nil | Nil |
| 1980 | Nil | 33.37 | 28.47 | Nil | Nil | Nil | Nil | Nil | Nil | Nil |
| 1981 | Nil | 18.13 | 38.18 | Nil | Nil | Nil | Nil | Nil | Nil | Nil |
| 1982 | Nil | 24.16 | 33.07 | Nil | Nil | Nil | Nil | Nil | Nil | Nil |
| 1983 | Nil | 44.56 | 40.13 | Nil | Nil | Nil | Nil | Nil | Nil | Nil |
| 1984 | Nil | 39.13 | 48.31 | Nil | Nil | Nil | Nil | Nil | Nil | Nil |
| 1985 | Nil | 44.36 | 33.03 | Nil | Nil | Nil | Nil | Nil | Nil | Nil |
| 1986 | Nil | 40.37 | 33.74 | Nil | Nil | Nil | Nil | Nil | Nil | Nil |

**(Purchase of materials from outside Kerala**

| Year | Copper | Steel | Aluminium | Brass | Transformer Oil | Fibre Glass cloth | Insulating paper & other items | Electrical items | Other components |
|---|---|---|---|---|---|---|---|---|---|
| 1977 | 59.38 | 94.48 | 92.37 | 100 | 100 | 100 | 100 | 100 | 100 |
| 1978 | 63.27 | 61.17 | 68.57 | 100 | 100 | 100 | 100 | 100 | 100 |
| 1979 | 55.17 | 62.28 | 45.57 | 100 | 100 | 100 | 100 | 100 | 100 |
| 1980 | 65.03 | 64.03 | 43.18 | 100 | 100 | 100 | 100 | 100 | 100 |
| 1981 | 63.43 | 61.98 | 37.03 | 100 | 100 | 100 | 100 | 100 | 100 |
| 1982 | 40.17 | 59.30 | 48.13 | 100 | 100 | 100 | 100 | 100 | 100 |
| 1983 | 36.38 | 55.18 | 21.97 | 100 | 100 | 100 | 100 | 100 | 100 |
| 1984 | 44.18 | 51.03 | 10.37 | 100 | 100 | 100 | 100 | 100 | 100 |
| 1985 | 62.28 | 50.93 | 18.37 | 100 | 100 | 100 | 100 | 100 | 100 |
| 1986 | 29.37 | 52.37 | 20.18 | 100 | 100 | 100 | 100 | 100 | 100 |

**Purchase of Imported materials**

| Year | Copper | Steel | Aluminium | Brass | Transformer Oil | Fibre glass Cloth | Insulating paper and other items | Electrical items | Other components |
|---|---|---|---|---|---|---|---|---|---|
| 1977 | 40.62 | 5.52 | 07.63 | Nil | Nil | Nil | Nil | Nil | Nil |
| 1978 | 36.73 | 12.24 | 20.65 | Nil | Nil | Nil | Nil | Nil | Nil |
| 1979 | 44.83 | 6.85 | 20.17 | Nil | Nil | Nil | Nil | Nil | Nil |
| 1980 | 34.94 | 2.12 | 23.25 | Nil | Nil | Nil | Nil | Nil | Nil |
| 1981 | 36.57 | 19.89 | 24.79 | Nil | Nil | Nil | Nil | Nil | Nil |
| 1982 | 59.83 | 16.54 | 18.80 | Nil | Nil | Nil | nil | Nil | Nil |
| 1983 | 63.62 | 0.66 | 38.80 | Nil | Nil | nil | Nil | Nil | Nil |
| 1984 | 55.82 | 9.84 | 41.32 | Nil | Nil | Nil | Nil | Nil | Nil |
| 1985 | 37.72 | 4.71 | 48.60 | Nil | Nil | Nil | Nil | Nil | Nil |
| 1986 | 70.63 | 7.26 | 46.08 | Nil | Nil | Nil | Nil | Nil | Nil |

Source : Survey Data.

Table 4 - 6.

**PERCENTAGE DISTRIBUTION OF INPUT PURCHASE ACCORDING TO REGIONS**

**UNITED ELECTRICAL INDUSTRIES LIMITED**

**1977 - 1986**

**(Purchase of Materials from Kerala (Percent)**

| Year | Copper | Steel | Brass | Aluminium |
|---|---|---|---|---|
| 1977 | Nil | 29.38 | Nil | Nil |
| 1978 | Nil | 33.17 | Nil | Nil |
| 1979 | Nil | 34.02 | Nil | Nil |
| 1980 | Nil | 35.62 | Nil | Nil |
| 1981 | Nil | 31.98 | Nil | Nil |
| 1982 | Nil | 32.34 | Nil | Nil |
| 1983 | Nil | 29.28 | Nil | Nil |
| 1984 | Nil | 32.46 | nil | Nil |
| 1985 | Nil | 29.10 | nil | Nil |
| 1986 | Nil | 35.46 | Nil | Nil |

**Purchase of materials from Outside Kerala (Percent)**

| Year | Copper | Steel | Brass | Aluminium |
|---|---|---|---|---|
| 1977 | 82.18 | 53.28 | 95.28 | 95.43 |
| 1978 | 82.12 | 49.73 | 92.13 | 95.53 |
| 1979 | 81.30 | 48.57 | 89.18 | 95.78 |
| 1980 | 81.11 | 46.91 | 88.37 | 96.01 |
| 1981 | 83.03 | 50.74 | 90.37 | 97.08 |
| 1982 | 82.14 | 50.53 | 92.17 | 95.11 |
| 1983 | 84.01 | 54.33 | 92.17 | 94.07 |
| 1984 | 80.83 | 49.36 | 87.07 | 97.18 |
| 1985 | 82.38 | 51.94 | 87.98 | 96.32 |
| 1986 | 86.13 | 49.68 | 86.98 | 97.01 |

**(Purchase of Imported Materials (Percent)**

| Year | Copper | Steel | Brass | Aluminium |
|---|---|---|---|---|
| 1977 | 17.82 | 16.33 | 04.72 | 4.57 |
| 1978 | 17.82 | 16.97 | 07.86 | 4.46 |
| 1979 | 18.70 | 17.41 | 10.82 | 4.22 |
| 1980 | 18.89 | 17.47 | 11.63 | 3.99 |
| 1981 | 16.94 | 17.28 | 09.59 | 2.92 |
| 1982 | 17.86 | 17.13 | 07.02 | 4.84 |
| 1983 | 15.98 | 16.39 | 07.83 | 5.93 |
| 1984 | 19.17 | 18.18 | 12.94 | 2.83 |
| 1985 | 17.62 | 15.94 | 12.01 | 3.65 |
| 1986 | 13.87 | 13.72 | 13.01 | 2.98 |

Source : Survey Data

Table : 4.7

**PERCENTAGE DISTRIBUTION OF INPUT PURCHASE ACCORDING TO REGIONS**

**THE PREMIER CABLE COMPANY LTD.**

**1977 - 1986**

**Purchase of imported materials (Percent)**

| Year | Copper | Aluminium | PVC and other Chemicals | Steel wires strips & tapes | Steel bars | XLPE compound | Others |
|---|---|---|---|---|---|---|---|
| 1977 | 09.62 | 08.52 | 06.64 | 49.64 | Nil | 65.82 | 43.63 |
| 1978 | 11.83 | 07.83 | 05.83 | 48.84 | Nil | Nil | 51.82 |
| 1979 | 24.62 | 11.42 | 03.62 | 47.62 | 38.72 | Nil | 56.83 |
| 1980 | 40.87 | 10.87 | 05.83 | 44.14 | Nil | Nil | 58.82 |
| 1981 | 31.32 | 18.76 | 12.82 | 45.69 | 39.62 | Nil | 59.64 |
| 1982 | 06.66 | 23.43 | 11.87 | 51.03 | 36.82 | Nil | 58.42 |
| 1983 | 18.82 | 09.97 | 12.63 | 53.66 | 51.74 | Nil | 49.70 |
| 1984 | 06.32 | 03.82 | 13.83 | 40.82 | 52.64 | 43.62 | 38.82 |
| 1985 | 05.53 | 06.77 | 12.82 | 41.63 | 28.83 | 40.83 | 33.43 |
| 1986 | 10.62 | 13.77 | 18.52 | 40.89 | 43.61 | 16.44 | 49.96 |

**Purchase of materials from outside Kerala (percent)**

| Year | Copper | Aluminium | PVC and other Chemicals | Steel wires strips & tapes | Steel bars | XVPE compound | Others |
|---|---|---|---|---|---|---|---|
| 1977 | 90.38 | 91.48 | 93.36 | 50.36 | Nil | 34.18 | 56.37 |
| 1978 | 88.17 | 92.17 | 94.17 | 51.16 | Nil | Nil | 48.18 |
| 1979 | 75.38 | 38.58 | 96.38 | 52.37 | 61.28 | Nil | 43.17 |
| 1980 | 59.13 | 39.13 | 94.17 | 55.86 | Nil | Nil | 41.18 |
| 1981 | 68.68 | 81.26 | 87.18 | 54.31 | 60.38 | Nil | 40.36 |
| 1982 | 93.34 | 76.58 | 88.13 | 48.97 | 63.18 | Nil | 41.58 |
| 1983 | 81.18 | 90.03 | 87.37 | 46.36 | 48.26 | Nil | 50.30 |
| 1984 | 93.68 | 96.18 | 86.17 | 59.18 | 47.36 | 56.38 | 61.18 |
| 1985 | 94.47 | 93.23 | 87.18 | 58.37 | 71.17 | 59.17 | 66.57 |
| 1986 | 89.38 | 86.23 | 81.48 | 59.11 | 56.37 | 83.56 | 50.04 |

Source : Survey Data.

Sometimes it is possible that certain industries generate only significant backward linkages. But in terms of the forward linkages they may be quite significant. They may be in a position to supply a large number of intermediate inputs and induce the growth of other industries leading to an acceleration in the process of industrialisation of a region. In other words, all industries may not be as much potent in generating backward linkages as forward linkages. Let us examine the nature of the forward linkages of the electrical machinary industry in the light of this perspective.

The electrical machinery industry in Kerala produces a wide variety of products such as KWH Metres, Motor Control Gears, L.T. Switchgears, 11 KV Switchgears, Plastic Film Capacitors, Carbon Film Resistors, Bare Conductors, Steel Wires, Ancillary Machines, Current Breakers, Current and Potential Transformers, Control Panels, Bushings, On Load Tap Changers, Shunt Reactors, Busducts, Spares etc. All these products are important inputs for power generating and other organising industries. The variety of the items itself shows that the industry has very high potential forward linkages. Metres, Cables, Conductors, Transformers, are the items which have a substantial weight in the product mix of the industry.

An examination of the pattern of sales of finished products shows that it is not much different from the pattern of purchase of inputs from the point of view of its regional linkages. On an average, Kerala accounts for only about 15 percent of its total sales of output (Table 4.8). The only encouraging trend is that the proportion of sales within Kerala has increased from nearly 13 percent in 1977 to 19 percent in 1986. Sales in the other states within India accounts for a substanial proportion. However, it has declined from 83 percent in 1977 to 72 percent in 1986. Export which accounted for only 4 percent of the total sales in 1977 increased to about 9 percent in 1986. A point that needs to be made in this context is that

while the industry imports about one fourth of its input requirements, it is able to export only about one twelth of its output. This has inter-alia important implications for the use of our scarce foreign exchange reserves.

When the sales data are examined firm wise also, the picture is not significantly different for sales within Kerala (Table 4.8). Though, there is some variation across companies, they are not significant enough (Table 4.9) Sales in the other states of India constitutes a principal proportion of total sales. It is nearly 75 percent with some variations between firms. This proportion declined over the years with respect to Premier Cables and ALIND, while it marginally increased in the case of UEI and remained more orless the same as far as TELK is concerned.

Consider the case of exports. Only Premier Cables and ALIND export its manufactured items, Though all units are engaged in imports of raw materials and other inputs. Premier cables has steadily improved its exports from about 10 percent of its total sales to 20 percent over a period of 10 years from 1977 to 1986. The exports of ALIND vary from 5 percent to 22 percent without showing any particular trend.

Table 4 - 8.

**Regional Pattern of Distribution of output (All sample factories 1977-'86)**

| Sales within Kerala | Sales outside Kerala | Export | Total |
|---|---|---|---|
| 700.08 | 4550.27 | 222.82 | 5474.34 |
| (12.79) | (83.12) | (4.07) | (100) |
| 752.63 | 4246.14 | 364.48 | 5363.26 |
| (14.03) | (79.17) | (6.8) | (100) |
| 815.39 | 4813.51 | 217.15 | 5746.05 |
| (14.19) | (83.53) | (2.52) | (100) |
| 532.39 | 4972.77 | 249.51 | 7554.67 |
| (9.2) | (86.23) | (4.32) | (100) |
| 1106.91 | 4767.55 | 421.73 | 6296.21 |
| (17.58) | (75.72) | (6.70) | (100) |
| 880.90 | 5308.99 | 407.75 | 6595.67 |
| (13.34) | (80.48) | (6.18) | (100) |
| 830.99 | 5037.79 | 343.72 | 6212.50 |
| (10.38) | (83.48) | (5.53) | (100) |
| 862.94 | 3208.56 | 282.35 | 4353.85 |
| (19.42) | (75.20) | (6.35) | (100) |
| 1096.12 | 4579.22 | 891.44 | 6566.78 |
| (18.07) | (75.48) | (6.45) | (100) |
| 1611.40 | 6167.67 | 734.95 | 8514.03 |
| (18.92) | (72.44) | (8.63) | (100) |

Note : Figures in the bracket indicate percentages

Source : Survey Data

Table 4.9

**PERCENTAGE DISTRIBUTION OF OUTPUT ACCORDING TO REGIONS AND FIRMS WISE : 1977 - 86**

**THE PREMIER CABLE COMPANY LIMITED**

| Year | Sales inside Kerala | Sales outside Kerala | Export | Total |
|---|---|---|---|---|
| 1977 | 05.98 | 84.29 | 09.03 | 100 |
| 1978 | 06.80 | 81.40 | 11.79 | 100 |
| 1979 | 07.86 | 82.81 | 09.55 | 100 |
| 1980 | 06.86 | 84.67 | 08.46 | 100 |
| 1981 | 14.81 | 68.74 | 16.44 | 100 |
| 1982 | 06.79 | 78.64 | 14.56 | 100 |
| 1983 | 10.60 | 78.60 | 10.79 | 100 |
| 1984 | 16.16 | 75.85 | 12.05 | 100 |
| 1985 | 11.26 | 57.71 | 31.02 | 100 |
| 1986 | 12.46 | 67.84 | 19.69 | 100 |

Source : Survey Data

**THE ALUMINIUM INDUSTRIES LIMITED**

| Year | Sales inside Kerala | Sales Outside Kerala | Export | Total |
|---|---|---|---|---|
| 1977 | 11.25 | 83.21 | 04.93 | 100 |
| 1978 | 14.26 | 70.90 | 14.83 | 100 |
| 1979 | 14.25 | 80.84 | 04.89 | 100 |
| 1980 | 03.08 | 88.19 | 08.72 | 100 |
| 1981 | 12.15 | 79.58 | 08.26 | 100 |
| 1982 | 14.66 | 77.79 | 07.67 | 100 |
| 1983 | 12.41 | 77.61 | 09.95 | 100 |
| 1984 | 32.00 | 46.91 | 21.07 | 100 |
| 1985 | 18.36 | 59.84 | 21.81 | 100 |
| 1986 | 33.07 | 52.96 | 13.96 | 100 |

Source : Survey Data

**THE UNITED ELECTRICAL INDUSTRIES LIMITED**

| Year | Sales inside Kerala | Sales Outside Kerala | Export | Total |
|---|---|---|---|---|
| 1977 | 24.14 | 75.85 | - | 100 |
| 1978 | 23.94 | 76.05 | - | 100 |
| 1979 | 27.87 | 72.12 | - | 100 |
| 1980 | 20.71 | 79.28 | - | 100 |
| 1981 | 26.72 | 73.27 | - | 100 |
| 1982 | 24.80 | 75.19 | - | 100 |
| 1983 | 21.15 | 78.84 | - | 100 |
| 1984 | 26.83 | 73.16 | - | 100 |
| 1985 | 22.86 | 77.13 | - | 100 |
| 1986 | 17.75 | 82.24 | - | 100 |

Source : Survey Data

## THE TRANSFORMERS AND ELECTRICALS, KERALA LIMITED

| Year | Sales inside Kerala | Sales Outside Kerala | Export | Total |
|---|---|---|---|---|
| 1977 | 10.63 | 89.36 | - | 100 |
| 1978 | 11.47 | 88.52 | - | 100 |
| 1970 | 08.46 | 91.53 | - | 100 |
| 1980 | 06.59 | 93.40 | - | 100 |
| 1981 | 16.56 | 83.43 | - | 100 |
| 1982 | 09.50 | 90.49 | - | 100 |
| 1983 | 10.10 | 89.89 | - | 100 |
| 1984 | 11.47 | 88.52 | - | 100 |
| 1985 | 14.96 | 85.03 | - | 100 |
| 1986 | 14.11 | 85.88 | - | 100 |

Source : Survey Data

The major products of UEI are Motor Control Gears KWH Meters, and Plastic Film Capacitors which account for nearly 90 percent of its total output (Table 4 - 10). In 1977, 45 percent of the KWH Meters 25 percent of Motor Control Gears and 14 percent of the Plastic Film Capacitors sold in Kerala. But by 1986 the percentage KWH Meters and Plastic Capacitors declined to 38 percent and 2 percent respectively, though the sales percentage of motor control gears recorded an increase of 17 percentage points. UEI used to import its output in the past, but its exports have come to naught during the study period.

The major items produced by TELK are Power Transformers, Current Transformers, Potential Transformers and Gas Circuit Breakers The sales of each of these items are increadibly low in Kerala.(4.11). Only its minor output are sold in Kerala. TELK also used to export part of its output in the past. During the study period, owing to economic difficulties TELK totally stopped its exports. But it has resumed exports in recent years.

ALIND produces a wide range of products. Only an insignificant proportion of these products are sold in Kerala(4.12). The story of exports is not also any better. Nearly 90 percent of its output of almost all items find a market in the other states of India.

XLPE cables, PVC cables, copper control cables and AAC/ACSR conductors are the chief items manufactured by Premier Cables. While XLPE cables and PVC cables account for nearly one fourth of its total sales in Kerala, the sales of the other items vary from 10 to 15 percent of the total. Almost 10 to 20 percent of these items are exported and the balance go to the other states in India for sales. ( Table 4 - 13 )

A picture of the purchase of rawmaterials and sales of finished products is given in Chart I. The Chart clearly depicts the fact that the electrical machinery industry in Kerala does not have much regional linkages both forward and backward.

Table 4.10

**PERCENTAGE DISTRIBUTION OF IMPORTANT ITEMS OF OUTPUT SOLD**

**THE UNITED ELECTRICAL INDUSTRIES LTD. 1977 - 1986**

**Percentage Sales to total sales**

| Year | KWH Metres | Motor Control gears | L.T. Switch gear | 11 KV Switch gear | Plastic film Capacitors | Carbon film Resistors | Other Products | Spares | Total |
|---|---|---|---|---|---|---|---|---|---|
| 1977 | 28.85 | 46.75 | 02.23 | 0.73 | 17.98 | 0.15 | 2.96 | 0.31 | 100 |
| 1978 | 29.31 | 43.74 | 03.72 | 0.68 | 20.27 | 0.85 | 0.70 | 0.70 | 100 |
| 1979 | 24.94 | 43.42 | 04.67 | 0.94 | 16.69 | 0.66 | 0.64 | 0.81 | 100 |
| 1980 | 31.70 | 40.02 | 12.50 | 2.68 | 11.30 | 0.89 | 0.23 | 0.61 | 100 |
| 1981 | 30.50 | 43.88 | 11.70 | 2.01 | 09.95 | 0.57 | 0.59 | 0.78 | 100 |
| 1982 | 34.02 | 46.61 | 11.71 | 2.35 | 11.57 | 1.61 | 2.35 | 1.11 | 100 |
| 1983 | 31.84 | 43.92 | 11.21 | 1.83 | 07.71 | 0.76 | 0.97 | 0.17 | 100 |
| 1984 | 34.41 | 49.20 | 10.71 | 1.85 | 02.49 | 6.89 | 0.10 | 0.25 | 100 |
| 1985 | 34.96 | 45.52 | 08.40 | 1.59 | 06.61 | 1.60 | 0.51 | 0.75 | 100 |
| 1986 | 32.08 | 44.84 | 10.57 | 2.69 | 07.12 | 1.86 | 0.43 | 0.50 | 100 |

**Sales inside Kerala)**

| Year | KWH Metres | Motor Control gear | L.T Switchgear | 11 KV Switchgeat | Plastic film Capacitors | Carbon Resistors | Other Products | Spares | Total |
|---|---|---|---|---|---|---|---|---|---|
| 1977 | 45.01 | 25.28 | 9.24 | 3.04 | 14.28 | 0.64 | 1.17 | 1.32 | 100 |
| 1978 | 45.28 | 24.33 | 3.83 | 2.84 | 14.25 | 3.58 | 2.93 | 2.93 | 100 |
| 1979 | 50.58 | 22.17 | 4.72 | 3.37 | 10.22 | 2.38 | 2.30 | 2.93 | 100 |
| 1980 | 54.83 | 26.41 | 3.61 | 3.62 | 05.04 | 2.20 | 1.13 | 2.93 | 100 |
| 1981 | 41.68 | 37.83 | 6.11 | 2.81 | 04.24 | 2.14 | 2.23 | 2.93 | 100 |
| 1982 | 40.41 | 43.92 | 6.89 | 2.81 | 06.05 | 2.81 | 3.63 | 4.51 | 100 |
| 1983 | 37.21 | 48.49 | 5.94 | 2.66 | 03.05 | 0.70 | 1.09 | 0.83 | 100 |
| 1984 | 38.48 | 47.49 | 6.38 | 2.96 | 02.27 | 1.06 | 0.40 | 0.94 | 100 |
| 1985 | 36.24 | 44.83 | 6.13 | 3.04 | 01.85 | 2.26 | 2.25 | 3.27 | 100 |
| 1986 | 37.63 | 42.24 | 6.65 | 3.18 | 02.25 | 2.77 | 1.43 | 2.84 | 100 |

(Sales outside Kera

| Year | KWH Metres | Motor Control gears | L.T. Switvhgear | 11 KV Switchgear | Plastic film Capacitors | Carbon film Resistors | Other Products | Spares | Total |
|---|---|---|---|---|---|---|---|---|---|
| 1977 | 28.71 | 53.59 | -- | -- | 19.16 | -- | 3.53 | -- | 100 |
| 1978 | 24.29 | 49.84 | 3.69 | -- | 22.17 | -- | -- | -- | 100 |
| 1979 | 24.94 | 51.28 | 4.66 | -- | 19.20 | -- | -- | -- | 100 |
| 1980 | 25.66 | 43.57 | 14.82 | 2.44 | 12.94 | 0.55 | -- | -- | 100 |
| 1981 | 26.42 | 46.08 | 13.73 | 1.72 | 12.03 | -- | -- | -- | 100 |
| 1982 | 31.92 | 49.32 | -- | 2.20 | 13.39 | 1.22 | 1.93 | -- | 100 |
| 1983 | 30.40 | 42.66 | 12.75 | 1.59 | 08.96 | 0.77 | 0.93 | -- | 100 |
| 1984 | 33.03 | 49.82 | 12.29 | 1.43 | 02.57 | 1.98 | -- | -- | 100 |
| 1985 | 34.55 | 45.72 | 09.07 | 1.17 | 08.07 | 1.40 | -- | -- | 100 |
| 1986 | 30.88 | 45.89 | 11.41 | 2.58 | 08.17 | 1.55 | -- | -- | 100 |

Source : Survey Data

Table 4.11

**PERCENTAGE DISTRIBUTION OF IMPORTANT ITEMS OF OUTPUT SOLD**

**TRANSFORMERS AND ELECTRICALS (KERALA) LIMITED**

**1977 - 1986**

**Sales of finished products**

| Year | Power Transformers | Current & Potential transformers | Bushings | on load tap changers | Gas Circuit Breakers | Shunt Reactors | Isolated phase Bus Ducts | Service changes | Others | Scrap |
|---|---|---|---|---|---|---|---|---|---|---|
| 1977 | 83.45 | 12.42 | 0.60 | 0.16 | Nil | Nil | Nil | Nil | 3.37 | Nil |
| 1978 | 93.95 | 08.55 | 1.39 | 0.97 | 0.40 | Nil | Nil | Nil | 4.03 | Nil |
| 1979 | 78.89 | 11.76 | 2.72 | 1.86 | 0.52 | Nil | Nil | Nil | 2.62 | 1.64 |
| 1980 | 78.89 | 11.76 | 2.72 | 1.86 | 0.52 | Nil | Nil | Nil | 1.63 | 2.62 |
| 1981 | 83.86 | 11.86 | 1.00 | 0.14 | 0.42 | Nil | Nil | 0.17 | 0.32 | 2.23 |
| 1982 | 77.08 | 13.88 | 0.44 | 0.46 | 3.71 | Nil | Nil | 0.43 | 0.93 | 2.74 |
| 1983 | 68.81 | 14.45 | 1.15 | 0.67 | 5.37 | Nil | Nil | 1.51 | 4.15 | 2.86 |
| 1984 | 71.48 | 18.32 | 0.60 | 0.40 | 3.55 | Nil | Nil | 1.71 | 2.27 | 1.23 |
| 1985 | 66.54 | 13.79 | 0.84 | 0.51 | 0.17 | 6.32 | 4.55 | 1.60 | 3.63 | 2.05 |
| 1986 | 66.12 | 14.85 | 0.55 | 4.45 | 6.74 | 3.75 | 0.65 | 1.40 | 2.92 | 1.56 |

**Percentage sales outside the state.**

| Year | Power Transformers | Current Transformers | Potential Transformer | Gas Circuit Breakers | Minimum Oil circuit Breakers |
|---|---|---|---|---|---|
| 1977 | 99.40 | 100 | 100 | Nil | Nil |
| 1978 | 98.75 | 100 | 100 | 100 | Nil |
| 1979 | 96.98 | 100 | 100 | 100 | Nil |
| 1980 | 100.00 | 100 | 99.17 | 100 | Nil |
| 1981 | 97.77 | 100 | 99.91 | 100 | NIl |
| 1982 | 98.34 | 100 | 99.76 | 100 | 0.33 |
| 1983 | 95.63 | 99.59 | 100 | 100 | 1.04 |
| 1984 | 99.57 | 99.64 | 99.46 | 85.71 | 0.44 |
| 1985 | 98.03 | 100 | 99.32 | 94.62 | Nil |
| 1986 | 99.50 | 100 | 99.92 | 95.37 | Nil |

**Percentage Sales in Kerala (Main production)**

| Year | Power Transformers | Current Transformers | Potential Transformers | Gas Circuit Breakers |
|---|---|---|---|---|
| 1977 | 0,60 | Nil | Nil | Nil |
| 1978 | 1.25 | Nil | Nil | Nil |
| 1979 | 3.02 | Nil | Nil | Nil |
| 1980 | Nil | Nil | 0.83 | Nil |
| 1981 | 2.23 | Nil | 0.09 | Nil |
| 1982 | 1.66 | Nil | 0.24 | Nil |
| 1983 | 4.37 | 0.41 | Nil | Nil |
| 1984 | 0.43 | 0.36 | 0.54 | 14.29 |
| 1985 | 1.79 | Nil | 0.68 | 05.38 |
| 1986 | 0.50 | Nil | 0.08 | 04.61 |

Source : Survey Data.

Table 4. 12

**PERCENTAGE DISTRIBUTION OF IMPORTANT ITEMS OF OUTPUT SOLD**

**THE ALUMINIUM INDUSTRIES LIMITED (Percentage of Total Sales)**

**1977 - 1986**

| Year | Bare conductors | Solidal under ground cables | Insulated Aluminium Cables | Steel Wires | Ancillary machines | Circuit Breakers 11 KV panels | Circuit Breakers 22/33/66 KV | Current Transformers 22KV/33 KV | Current Transformers 33KV/66 KV | Control Panels | Current Transformers 132 KV | 132 KV SF-6B Breakers | 220 KV SF-6 Breakers | Relays | Others |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) | (11) | (12) | (13) | (14) | (15) | (16 |
| 1977 | 63.87 | 3.08 | 2.63 | 13.87 | 0.57 | 8.87 | 1.18 | 0.11 | 0.03 | Nil | 0.08 | Nil | Nil | Nil | 5.68 |
| 1978 | 66.45 | 3.83 | 3.62 | 10.67 | 0.68 | 6.19 | 2.66 | 0.16 | 0.02 | Nil | 0.06 | Nil | Nil | Nil | 5.73 |
| 1979 | 67.47 | 3.41 | 2.12 | 09.39 | 0.84 | 4.55 | 4.41 | 0.12 | 0.23 | Nil | o.09 | Nil | Nil | Nil | 7.36 |
| 1980 | 51.83 | 3.52 | 2.78 | 10.37 | 0.57 | 19.02 | 3.29 | 2.84 | Nil | Nil | 0.13 | Nil | Nil | Nil | 5.71 |
| 1981 | 66.39 | 2.37 | 3.93 | 10.23 | 0.56 | 2.65 | 2.94 | 2.73 | 0.03 | Nil | 0.12 | Nil | Nil | Nil | 8.05 |
| 1982 | 64.13 | 0.88 | 0.26 | 05.34 | 1.13 | 2.52 | 4.41 | 0.04 | 0.03 | Nil | 0.02 | Nil | Nil | Nil | 21.24 |
| 1983 | 56.09 | 4.24 | 2.49 | 09.61 | 0.90 | 6.52 | 6.61 | 0.21 | 0.25 | 0.07 | Nil | 0.18 | Nil | 0.05 | 12.71 |
| 1984 | 53.72 | 2.14 | 4.20 | 10.94 | 0.99 | 9.96 | 4.52 | 4.19 | 0.34 | 0.51 | Nil | Nil | Nil | 0.49 | 7.91 |
| 1985 | 59.08 | 2.52 | 5.37 | 17.62 | 1.90 | 1.41 | 0.08 | 0.31 | 0.47 | 9.21 | Nil | Nil | Nil | 0.34 | 11.65 |
| 1986 | 65.20 | 1.42 | 1.63 | 17.92 | 0.91 | 5.31 | 0.19 | 0.14 | 0.23 | 0.09 | 0.21 | Nil | 0.14 | 1.18 | 5.56 |

**Percentage sales outside Kerala**

| Year | Bare Conductors | Solidal under ground cables | Insulated Aluminium cables | Steel Wire | Aneillary Machines | Circuit Breakers 11 KV panels | circuit Breakers 22/33/66 | Current Transformers 22/23/KV | Carrent Transformers 33 KV/66KV | Control Panels | Current Transformers 132 KV | 132 KV SF-6 Breakers | | 220 KV SF-6 Breakers | Relays | Others |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) | (11) | (12) | (13) | (14) | (15) | (16) | |
| 1977 | 90.40 | 90.91 | 89.18 | 84.37 | 90.07 | 90.17 | 89.73 | 90.73 | 90.30 | Nil | Nil | | | | | |
| 1978 | 98.28 | 89.20 | 91.28 | 90.00 | 81.28 | 92.70 | 91.89 | 92.30 | 38.28 | Nil | 93.08 | | | | | |
| 1979 | 89.08 | 90.18 | 92.03 | 90.00 | 28.18 | 98.08 | 89.17 | 91.03 | 87.18 | Nil | 94.03 | | | | | |
| 1980 | 93.17 | 91.80 | 90.36 | 91.18 | 82.30 | 89.08 | 93.07 | 90.08 | 88.13 | Nil | 88.17 | | | | | |
| 1981 | 94.30 | 95.78 | 92.87 | 92.43 | 90.17 | 90.17 | 91.83 | 95.14 | 90.37 | Nil | 91.03 | | | | | |
| 1982 | 90.78 | 92.17 | 93.17 | 93.71 | 93.07 | 93.08 | 92.89 | 94.78 | 91.83 | Nil | 89.17 | Nil | Nil | Nil | Nil | |
| 1983 | 91.80 | 91.73 | 94.27 | 93.80 | 94.18 | 91.57 | 91.07 | 93.10 | 92.30 | Nil | Nil | | | | | |
| 1984 | 92.38 | 89.18 | 94.73 | 94.13 | 93.08 | 90.60 | 93.10 | 90.00 | 91.37 | Nil | Nil | | | | | |
| 1985 | 95.03 | 88.07 | 94.18 | 89.36 | 94.36 | 92.68 | 91.01 | 90.37 | 90.17 | Nil | Nil | | | | | |
| 1986 | 90.18 | 92.17 | 89.37 | 90.17 | 89.18 | 91.53 | 93.08 | 91.08 | 91.38 | Nil | Nil | | | | | |

(Percentage of Exports)

| Year | Bare Conductors | Solidal under ground cables | Insulated Aluminium Cables | Steel Wire | Ancillary Machines | Circuit Breakers 11 KV Panels | Circuit Breakers 22/33/66 KV | Current Transformers 22 KV/33 KV | Current Transformers 33 KV/66 KV | Current Transformers 132 KV |
|---|---|---|---|---|---|---|---|---|---|---|
| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) | (11) |
| 1977 | 6.2 | 4.80 | 6.49 | 10.81 | Nil | 3.18 | 3.27 | Nil | 4.36 | Nil |
| 1978 | 6.07 | 5.23 | 4.17 | 8.28 | Nil | 3.98 | 4.05 | Nil | Nil | Nil |
| 1979 | 5.26 | 5.17 | 4.17 | 6.31 | Nil | Nil | 7.41 | 5.72 | 2.10 | 2.18 |
| 1980 | 4.12 | 6.34 | 5.87 | 3.68 | Nil | Nil | 3.14 | 4.71 | 6.63 | Nil |
| 1981 | 2.60 | 2.16 | 3.28 | 5.21 | Nil | 3.14 | 2.68 | 2.01 | 4.56 | Nil |
| 1982 | 6.28 | 3.49 | 3.47 | 2.19 | Nil | 3.14 | 3.19 | 3.11 | 2.10 | Nil |
| 1983 | 4.18 | 4.58 | 2.03 | 3.14 | Nil | 3.25 | 5.13 | 1.49 | 2.67 | Nil |
| 1984 | 4,10 | 6.14 | 1.56 | 2.03 | Nil | 3.46 | Nil | 3.21 | Nil | Nil |
| 1985 | 1.25 | 5.67 | 2.58 | 5.41 | Nil | 3.21 | 2.58 | 3.26 | Nil | Nil |
| 1986 | 2.38 | 5.07 | 1.89 | 4.96 | Nil | 1.27 | 1.08 | 3.97 | Nil | Nil |

Source : Survey Data

**Percentage sales inside Kerala**

| Year | Bare Conductors | Solidal underground cables | Insulated Aluminium cables | Steel Wire | Ancillary Machiners | Circuit Breakers 11 KV Panels | Circuit Breakers 22/33 KV | Current Transformers 22 KV/33 KV | Current Transformers 33 KV/66 KV | Control Panels | Current Transformers 13 KV | 132 KV SF-6 Breaker | 220 KV Sf-6 Breakers | Relays | Others |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1977 | 3.40 | 4.29 | 4.33 | 4.82 | 09.93 | 06.65 | 7.00 | 9.27 | 5.34 | Nil | 100 | Nil | Nil | Nil | 100 |
| 1978 | 5.65 | 5.57 | 4.55 | 1.72 | 18.72 | 03.32 | 4.06 | 7.70 | 11.72 | Nil | 6.92 | Nil | Nil | Nil | 100 |
| 1979 | 5.66 | 4.65 | 3.80 | 3.69 | 21.82 | 01.92 | 3.42 | 3.25 | 6.87 | Nil | 3.79 | Nil | Nil | Nil | 100 |
| 1980 | 2.71 | 1.86 | 3.77 | 5.14 | 17.70 | 10.92 | 3.79 | 5.21 | 5.24 | Nil | 11.83 | Nil | Nil | Nil | 100 |
| 1981 | 1.10 | 2.06 | 3.85 | 2.36 | 09.83 | 06.69 | 5.49 | 2.85 | 5.07 | Nil | 8.97 | Nil | Nil | Nil | 100 |
| 1982 | 2.94 | 4.34 | 3.36 | 4.10 | 06.87 | 03.78 | 3.92 | 2.11 | 6.07 | Nil | 10.83 | Nil | Nil | Nil | 100 |
| 1983 | 4.02 | 3.69 | 3.70 | 3.06 | 05.82 | 05.18 | 3.80 | 5.41 | 5.23 | 100 | Nil | 100 | Nil | 100 | 100 |
| 1984 | 3.52 | 4.68 | 3.71 | 3.84 | 06.92 | 05.94 | 6.92 | 6.79 | 8.63 | 100 | Nil | Nil | Nil | 100 | 100 |
| 1985 | 3.72 | 6.26 | 3.24 | 5.23 | 05.64 | 04.11 | 8.05 | 5.66 | 9.83 | 100 | Nil | 100 | Nil | 100 | 100 |
| 1986 | 7.44 | 2.76 | 8.74 | 4.87 | 10.82 | 07.20 | 9.19 | 4.65 | 8.62 | 100 | 100 | Nil | 100 | 100 | 100 |

Table 4.13.

**PERCENTAGE DISTRIBUTION OF IMPORTANT ITEMS OF OUTPUT SOLD**

**THE PREMIER CABLE COMPANY LIMITED**

**1977 - 1986**

| Year | Percentage Sales to Total Sales | | | | | |
|---|---|---|---|---|---|---|
| | XLPE Cables | PVC Cables | Copper Control Cables | AAC/ACSR Conductors | Aluminium Conductors | Strips |
| 1977 | 49.83 | 40.37 | 04.30 | 4.78 | 0.68 | Nil |
| 1978 | 37.89 | 42.30 | 10.81 | 5.38 | 2.37 | 1.25 |
| 1979 | 35.09 | 50.18 | 09.87 | 4.34 | 0.38 | Nil |
| 1980 | 41.89 | 40.07 | 10.13 | 3.87 | 1.29 | 2.75 |
| 1981 | 36.37 | 45.18 | 12.37 | 5.89 | 0.17 | Nil |
| 1982 | 43.71 | 41.78 | 10.17 | 4.37 | 0.98 | Nil |
| 1983 | 39.09 | 42.73 | 09.87 | 5.13 | 3.28 | Nil |
| 1984 | 40.17 | 41.63 | 09.08 | 5.71 | 2.30 | 1.01 |
| 1985 | 39.17 | 40.30 | 10.93 | 4.73 | 2.18 | 2.98 |
| 1986 | 40.37 | 40.18 | 09.73 | 3.10 | 2.09 | 4.48 |

**Percentage Sales Inside Kerala**

| Year | XLPE Cables | PVC Cables | Copper Control Cables | AAC/ACSR Conductors | Aluminium Conductors | Strips |
|---|---|---|---|---|---|---|
| 1977 | 28.17 | 20.30 | 18.17 | 12.38 | 13.17 | Nil |
| 1978 | 24.37 | 18.18 | 12.30 | 11.83 | 12.03 | 81.30 |
| 1979 | 21.83 | 12.37 | 11.80 | 10.98 | 13.96 | Nil |
| 1980 | 20.87 | 17.93 | 09.36 | 14.17 | 14.90 | 89.37 |
| 1981 | 21.97 | 18.13 | 10.33 | 14.08 | 15.17 | Nil |
| 1982 | 27.36 | 18.71 | 09.37 | 13.13 | 14.67 | Nil |
| 1983 | 26.90 | 17.83 | 10.66 | 14.37 | 09.13 | Nil |
| 1984 | 21.38 | 20.33 | 09.87 | 13.30 | 08.98 | 91.37 |
| 1985 | 20.17 | 19.30 | 10.17 | 14.98 | 08.36 | 93.33 |
| 1986 | 14.37 | 23.90 | 11.46 | 13.00 | 09.17 | 94.38 |

**Percentage Sales Outside Kerala**

| Year | XLPE Cables | PVC Cables | Copper Control Cables | AAC/ACSR Conductors | Aluminium Conductors | Strips |
|---|---|---|---|---|---|---|
| 1977 | 60.17 | 61.02 | 61.17 | 69.16 | 74.26 | Nil |
| 1978 | 54.59 | 67.06 | 66.67 | 75.50 | 71.72 | 18.70 |
| 1979 | 66.08 | 62.29 | 75.15 | 74.50 | 68.83 | Nil |
| 1980 | 65.95 | 30.14 | 79.54 | 72.22 | 67.20 | 10.63 |
| 1981 | 67.40 | 58.91 | 79.54 | 71.32 | 66.65 | Nil |
| 1982 | 61.28 | 62.36 | 81.50 | 73.89 | 65.97 | Nil |
| 1983 | 62.22 | 67.80 | 81.21 | 74.26 | 71.70 | Nil |
| 1984 | 66.25 | 70.54 | 82.08 | 76.57 | 72.64 | 08.63 |
| 1985 | 68.46 | 69.90 | 80.46 | 75.84 | 74.34 | 06.67 |
| 1986 | 74.97 | 64.79 | 79.97 | 77.70 | 78.02 | 05.62 |

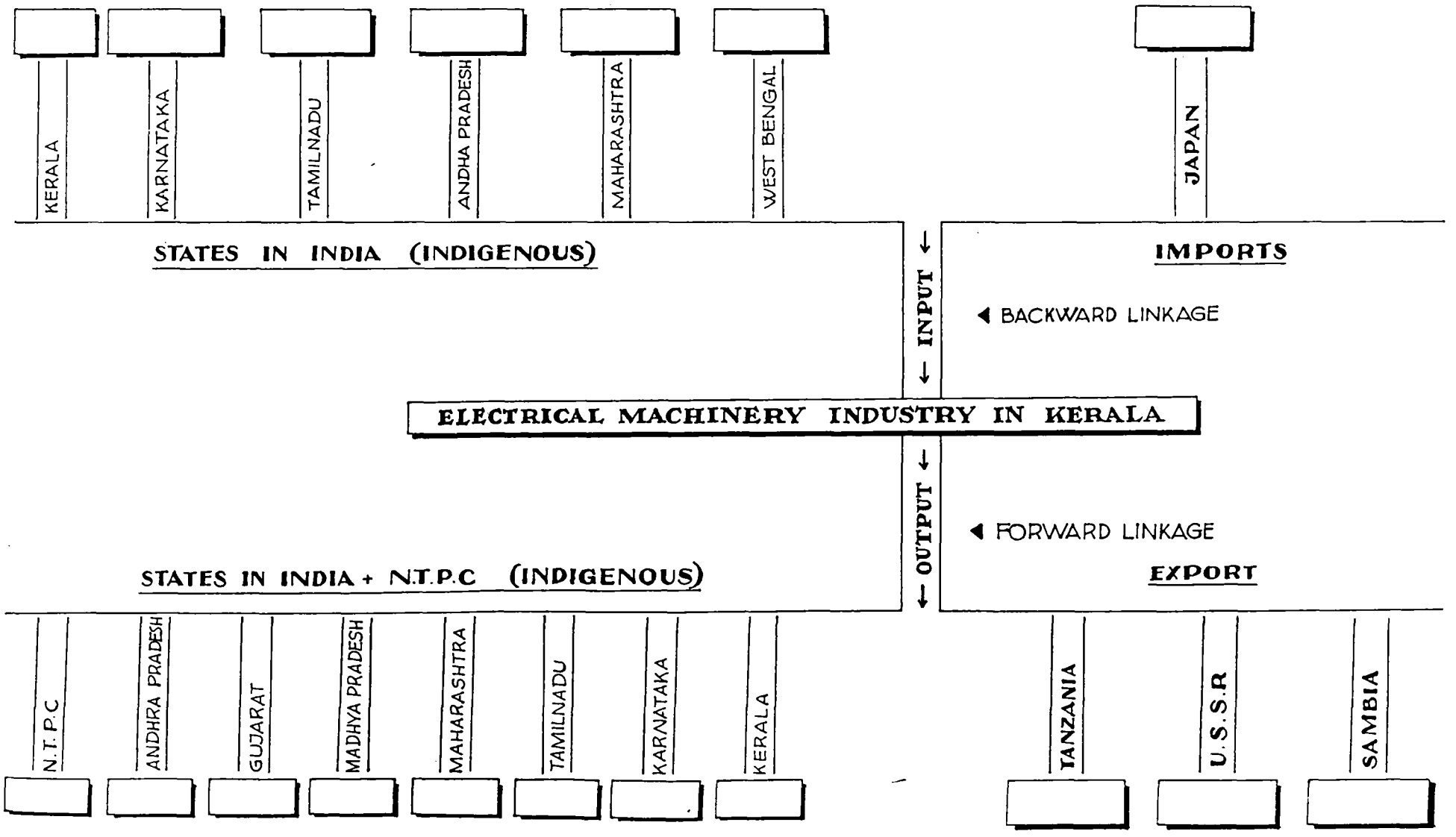
**Percentage of Exports to total sales**

| Year | XLPE Cables | PVC Cables | Copper Control Cables | AAC/ACSR Conductors | Aluminium Conductors |
|---|---|---|---|---|---|
| 1977 | 11.66 | 18.68 | 20.13 | 18.46 | 12.87 |
| 1978 | 21.04 | 14.76 | 21.03 | 12.58 | 16.25 |
| 1979 | 12.09 | 25.34 | 13.05 | 14.52 | 17.21 |
| 1980 | 13.18 | 21.93 | 11.10 | 13.61 | 17.90 |
| 1981 | 10.63 | 22.96 | 10.13 | 14.60 | 18.18 |
| 1982 | 11.36 | 18.93 | 09.13 | 12.98 | 19.36 |
| 1983 | 10.88 | 14.37 | 08.13 | 11,37 | 19.17 |
| 1984 | 12.37 | 09.13 | 08.05 | 10.13 | 18.38 |
| 1985 | 11.37 | 10.80 | 09.37 | 09.18 | 17.30 |
| 1986 | 10.66 | 11.31 | 08.57 | 09.30 | 14.81 |

Source : Survey Data

CHART - I

# LINKAGES OF ELECTRICAL MACHINERY INDUSTRY IN KERALA



## C O N C L U S I O N

In this chapter, we have made an analysis of purchase of inputs and sales of output of the electrical machinery industry in Kerala. The analysis focused on not only the different items bought and sold, but also the patterns of their sales within the state, outside the state and in foreign markets. In the case of both purchase of inputs and sales of output, the market share of Kerala has been quite low. Though the industry depends on exports to a significant degree with respect to its inputs, the sales percentage abroad has been very low. This pattern has important implications for the expenditure of the country's scarce foreign exchange resources. A notable feature of the analysis is that the other states in the country account for a substantial proportion of the purchase of inputs and sales of outputs. Thus, though the economy has significant forward linkages, it has very little linkage effect with the local economy of the state. Whatever items are sold in Kerala, are being purchased by the State Electricity Board. Only very little of its output is bought by local factories for further production. Looking at from this perspective, the regional income multiplier of this industry is likely to be on a low scale. The implication thrown up by the analysis is that though the industry contributes modestly to the total value added by the industrial sector in the state, its contribution to the process of industrialisation has been only marginal. As this industry is largely capital intensive in nature, from the point of view of employment generation also, its contribution is not very significant. Another side light of the analysis is that the sales and purchases of the firms under study lend support to the argument that Kerala has been pursuing an outward oriented industrialisation strategy.[1]

* * * * *

---

1. See for details Suja A,N; "Export-Oriented Industrialisation and Kerala's Industrial Backwardness," thesis being submitted to the Cochin University of Science & Technology.

## CHAPTER - V

## AN ALTERNATIVE EXPLANATION IN TERMS OF LOCATION THEORY

It was shown in the previous chapter that the electrical machinery industry in Kerala does not have any significant linkage with the economy of Kerala. However, the question still remains unsolved as to why then this industry with many large units got established in Kerala. Alternatively, the fact of setting up of this industry in Kerala, despite its low linkages needs some explanation. In this chapter, we make an attempt to offer an explanation in terms of the theories of industrial location.

There are several theoretical approaches to location analysis. In the introductory chapter, there has already been a discussion on the various approaches to location analysis. Here, an attempt is made to analyse how far these factors affect the location of electrical machinery industry in Kerala.

### Factors affecting the location of electrical machinery industry in Kerala:

Against this background, it is worthwhile to examine the extent to which the various factors have influenced the location of electrical machinery industry in Kerala.

The first and foremost factor considered by the location economists is the 'transportation cost'. Transport cost constitutes a major factor in determining industrial location. Eventhough, Kerala is blessed with a well developed net work of roads, it is not fair to attribute the location of this industry to advantageous transport cost. Situated at the southern tip of the country Kerala is cut off from the rest of India and hence it is not an easy proposition to transport raw materials and finished products from Kerala to

the other parts of the country and vice versa. As frieght equalisation has been a declared policy of the Government of India till recently, industries in Kerala have not been paying higher transport costs, measurement of goods movements on the rail. But, distance can always cause time bottle necks. The larger the distance the greater the time taken to transport goods from one place to another. Distance has always affected this industry in obtaining raw materials and also in supplying finished products to the customers in time. This problem assures particular significance in the case of electrical machinery industry in Kerala, as this industry has, as we have seen in the previous chapter, very little linkages with the economy of Kerala both in terms of inputs used and output sold and as it heavily depends on other state and foreign countries, for inputs and markets for its products.

The second approach relating to 'profit maximisation' (profit maximisation approach) is also not applicable to the electrical industry in Kerala. The products of this industry are meant to be used as input in electric power industry which is generally the monopoly of the state. The customers, thus, are mainly state Electricity Boards which enjoy considerable monopsony power. Further, products of this industry are often sold on a credit basis. Moreover, this industry has been making loss for the last ten years. The industry is not situated near its market to make profit by the reduction of transport cost. The products have to be transported to long distance because the customers are mainly the State Electricity Board in the Northern Part of the country.

Another location factor considered by the location theorists is the availability of cheap labour. Labour is not cheap in Kerala because it is highly organised backed by the political parties and possessing considerable collective bargaining strength. Some economists have argued that the share of

labour in value-added in Kerala is not the highest in India. (K.K. Subrahmanian and P.M. Pillai, 1986). But, what is to be noted is that Kerala is not a place where the availability of cheap labour will act as a cushion for industrial growth in the sense perceived by Lewis (A. Lewis; 1955 ). However, it may be argued that skilled manpower of very high quality is available in Kerala. It is true. To some extent, the availability of engineers and technicians in Kerala could have been a factor in setting up of this industry in the state. This line of reorgnising has some validity when viewed against the fact that many of the large scale industries set up in other parts of India have drawn heavily on skilled manpower from Kerala. But what is more important is the availability of skilled and unskilled manpower at low wage rates than the availability of highly qualified technicians and engineers. Even if manpower were cheaply available in Kerala, it could not have been an explanation for the establishment of electrical machinery industry in the state because this industry is by nature less labour intensive having very low employment multipliers.

The raw materials used by the electrical machinery industry are copper, brass, steel and aluminium. Copper and steel are used in large quantities in the manufacture of transformers, switchgears etc. Aluminium is mainly used in the manufacture of cables and conductors. Kerala's mineral resources relevant to electrical machinery industry are: clay, glass sands, graphite and mica.

Procelain insulators, bushes, fuse carriers, and other ceramic accessories for H.T and L.T applications is a potential product line for Kerala taking into account the large clay deposits occuring in the state. The orientation of Kerala's electrical machinery industry to the transmission, distribution system and related market makes this product line worth while.

Availability of glass sands can support a special glass industry oriented to electrical engineering (lamp) industry and electronic industry. Exploitable graphite deposits are reported in several places especially Ernakulam, Thiruvananthapuram and Kollam districts which can be used in the manufacture of bushes and sliding contacts in electrical engineering applications.

Kerala when compared to the neighbouring states of Tamil Nadu, Karnataka and Andhra Pradesh are relatively poor in ferrous and non-ferrous metals and basic industrial raw materials such as coal, limestone etc. The state, however, possesses rich deposits of beach placer sands consisting of ilmenite, rutile, monasite, Zircon, Silimanite etc. Other minerals of economic importance found in the state are iron ore, bauxite, limestone (both of crystaline and marine origin), graphite and mica.

Mica deposits are found to be Thiruvananthapuram. Mica is invaluable for its dielectric and insulating properties and is used in the manufacture of many electronic and electrical equipments. Diezo - electric quartz crystals and mica plates have great importance in the radio, Telecommunication and electronic industries. Mica finds a ready market as a terminal insulator, in many modern appliances such as heaters, irons etc.

The iron ores of Calicut area have been the subject matter of intensive study for the past decade by different agencies. Nearly 79 million tonnes of iron ore both oxidised and unoxidised (magnetic quartz clock) containing between 35 and 40 per cent of iron has been estimated to occur by the Geological Survey of India in the Kozhikode district. The iron ores appear to be suitable for use in the manufacture of iron and steel. The iron ore deposits known to exist in the kozhikode region though not very large, are felt to be sufficient to achieve, an output of 100,000 tonnes of iron per annum. Steps are being taken to obtain bulk samples of the ore deposits for testing at the National Metallurgical Research Laboratory.

The cost of extracting these resources is very high in Kerala. So the producers find it easier and profitable to buy these raw materials either from other states or abroad. The available quantity is also inadequate to meet the growing demand for electrical industries and other industries which use them as major raw materials. Therefore, the location of electrical industries in Kerala on the basis of the availability of mineral resources cannot be explained away. There are possibilities of extracting more and more of these minerals and thereby chances for developing ancillary units which can supply these materials in the form of steel, brass and aluminium, but this is obviously a future possibility.

Another locoation factor is the availability of electricity at a cheap rate. The industrial sector constitutes the single largest consumer of electricity in the state. Nature has been very kind to this small state until very recently, in the matter of hydro electric power. Until 1982, the state was enjoying a surplus position in power production. And surprisingly, inspite of the ready availability of power, Kerala used to be an industrially backward state. Nature has been very kind to this small tate until very recently, in the matter of hydro electric power. Until 1982, the state was enjoying a surplus position in power production. And surprisingly, inspite of the ready availability of power, Kerala used to be an industrially backward state. After 1982, the state has been facing severe power shortage due to monsoon failures. It was before 1960 that most of the electrical machinery industry was set up in Kerala. Therefore, the availability of cheap power in quite large quantity could have been certainly an important factor for the emergence and growth of this industry in Kerala. Further, Many other industries were also set up in Kerala during that period with a view to make use of the availability of power.

A part from the cheap availability of power, there was yet another factor responsible for the setting up of this industry in Kerala, viz, the emergence of a number of power generating stations in the state.

Power system in Kerala:

The Kerala State Electricity Board is a public sector undertaking enjoying the privileges of a monopoly concern for the supply of electric power. The generation of electricity in the public sector in the Travancore state started in 1929 when the state Government set up in Thiruvananthapuram a thermal power station with three oil engines driven generation sets of 65MW each. Another power station equipped with three diesel sets of a total capacity of 240 MW was established in Kollam in 1954. By that time, the potentiality of developing hydro electric power was recognised and in 1933 work on Pallivasal hydro-electric was inaugurated.

Electricity was first introduced in Cochin state in 1935 when a thermal power station with diesel engines established in Thrissur. This was followed by the setting up of thermal stations seen on diesel oils in Kalamassery, Mattanchery and Ernakulam in 1938.

In Malabar, there were three receiving stations in the districts at Kathumunda, Kozhikode and Nilambur. This arrangement continued for some years even after the reorganisation of the states. West coast electric supply corporation, a private organisation engaged in the distribution of power catered to the needs of the calicut town.

One year after the launching of the second five year plan, ie. April 1957, The Kerala State Electricity Board was set up under the provisions of the Electricity (Supply) Act, 1958. By that time, the installed capacity of the system had reached 101.5 MW. During the second plan, the first and second stages of peringalkuthu project and two units of the Neriamangalam unit was completed, bringing the installed capacity to 1475 MW by the end of the year 1961. The Neriamangalam and Panniar project were completed during the third plan period, and the capacity of the system went up to 192.5 MW by the end of the year 1965. With the commissioning of the two units of the Sholayar project and all the units of the Sabarigiri project, the total

capacity of the Kerala grid rose to 528.5 MW towards the close of 1967 - 68. Thus the last decade witnessed a significant growth in power development in Kerala, the generating capacity rising by more than 3.8 lakh consumers and the percapita consumption of electricity increasing from year to year.

Thus, we see that Kerala has witnessed the emergence and growth of a number of power generating projects in Kerala with a very high potentiality. A brief sketch of installed capacity, generation and consumption from 1970-71 to 1985-86 is given in Table 5-1.

It is quite natural that these projects generate a very high demand for transformers, cables, Conductors, control panels, circuit breakers, steel wires, relays and a wide variety of other products that can be supplied by the electrical machinery industry. As there were a number of power projects in Kerala which could be the potential users of these products, it is quite appropriate that many units producing electrical machinery items got established in Kerala. In other words, it was the expected backward linkages of the power generating stations that primarily led to the growth of electrical machinery industry in Kerala.

But by the late seventies, the growth of the power generating industry in Kerala faced a severe crisis - Kerala which was having an abundance of water resources began to face, by this time, water shortage due to monsoon failures which later became a regular feature in the state. This factor arrested the growth of the existing power generating industry and the establishment of further units in the state. Thus, the demand for the output of the electrical machinery industry by the power generating industry began to face sharp decline and the former had to look elsewhere for a market for its products.

Table 5.1

Electricity Statistics at a glance

Electricity - Installed Capacity, generation and consumption in Kerala 1970 - 71 - 1985 '86

| | Unit | 1970-71 | 1974-75 | 1979-80 | 1980-81 | 1981-82 | 1982-83 | 1983-84 | 1984-85 | 1985-86 |
|---|---|---|---|---|---|---|---|---|---|---|
| Installed Capacity | | | | | | | | | | |
| Utilisation & Non utilisation | MW | 16271 | 20345 | 31307 | 33316 | 35781 | 39235 | 43706 | 47269 | 51766 |
| Utilities | MW | 14709 | 18317 | 28448 | 30214 | 32345 | 35363 | 39339 | 42591 | 04663 |
| Hydro | MW | 06383 | 07529 | 11384 | 11791 | 12173 | 13056 | 13855 | 14470 | 15477 |
| Nuclear | MW | 00420 | 00640 | 00640 | 00860 | 00860 | 00860 | 01095 | 01095 | 01330 |
| Thermal (Coal) | MW | 07508 | 09743 | 15991 | 17123 | 18695 | 20712 | 23648 | 26311 | 28708 |
| Oil & gas | MW | 00398 | 00395 | 00433 | 00440 | 00617 | 00735 | 00740 | 00715 | 01148 |
| Non Utilities | MW | 01562 | 02028 | 02859 | 03102 | 03436 | 03872 | 04367 | 04678 | 05103 |
| Generation (U + NU) | BU | 69.21 | 76.68 | 112.82 | 119.26 | 131.12 | 140.30 | 150.99 | 168.65 | 183.66 |
| Utilities | BU | 55.83 | 70.20 | 104.81 | 110.84 | 122.10 | 130.26 | 140.18 | 156.44 | 170.30 |
| Hydro | BU | 25.25 | 27.28 | 045.48 | 046.54 | 049.56 | 048.37 | 049.95 | 053.82 | 050.98 |
| Nuclear | BU | 02.42 | 02.21 | 002.88 | 003.00 | 003.02 | 002.02 | 003.55 | 004.07 | 004.99 |
| Thermal(Coal) | BU | 27.80 | 39.54 | 055.72 | 060.71 | 068.75 | 077.91 | 084.44 | 096.61 | 122.44 |
| Oil & gas | BU | 00.36 | 00.57 | 000.55 | 00.59 | 000.77 | 001.96 | 002.24 | 001.94 | 001.80 |
| Non-utilities | BU | 05.38 | 06.48 | 008.19 | 08.42 | 009.02 | 010.04 | 010.81 | 012.21 | 013.36 |
| Auxilary consumption (U + NU) | BU | 03.44 | 04.96 | 007.35 | 009.38 | 010.21 | 011.41 | 0012.81 | 012.81 | 014.59 |
| Transmission & Distribution | BU | 09.31 | 13.56 | 020.08 | 021.08 | 023.59 | 025.64 | 0027.64 | 030.88 | 034.59 |
| Consumption (U +NU) | BU | 48.46 | 58.26 | 085.39 | 089.44 | 098.15 | 104.45 | 111.89 | 124.96 | 134.88 |
| Industrial | BU | 34.33 | 38.31 | 053.24 | 055.40 | 000.89 | 060.75 | 066.55 | 074.16 | 078.20 |
| Transport | BU | 07.37 | 01.53 | 002.30 | 002.27 | 002.50 | 002.63 | 002.71 | 002.88 | 003.14 |
| Agriculture | BU | 04.47 | 07.76 | 013.45 | 014.49 | 015.20 | 017.82 | 018.23 | 021.40 | 023.53 |
| Domestic Commercial & services | BU | 08.29 | 10.66 | 010.40 | 017.58 | 019.56 | 022.25 | 024.40 | 026.52 | 030.01 |

Source : Ministry of Energy, government of India, various years.

Government policy towards the location of Industry in Backward Areas:

The reasons for India's failure to achieve balanced regional development can be sought in the philosophy of development incorporates in our plans and planning models. (Government of India, Planning commission). Indian planners like planners everywhere considered development of industry to be vital for accelerated economic growth. Thus, the establishment and expansion of large scale capital-intensive, urban central manufacturing industries, has received a very high priority in the programmes of Indian planning. Locational factors such as the availability of rawmaterials, power, modern means of transport and communication, banking and such other services have caused the concentration of industries in a few developed centres. Besides, powerful political forces have ventured to all possible investment opportunities into theirown respective command areas.

The regional inequalities aggravated during the process of development have forced the policy makers to initiate adhoc programmes to reduce inequalities and bring about balanced regionaldevelopment (Hirschman, A.O., 1968).

The Industrial Policy Resolution of 1956 stressed the fact that disparities in the levels of development between different regions should be progressively reduced. The policy stated that only" by securing a balanced and co-ordinated development of the industrial and agricultural economy in each region, can the entire country attain higher standards of living." (Industrial policy Resolution, 1956).

The Government of India's industrial policy since independence has been broadly shaped interms of the comprehensive Industrial policy Resolution of 1948. That Resolution emphasised clearly the responsibility of the Government in the matter of promoting, assisting and regulating the development of industry in the national interest. It envisaged for the public sector a increasingly active role.

Disparities in the levels of development as between different regions in the country should also be brought for special attention. The special needs of the less developed areas have to be kept in view, so that the entire pattern of investment is adopted to the securing of the balanced regional development in the country (Third plan Document).

In the first place; National Development Council has recommended programmes for setting up decentralised industrial production. Secondly, in the location of new enterprises, whether public or private, consideration was given to the need for developing a balanced economy for different parts of the country. Some industries were to be located in particular areas in view of the availability of raw materials or other natural resources while in some others considerations such as market, profit etc. were there. Thirdly steps were taken to promote greater mobility between different parts of the country, including organisation of scheme of migration and settlement from more to less densily populated areas.

Location of industries:

It is clearly stated in the Third Five Year Plan Document that, as regards the diffusion of industrial activity, so far as the larger industries are concerned, economics and technical considerations are always important. In the location of public sector projects, the claims of relatively backward areas have been kept in view, wherever this could be done without giving up the essential technical and economic criterion. In the selection of the sites for basic capital and producer goods industries, proximity to raw materials and other economic consideration have naturally been important. However, the needs of areas which have the necessary potential for industrial development could be kept in view in the selection of sites for industrial projects both in the public or private sector. The general approach has to be to avoid further concentration of industrial activity in

areas where considerable development has already taken place or have been planned, but expansion in existing industries in such areas can not, of course, ruled out, it leads to greater economies in production·Similarly, care must be taken to set up new industries away from large and congested cities. (Third plan objectives) (Third Five Year Plan Document)

The Industrial Policy Resolution visualised that facilities such as power, water supply, and transport should be made available in areas which are at present lagging behind industrially or where there is greater need for providing opportunities for employment. Increase in the supply of electric power and the extension of rural electrification are important factors in opening up new possibilities of regional development. Expansion of the general educational base through the programme of free and compulsory primary education and provision of facilities for technical training is likely to make a steadily increasing contribution to the development of less developed regions· Financial provisions for these programmes have been made in the plans of the states.

Location of industries in Kerala:

It is in the light of the policies of the Government of India, the location of industries in Kerala has to be justified in part.

The level of industrial development and its rate of growth in any region is a function of many variables such as historical factors, locational factors, supply of entrepreneurial skill, labour management relations, raw material supplies, cheap and adequate power, state's policy towards industrialisation, politiical stability etc. The state has been 'unlucky' in any other expect cheap and adequate power at the time of the setting up of industries in the state. High wage cost and militancy of labour are said to be the two aspects which acted as a constraint to attract private capital in the state. Therefore, the state demands more central investment in

industrial units in the state since it has only very limited financial resources. For many years labour agitation in the state and the situation created in the industries as a result of such agitations were cited as the main reasons why industrialists from within and outside the state were shy of investing in the state.

Lack of industrial dynamism is another factor which badly affects industrial development in the state. Kerala is not fortunate in this respect as states like Gujarat, Maharashtra, Tamil Nadu etc., which have a very good representation in the industrial map of India (Table 5-2)

Inter-industry linkage is also weak within the state. Another disadvantage in the absence of backward linkage is the procurement of rawmaterials in time to carry out production. Electrical industries established in other parts of the country viz, Tamil Nadu, Maharashtra, Gujarat etc., have some advantage such as easy access to raw materials. The units in Kerala have to face competition in the input market too.

Another factor which needs special attention is the political instability experienced by the state. Kerala had witnessed a high degree of political instability. This gave an element of uncertainity in the policy matters and the long term perspective in planning is adversely affected. The location of industries, various concessions and incentive to act perspective industrialists to invest them money etc become initimately tied to the direction, idelogy and programmes of Government in power.

The dependence of the manufacturing sector on foreign technology have resulted in near stagnation in demand for industrial goods resulting in excess capacities and technical and managerial inefficiencies. (Shetty S.L. 1978). The electrical machinery industry is also no exception to this. The Report of the Working Sub Group on Electrical Equipment 1984, showed that in most of the industries like transformers, H.T. circuit breakers, power capacitors etc. there existed excess capacities (The Report of the working sub group on Electrical Equipment, 1984).

Table 5.2

## LEVELS OF INDUSTRIAL DEVELOPMENT

| SL NO | State | No. of factory employees per thousand population in 1975-76 (Nos) | Share of registered manufacturing in state product | Share of unregistered manufacturing in state product | Percentage growth in factory employment 60-65 | Value of property held by central govt. Public Enterprises as of 31-3-78 per capita in Rs. | Disbursed of all India financial institutions in per capita | | Disbursal of all India financial institution percentage distribution | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | 69 - 74 | 74 - 78 | 69 - 74 | 74 - 78 |
| 01. | Maharashtra | 19 | 18.2 | 7.2 | 36.4 | 180 | 42 | 72 | 27.0 | 20.8 |
| 02. | Gujarat | 18 | 14.6 | 7.8 | 52.3 | 235 | 35 | 73 | 11.9 | 11.2 |
| 03. | W. Bengal | 18 | 14.6 | 5.7 | 20.3 | 239 | 15 | 34 | 08.6 | 08.7 |
| 04. | Tamil Nadu | 11 | 11.9 | 7.6 | 53.5 | 137 | 23 | 50 | 11.8 | 11.9 |
| 05. | Karnataka | 11 | 08.5 | 9.2 | 100.0 | 144 | 18 | 54 | 06.5 | 09.2 |
| 06. | Kerala | 11 | 06.1 | 6.4 | 58.3 | 152 | 08 | 37 | 02.2 | 04.5 |
| 07. | Punjab | 09 | 05.6 | 5.3 | 103.9 | 167 | 08 | 33 | 01.4 | 02.5 |
| 08. | Haryana | 10 | 07.8 | 3.6 | | 144 | 26 | 49 | 03.2 | 02.8 |
| 09. | Andhra Pradesh | 08 | 06.6 | 5.1 | 81.6 | 113 | 07 | 23 | 03.9 | 05.7 |
| 10. | Madhya Pradesh | 06 | 06.6 | 4.9 | 79.1 | 431 | 06 | 09 | 03.4 | 02.3 |
| 11. | Assam | 05 | 07.9 | 3.6 | 03.8 | 248 | 09 | 22 | 01.6 | 01.9 |
| 12. | Bihar | 05 | 10.6 | 2.9 | 77.8 | 500 | 10 | 12 | 07.1 | 04.0 |
| 13 | Uttar Pradesh | 05 | 05.2 | 5.1 | 50.6 | 055 | 06 | 09 | 07.0 | 07.9 |
| 14. | Rajasthan | 04 | 04.5 | 5.0 | 93.0 | 108 | 08 | 24 | 02.4 | 03.6 |
| 15. | Orissa | 03 | 04.5 | 4.0 | 146.7 | 298 | 06 | 13 | 01.7 | 01.6 |
| 16. | Himachal | 04 | 01.5 | 2.0 | .. | 253 | 04 | 23 | 00.2 | 00.5 |
| 17 | Jammu & Kashmir | 03 | 01.7 | 5.3 | .. | 013 | 01 | 34 | 00.1 | 00.9 |

Reference : Kuchal, Industrial Economy of India, P.276.

## C O N C L U S I O N

From the above discussion we can come to the conclusion that the existence of electrical machinery industry can not be justified on the basis of the location factors, though there are some exceptions. The growth of electricity supply industry no doubt contribute towards the establishment of electrical machinery industry. The policy of the Central Government relating to the uplift of the backward region by starting large scale industries also played an important role in making massive investment for these industries in Kerala. But these industries fail to generate necessary linkages for the further growth of the state economy.

* * * * *

# CHAPTER - VI

## C O N C L U S I O N

It is well known that Kerala is an industrially backward state, though it has made significant progress in health care, education, infrastructural development etc., Kerala is rich in many factors that are required for industrial growth. Still industrial backwardness persists. Attempts have been made by researchers to identify the factors responsible for Kerala's industrial backwardness.

Some argued that the industrial scene in Kerala is stunted because of constant labour struggles. Some others argue that high wage rates is causative factor. There is another view point that declining centre sectoral investment has affected Kerala's industrial progress. All these arguements have been supported and contested by different scholars. But major point, that should have been looked into but was glossed over is the linkage effect of the industrial sector. In fact the most significant factor underlying any strategy of industrialisation is linkage effect. Unfortunately no major attempt to understand the linkages generated by various industrial subsectors in Kerala has been made, barring one or two.

In this context our study advanced the hypothesis that Kerala's industrial backwardness is due to the lack of linkages generated by most of the large scale industries set up in the state. Inorder to verify this hypothesis in greater detail we have chosen the electrical machinery industry in Kerala. Out of the seven large scale units in the state four namely, TELK, ALIND, PCC and UEI have been selected for detailed analysis. This study based on data collected from the selected units demonstrates very clearly that the electrical machinery industry in Kerala does not contribute to the regional income multiplier in any significant manner. Most of the

inputs required by the industry are either purchased from the rest of India or imported from foreign countries. Similarly, the output of the industry is seldom sold in Kerala. Much of its output are intermediate goods which normally have important linkage with other industries. But, unfortunately these linkages are not manifest with the domestic economy of Kerala. In other words, whatever linkages are generated by the industry they are with the rest of India. In this sense, this industry, as many other large scale industries in the state, do not contribute to any principal extent, to the industrial progress in the state.

The scenario raises a number of questions. An important question that is asked is why then this industry with a large quantum of capital investment came to be established in Kerala . As the linkage analysis doesnot justify the existence of this industry in Kerala, we made an attempt to explain the phenomenon interms of location theory. As is common knowledge there are many factors that account for industrial location. Nearness to inputs, nearness to the market, availability of skilled manpower, lower transportation cost etc. are some of the location factors. Except skilled manpower and infrastructural facilities of some kind, many of the above factors are not present in Kerala. Therefore, the location theory doesnot provide an adequate explanation for the existence of the industry in Kerala.

The predicamment calls for an enquiry into alternative channels. An important input for many industries is cheap electricity. Till the mid seventies, during which period many of the electrical machinery industry units were established in Kerala, the state was endowed with surplus electricity. But, the availability of cheap electricity does not explain the existence of electrical machinery in Kerala. If it were the sole causative factor, many other large scale industries with considerable local linkages would have been set up in the state. This did not happen.

Another arguement is that centre sector investment motivated by regional development considerations would be another explanatory factor. There is some truth in it. Central sector investment has never been high in Kerala. Further, its share significantly declined over time.

Still, the question remain unanswered. Our analysis in Chapter V. adduces some evidence though fragmentary in nature, to the fact that this industry got established in Kerala in the context of increasing power generation and the subsequent anticipation of increased demand for power generating equipments. The late fifties and the sixties held out considerable promise for an impressive growth of electricity supply in the state. Closely associated with this is the increasing demand for power generating equipments. It is in anticipation of such a demand that, in all probability the electrical machinery industry units got established in the state. But, the scenery changed very fast in the seventies. Kerala changed itself from the position of power surplus to power deficit. Not only that new generating stations did not come up, but even the existing stations did not generate power in full capacity. This would have led to a decline in demand for the output of the industry in Kerala. Naturally, this industry looked for clients outside the state. This aspect is not fully reflected in the data we have assembled in our study. The reason for this is that our study period begin from the later half of seventies. What we have explained above would have happened before this period. This in a sense is a limitation of our study.

However, to the above explanation one should also add the policies of the Govt. of Kerala. Though rapid industrialisation of the state has been the major agenda in all five year plans, no specific policy regarding procurement of output produced in the state, by the state have been formulated. The State Electricity Board could have absorbed a good

proportion of the output of the industry did not do so. Instead, the Kerala State Electricity Board meets much of its requirements for power generating equipments from suppliers outside Kerala. They may have reasons to cite for this. The fact remains that the output of the industry has to seek market elsewhere. All these utlimately ended up in a situation where the industry by and large remains unintegrated to the state economy.

From our analysis, it is clear that the industrialisation process in the state is sluggish largely because of the lack of inter - industry linkages and the advantages of the consequent agglomeration economies. Though the geographical situation of the state is partially responsible for this, a significant factor is the neglect by the state. Therefore, a moreimaginative industrial policy based on an indepth inter - industry analysis needs to be formulated, if the cherished goal of rapid industrialisation is to be achieved.

. . . . .

# B I B L I O G R A P H Y

BOOKS:


1. Ahluwalia, I.J; "Industrial Growth in India, Stagnation Since The Mid Sixties; Oxford University Press, Delhi, 1985. P. 7.

2. Button K.J; 'Urban Economics; Theory and Policy' The Mac Press Limited; London, 1976. P. 23.

3. George, K.K; "Centre - State Financial Flows and Inter - State Disparities" Criterion Books; Delhi, 1988, PP : 2 - 18, 22 - 29, 135 - 146.

4. Green Hut, M.L; " Plant Location in Theory and Practice", The Economics of Space";Chapel Hill, The University of North Carolian Press, 1956, PP: 97 - 117.

5. Hirschman, Albert, O; "The Strategy of Economic Development," W.W. Morton and company, New York, 1958, PP: 91 - 118.

6. Jules Backman; "Economics of Electrical Machinery Industry", New York University Press, 1962 PP: 1 - 13.

7. Kuchal, S.C; "The Industrial Economy of India" Chaitanya Publishing House, Allahabad, 1983, PP: - 271, 272.

8. Lousch, A; "The Economics of Location," New Haven, Yale University Press, 1954, pp: 3 - 61, 100 - 195.

9. Lewis, W. Arthur,"The Theory of Economic Growth" London; G. Allen & Unwin Ltd; 1955.

10. Rajat. K. Roy; "Industrialisation in India" Oxford University Press, Delhi, 1979, PP: 165 - 174.

11. Richardson, H.W; "Regional Economics", Neidenfeld and Nicolson (ed), London, 1976, P: 398.

12. Sankaranarayan, K.C. and Karunakaran, V; "Kerala Economy"; Oxford Publishing Company, New Delhi, 1985, PP: 153, 154, 171.

13. Sargent Florence, P; "The Logic British and American Industries", Routedge and Organ Paul Ltd., London, 1972, P. 98.

14. Weber, Alfred; "Theory of Location of Industries" Chicago University Press, 1957.

15. William, Alonso, " Location Theory", in Needleman (ed)," Regional Analysis", Penguin Books Ltd; England, 1969; P P: 101 - 125.

. . . . .

JOURNAL ARTICLES:

1. Chenery H.B and Watanabe. T, "International Comparison of the structure of production", Econometrica, Vol. 26, 1958.

2. Hazari, Bharat: R.," Empirical Identification of Key Sectors in the Indian Economy","The Review of Economics and Statistics" Vol.II, No. 3, August 1970.

3. Isarad, W; "Inter - regional and Regional Input - Output Analysis, A Model of Space Economy", The Review of Economics and Statistics, Vol. II, No. 3, August 1970.

4. Krishnan, T.N.; "Wages, Employment and output in inter - related labour markets in an Agrarian Economy" study of Kerala, "Economic and Political weekly", Vol; XXVI July 29, 1991.

5. Leontief, W.W; "Quantitative Input - Output Relations in the Economic System of the United States, "The Review of Economics and Statistics," Vol IV, No.6 1936.

6. Mathur, P.N. (et.al); "Input - output Table 1963", Arthavijnana, Vol.XIX, March 1972.

7. Mukherjee, M; "The Technique of Social Accounting in a Pre-industrial Economy", - Sankhya, Vol. XIV, Parts I & II, 1954.

8. Panchamukhi, V.R., "Linkages in Industrialisation A Study of Selected Developing Countries in Asia, "Journal of Development Planning; No.8, U.N. Department of Economics and Social affairs, New York, 1975.

9. Raj, K.N; "Growth and Stagnation in Indian Industrial Development", Economic and Political Weekly; No.26, Vol. XIV 1970.

10. Shetty, S.L; "Structural Retrogression in the Indian Economy Since Mid - Sixties", Economic and Political Weekly; Annual No. 1978.

11. Subrahmanian, K.K.; "Development Paradox in Kerala - Analysis of Industrial Stagnation" - Economic and Political Weekly; Vol. XXV, No. 37, Sept. 15, 1990, P.P 2053 - 2058.

12. Thampi, P.M.; "Wage - Cost and Kerala's Industrial Stagnation - Study of Organised Small Scale Sector, "Economic and Political Weekly" Vol. XXV, No. 37, 1990, P.P - 2077 - 2078.

. . . . .

# REPORTS AND OTHER PUBLICATIONS


GOVERNMENT OF INDIA:

- The Report of the Electrical Equipment manufacturer's Association.
- The Report of the Working Sub - Group on Electrical Equipment, 1984.

PLANNING COMMISSION:

- Plan Documents.

GOVERNMENT OF KERALA:

- Publications of the Bureau of Economics and Statistics.
- Statistics for Planning (Various years)
- Plan Documents.

STATE PLANNING BOARD:

- Economic Review (for various years)
- Plan Documents
- Report of the High Level Committee on Industry, Trade and Power, 1984.

WORKING PAPERS:

(i) Subrahmanian, K.K. and Pillai, P.M; "Kerala's Industrial Backwardness; An Exploration of Alternative Hypothesis, "Working paper No. 210 Centre for Development Studies, 1985,

2) Thomas Isaac and Michael Tharakan; "An Enquiry into the Historical Roots of Industrial Backwardness in Kerala - A Study of Travancore Region," Centre for Development Studies, Working paper No. 215 1986.

3) Pillai. P.P; "Input Output Analysis for the Kerala Economy" - 1987.

. . . . .