CHAPTER I

INTRODUCTION

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 unbalanced 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. Sometimes, 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, in fact, 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 induce industrialisation. In this context, it is worth noting that, Kerala provides a very large consumer market. The fact that, per capita expenditure in Kerala exceeds per capita income points to this 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 similar line of argument 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 per capita consumer expenditure of Rs.2,436 in 1986-87 was higher than the estimated per capita State Domestic Product of Rs.2,371. (T.N. Krishnan; 1991).
(Subrahmanian, K.K. 1990) 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 argument 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 in-depth 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 thereby 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 framework.

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 raw materials, acquisition of skill and technology, procurement of credit services, 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 assigned 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 correspond 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 Wassily 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.

$$X - AX = Y$$  \hspace{1cm} (1)

Where $X$ is the total output vector

'$A$' the technological co-efficient matrix and '$Y$' the final demand vector.

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

$$X = (1-A)^{-1} Y$$  \hspace{1cm} (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; attempts 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 Isard, 1957 (W. Isard, 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. 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 territories of India.

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.


(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.


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


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


---

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 Pakistan.

The focus of Panchamukhi's study (Panchamukhi, 1975) is on an international comparison of linkage co-efficients of six Asian countries - India, Pakistan, 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 compiled 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-requisite 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 worth noting 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.)
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 owing 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, viva-as 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,
The last chapter presents the findings of the study.

In addition to a particular period, the study also examines the regional factors relevant for the growth of the industry. Finally, an attempt is made to explain the causes for the emergence of the industrial sector in Kerala. The availability of power and mineral resources is also taken into consideration in the context of Kerala's economy. The availability of power in Chapter 5, Location theory, does not seem to be having much of an influence on the location theory as attempted in Chapter 4. An attempt at an explanation in terms of the Location theory is attempted.

All data are mainly used in the sector for detailed analyses. Balance sheets are not available. Data for a 10-year period from 1970 to 1980 have been collected by directly visiting the factories and also from the companies, sales etc. Within the state, outside the state, and abroad industries (UEI, Crompton, etc. and United Electrical Premier cable company Limited (PCC); Crompton and United Electrical, Algin, Kundera and Manager, etc.) are selected as transformers and electricals in Kerala, Limited (TELK).
The last chapter presents the findings of the study. Industry during a particular period, balance and certain regional specific factor relevant for the growth of the industry in terms of the policy of regional balance and the existence of the industry in Kerala. Finally, an attempt is made to justify the existence of the industry in Kerala. The availability of power and mineral resources is also taken to explore the causes for the significance in the context of Kerala economy. The availability of power and mineral resources is also taken to explore the causes for the significance in the context of Kerala economy. An alternate explanation in terms of the location theory is attempted.

All data are mainly used in this sector for detailed analysis. Various factors are collected from the factors, together with the purchase and sales data and collected from the activities generated by the electrical machinery industry. Balance sheet is a detailed analysis of the data collected from the electrical machinery industry in Kerala and from the secondary data. It also gives a brief account of the performance of the sample units. In chapter three, we describe the other characteristics of the electrical machinery industry in Kerala, as thrown up by the secondary data. In chapter two, we describe the other characteristics of the electrical machinery industry in Kerala. This chapter highlights the problems, objectives, and methodology of the study.

The study altogether consists of six chapters. The introductory chapter...