CHAPTER II

A REVIEW OF STUDIES ON RUBBER PLANTATIONS
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A large number of studies on different aspects of rubber plantation industry have been made by several expert committees and individual scholars. The literature available on rubber plantation industry deals with various aspects such as the economics of rubber cultivation, supply response to price changes, forward and backward linkages, management practices, role of government, yield performance of different types of planting material etc. Some studies on the technological changes in the rubber plantation industry have been carried out in Malaysia, one of the major rubber producing countries in the world. The present chapter presents a brief review of important studies available on rubber plantation industry.

Reports

Most of the studies on rubber plantation industry published in the fifties and sixties were conducted by various committees appointed by the government of India and Rubber Board. The first systematic study on various aspects of rubber plantation
was done by the Plantation Inquiry Commission\textsuperscript{1}. The growth of the industry, area distribution of rubber holdings and the position of small holding sector in the industry were the chief areas of interest for the commission. Among other things the committee discussed the capital structure, marketing, transporting and labour relations in the industry.

The marketing problems of rubber growers were examined by Reddy\textsuperscript{2}. The study was mainly concerned with problems of the small holding sector. It emphasised the need for an efficient marketing organisation in the small holding sector.

In 1959, the committee appointed for enquiring into the kangany system in the plantations of Kerala submitted its report\textsuperscript{3}. The report recommended the abolition of kangany system in Kerala, which was subsequently accepted by the government.


\textsuperscript{2}Reddy D.V. (1950), Marketing Organisation for Rubber, Indian Rubber Board, Kottayam.
In order to suggest improvements in the rubber plantation industry in India, Rubber Board sent a team to Malaya. The recommendations of this delegation is largely related to the organisation of development, research and extension activities in the rubber plantation industry.

In 1968, Rubber Small Holdings Economics Enquiry Committee appointed by the Ministry of Commerce, Government of India conducted a study on the economics of rubber small holdings in India with a view to bringing to light the drawbacks and deficiencies of the small holding sector. The Committee observed that small growers react more quickly to price changes than large growers. The potential of the small holding sector as the source of employment and livelihood to a sizable section of the population is emphasised in the study. According to the committee, distribution of the planting materials at concessional

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5 Abdullah T.M. (1968), Report of the Rubber Small Holdings Economics Enquiry Committee (1968), Rubber Board, Kottayam
rates and subsidies helped the diffusion of improved materials among the growers. It was pointed out that the lack of proper cultural practices is one of the major reasons affecting the productivity in small holdings.

Unny and George Jacob\textsuperscript{6} conducted a sample survey of the small holdings in India in 1969-70. The main objective of the study was to estimate the yield per hectare of the small holding sector. Various factors such as area under rubber, planting materials used, cultural practices, tapping systems, method of processing and marketing adopted were also analysed. They came to the conclusion that interplanting of other trees or crops with rubber is comparatively low in area planted with budgrafts and clonal seedlings vis-a-vis area planted with unselected seedlings. Manuring and plant protection measures are regularly done only in area under high yielding varieties. Regarding tapping practices, the study found that alternate daily tapping is very common in budded area while daily tapping is followed in unselected area.

\textsuperscript{6} Unny, R.G and George Jacob (1972), Rubber Small Holdings in India, Report of the Sample Survey 1969-70, Rubber Board, Kottayam
Family labour is employed for tapping small holdings. It was found by the study that majority of the small holders' rubber is sold mainly to the licensed dealers. This study was the first systematic study conducted to assess the position of the small holding sector in India.

Krishnankutty, P.N. and Haridasan, V. provides some idea on the family budget of rubber plantation workers. The main objective of the study was to examine the living conditions of the plantation workers. The major conclusions are that 61.1 percent of the expenditure of the plantation workers is incurred on food articles and that the net difference between income and expenditure of families surveyed was found to be positive.

A study of the management practices in rubber plantation industry was conducted by Sudarsanan Pillai. The overall objective of the study was to investigate into the various

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8 Sudarsanan Pillai, P. (1993), A Study of the Management Practices in Rubber Plantation Industry in India, Research Project Sponsored by Indian Council of Social Science Research, School of Management Studies, Cochin University of Science and Technology, Cochin.
management practices followed in the plantation industry in India at large and rubber plantations in particular with a view to evolving suitable tools, strategies, policies etc. and also for developing an integrated management system for rubber plantation industry in India. A comparative study of the management practices followed in India and Malaysia was also undertaken. Primary data for the study has been collected from the estates and holdings in India and Malaysia.

Books on Rubber

One of the most important books published on rubber plantation industry is that of Barlow. In his book, Barlow gives historical, technological, social, political and economic aspects of the Malaysian Rubber Plantation Industry. The ultimate goal of the development of the industry is perceived, in this book, as the maximisation of social value product, this being defined in broad terms which include an equitable distribution of gains amongst all members of society. Technological aspects of production and processing and the development of the synthetic rubbers are

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analysed. The economics of producing and processing rubber on estates and small holding and possible improvements in the deployment of resources are explored. The structure of marketing channel between producers and consumers and the organisational arrangements on patterns of resource allocation are also examined. The book contains valuable information and a penetrating analysis of the rubber plantation industry in Malaysia.

National Council for Applied Economic Research\textsuperscript{10} drew our attention to the demand and supply position of natural synthetic and reclaimed rubber in India. Demand and supply forecasts were worked out on the basis of regression analysis. The desirable stock of rubber to be held in the future and operational stocks at different stages from the producer to the consumer were estimated using statistical models. However, a comparison of the estimated and actual figures for the eighties, currently available showed that there is wide difference between the two. In the case of natural rubber, it was found that the production and tapnable area were under estimated by about 25 percent while the consumption was over estimated by about 12 percent for the year 1989-90.

Estimates for other years also showed wide variation with the actual figures. The deficit in supply was over estimated by about 300 per cent. While arriving at the estimates, the study seems to have taken a biased view of the demand and supply position of natural rubber in India.

Tan\textsuperscript{11} examined the problems in the marketing of natural rubber. The study developed an econometric model of the world natural and synthetic rubber market. It was pointed out by the study that the secular decline in natural rubber price up to 1973 in the world market was primarily due to the substitution of natural rubber by the cheaper synthetic rubber. The econometric model developed was used for forecasting natural rubber price. The study also analysed the implication of natural rubber market stabilisation along the lines of international natural rubber agreement. It was found by the study that the natural rubber supply is influenced by prices up to fourteen year lags. The study emphasised the need for a stockpiling policy so that consumers will not be faced with unforeseen shortages.

Umadevi\textsuperscript{12}, studied the backward and forward linkages of the plantation sector vis-a-vis the other sectors in the Kerala economy. The study uses Ramussen's method of quantitatively estimating the backward and forward linkages which accounts for the direct requirements also. A 24x24 input-output table for Kerala for the year 1973-74 at purchase prices was constructed for the study. The main conclusion emerging from the study is that the rapid growth of the plantation sector may not be helpful in providing a growth stimulus to the economy. The linkage of agriculture and animal husbandry with the rest of the economy is better than that of the plantation sector. Hence, the present trend in Kerala of converting the land under paddy into cash crop cultivation needs to be viewed with alarm. She has observed that if rubber is processed inside Kerala the linkage of the rubber products industry is likely to be high. It is not high at present since it is not processed in Kerala on a large scale. If rubber is processed and exchanged for food, which is imported by Kerala, then it would promote a horizontal division of labour, i.e. exchange for finished goods rather than the exchange of an unfinished good for a finished good leading to a vertical division

of labour, of latter, puts the producer of raw materials at a disadvantage in the process of exchange.

Ph.D Thesis

Jose Thomas studied the economics of rubber plantation industry in Kerala. After discussing the importance and growth of the industry, the impact of various development schemes are explained. Role of Rubber Board and Rubber Marketing Societies in the development of the industry are examined. The demand-supply position of natural rubber industry is also studied. Cost of production of rubber is calculated, by using secondary data. The profit shares of the estate sector and the small holding sector are found out by using the break-even chart. It is concluded that comparatively estates enjoy higher rate of profit than small holdings. Other major conclusions of the study are:

1. Wide fluctuations in the prices of natural rubber adversely affect the long term supply position, due to the difficulties

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on the part of the rubber producers to make healthy, long term plan for future production

2. Further, improvement in production is comparatively higher in small holding sector than estate sector.

3. Break even analysis showed that the break even point for the estate sector has increased to 631 kgs. in 1974-75 from 410 kgs. in 1965-66. The profit share remained more or less same during the period in the estate sector.

4. For the small holding sector, the break even points are 325 kgs. and 474 kgs. respectively in 1965-66 and 1974-75. But the profit share has decreased sharply from 450 kgs. to 196 kgs.

Management practices in the rubber plantations in India was studied by Haridasan, V.\textsuperscript{14} A comparison between the practices followed by Indian and non-Indian companies is also made. The management practices in the rubber plantations are examined in the light of management principles and techniques adopted in business and industry. Management principles of finance, marketing, materials, transporting, planning, organising, staffing, directing and controlling are examined. The study is limited to the estates belonging to the limited companies in India.

\textsuperscript{14} Haridasan, V (1979), An Enquiry into the Management Practices Followed in Rubber Estates in India, Ph.D. Thesis, Cochin University of Science and Technology, Cochin.
Ciciliyamma studied the structural changes and profitability in the rubber plantation industry. She analysed the changes in rubber area in comparison with area under other cash crops. A major reason for the change in area under rubber cultivation, as found by the study, is the proliferation of a large number of small holdings. Supply response of natural rubber was studied using a simple distributed lag model which hardly considers the characteristics of a perennial crop like rubber. It was found that the price of competing crops had a greater influence on the changes in area and output than the lagged prices. The profitability of rubber cultivation among small holders was analysed from a single village in Meenachil Taluk. Meenachil Taluk is the region where the yield per hectare is highest in Kerala. Therefore conclusions based on the data from this taluk alone could hardly be used for explaining the general situation in Kerala.

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Raju\textsuperscript{16} analysed the input and output price movements, productivity trends, capacity utilisation and returns to scale in rubber-based industry in Kerala. The analysis of trends in input and output prices led the researcher to the conclusion that both had increased over the years. Rubber-based industry in Kerala showed signs of declining trend in productivity and decreasing returns to scale. The capacity utilisation of the rubber manufacturing units selected for the study was low. Shortage of power and raw materials, labour problems and inadequate marketing facilities are the major hurdles in the progress of the industry identified in the study. The researcher had given much attention to the supply side of natural rubber. Analysis of supply response using the distributed lag model revealed that short-term response is mainly affected by current price rather than lagged price and long-term planting decisions are influenced by the prices of the previous eight years. The study concludes that favourable price was one of the major reasons for the increase in rubber production in the state. He also examined the changes in production and productivity in the natural rubber plantation industry in Kerala.

Articles in Research Journals

Yee\textsuperscript{17} had established that with yield stimulation, the increase in yield, particularly in the older tapping panels, offsets the increase in production cost and hence a higher level of operating profits can be derived.

Dand\textsuperscript{18}, forecasted the prices of RSS 1 and RSS 2 sheet rubber using the Box and Jenkins technique. Starting with a generalised forecasting model, he worked out the forecasts after completing the steps involved such as identification, estimation and diagnostic checking.

Sunil Mani\textsuperscript{19} examined the intra-year variation in the price of natural rubber in the 1970s and the role played by

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the rubber stock in explaining it. He also presents a brief account of the rubber economy in Kerala, and the pattern of distribution of small holdings and estates between 1955 and 1979.

Yee, Longworth and Strong\textsuperscript{20} studied the nature and magnitude of shift in the derived input demand and cost functions associated with different levels of rubber growing technologies. The paper analyses two different aspects of the problem. The study tried to answer questions such as whether past research has produced technology biased towards one or more input factors, the effect of past technology advances on the unit cost of producing raw rubber. The methodology is based on the assumption that the basic underlying production process may be described by a Cobb-Douglas production function. The study is based on the data collected from the estate sector pertaining to three production years, viz., 1964, 1970 and 1976. The conclusions of the study are:

1. Technological developments which occurred in the past have played an important role in the Malaysian rubber industry in increasing productivity and reducing unit cost of production.

2. Past research has not been biased in favour of one or more inputs.

3. The gains from research along the same lines as in the past appear to have been diminishing over time.

Chew estimated the rate of technological change in Chinese rubber small holdings in Peninsular Malaysia under the framework of a production function. A Cobb-Douglas production function was specified and fitted to two sets of cross-sectional data collected in 1963-64 and 1978. The study concluded with the observation that the technological changes in Chinese rubber small holdings is the capital-augmenting type. The estimated rate of progress was about 1.2 per cent per annum.

Suleiman and Ching examined the productivity of land and labour in the Malaysian rubber estate sector for the period


1960-84. They have established that, to a large extent, land productivity was responsible for the growth of the labour productivity. Further, they found that the continued economic viability of the rubber industry depends very much on improvements in land utilisation via re-investment policy, development and adoption of high yielding planting materials.

Tharian George, Tomy Joseph and Toms Joseph evaluated the yield performance of some selected planting materials. The data was collected from one of the largest rubber planting companies in India. The main objectives of the study were to assess the yield performance of selected planting materials, to estimate the extent of individual and combined influence of selected variables on yield rate, to determine the year of tapping which gives the maximum yield for each planting material and to assess the planting policy of the Company. Fifteen popular planting materials were selected for the study. Since the data pertaining to yield for the 20 years of tapping were not available for all the varieties, trends in yield rates were analysed separately for

three time periods, viz., ten, fifteen and twenty year periods. The influence of year of tapping and density on the trends in yield rates of individual planting materials were estimated by employing multiple regression analysis.

The analysis of yield data showed that PB 28/59, RRIM 605, PB 5/51 and GT1 are found to be superior to others in terms of yield during the ten years where data for all the 15 types of planting materials were available. RRIM 605 had the lowest coefficient of variation. An observation offered by the study was that there is a positive relationship between yield and instability. The multiple regression analysis showed that the variation in yield can be explained from 64 to 87 per cent in the 20 year period, 76 to 98 per cent in the 15 year period and 74 to 100 per cent in the ten year period depending on the planting material. Further, the study observed that the planting policy of the company in relation to the yield performance of the selected planting materials during the ten year period justifies its policy as is evident from the rank correlation. A limitation of the study is that the data had been collected from a single plantation Company, so that generalisation is hardly possible. Another point to be noted is that, RRII 105, the most popular planting material in India, has not been included in the study.
Tharian George, Haridasan and Sreekumar\textsuperscript{24} conducted a study on the role of government and structural changes in rubber plantation industry. The study analysed the development of the industry and the implications of the policies pursued by the government from time to time. The study observes that the price factor is relatively more significant when compared to the various factors which played a positive role in the development of the rubber plantation industry in India till the 1940s. On various occasions, the prices were protected from falling below remunerative levels which, to a large extent, played a pivotal role in maintaining the tempo of growth of the industry. The study examined the various measures introduced by the government to achieve the growth of the industry since independence. The major reasons for the increase in production and productivity found by the study are:


2. Extension of cultivation in traditional as well as non-traditional areas. In this process, the concerned state

governments have also taken active interest by establishing rubber plantations under public sector corporations.

3. The land reforms introduced in Kerala State in 1965, which exempted plantation crops from land ceiling while maximum limits to individual holdings for other crops were introduced.

4. Policy of notifying minimum price for natural rubber based on the estimated cost of production.

5. The growth of indigenous rubber goods manufacturing industry.

The study concludes that both the central and state governments played an active role in the development of the industry. The policies followed by the government had certain significant consequences on the structure of the industry in terms of changes favouring the growth of a dominant small holding sector, in the geographical distribution of area under rubber and in the ownership pattern in the estate sector.
Sudarsanan Pillai\textsuperscript{25} pointed out that modern management techniques and practices which are found most effective in industries have not found their proper use in plantations. The management practices in the large number of rubber plantations under various organisational set up widely differ from each other. It was observed by the study that the rubber plantations offer tremendous opportunities to implement modern management techniques to improve both production and productivity.

Toms Joseph, Haridasan and Joy Cyriac\textsuperscript{26} made a study on the comparative cost advantages of two types of rain guarding of rubber trees. The study was conducted among small holdings with equal representation to the two types of rain guarding, viz., polythene sheet rain guarding and tapping shade rain guarding. The average yield per hectare at which rain guarding is profitable has been calculated by employing the discounted cash flow analysis. The cost and benefit figures were estimated using the


details on cost, yield per hectare and stand per hectare. The income received and the cost incurred were discounted to facilitate comparison. The average yield which makes the cost-benefit ratio equal to unity which is the minimum average yield to recommend rain guarding, was calculated on the assumption of 20 per cent yield increase from rain guarding. The estimated figure is 675 kg/hectare. The adjusted three year average cost estimate gives results in favour of polythene sheet rain guarding.

Sudarsanan Pillai\textsuperscript{27} in another study examined the management of rubber marketing in India. The major problems in rubber marketing, identified by the study were the fluctuations in price, fluctuations in supply and the visual grading system. It was recommended that the setting up of a central marketing agency in the model of coffee pool which would ensure justifiable price to the growers. Opening of more regional and central processing factories and the formation of more rubber producers' societies are other recommendations of the study. The need for a proper import distribution management to safeguard the interests of both rubber cultivators and manufacturers has been emphasised by the study.

It has been found from the survey of literature that though many studies have been conducted on rubber plantation industry in India and its various aspects, no study has so far focused attention exclusively on the technological changes in rubber plantation industry in Kerala. In this context, the present study would be a pioneering attempt at analysing the technological changes and performance of the rubber plantation industry in the country.