CHAPTER II

REVIEW OF LITERATURE

2.1. Introduction

Many literatures are available on several aspects of rubber cultivation, production and commercial use of natural rubber. However, only limited studies have been conducted on the foreign trade of natural rubber in India. This chapter is intended to provide an overview of important literatures on natural rubber, focusing on the available resources on the foreign trade of natural rubber.

A major factor that influences the foreign trade of natural rubber is the price of natural rubber in the international and domestic markets. International policies, regulations and agreements taken by governments also influence trade of natural rubber. They affect the import and export of natural rubber and also the price of natural rubber. Other factors influencing the price are the production and consumption of natural rubber, which in turn affect the foreign trade. Another factor influencing the foreign trade is the demand of natural rubber. If the domestic supply falls short of the demand, import of natural rubber increases. Subsidies and policies offered by the government affect the production and price of natural rubber which in turn affect the foreign trades. A brief overview of the most important related works in this field is mentioned here.
2.2. Studies on History, Development and Problems

Bauer (1948)\textsuperscript{1} has made one of the earliest and comprehensive studies on rubber. The growth of the industry, distribution of area under rubber cultivation, establishment of international rubber regulations, nature and characteristics of plantation labour and prospects of the rubber industry in the world have been some of the major concerns of the study made by Bauer.

Schidrowitz and Dawson (1952)\textsuperscript{2} traced world history of the rubber industry. The authors have examined the origin of the industry, raw materials, and also the scientific as well as technological developments in rubber manufacturing industry across the world.

Donnithorne, Audrey (1958)\textsuperscript{3} have studied in detail the various developments in British rubber manufacturing industry before 1958 starting right from the structure of the industry, particularly the innovations in this industry and the implications of such innovations on the economics of manufacturing of rubber based products. The study has covered; inter alia, rubber compounding and the use of the same for manufacture of various rubber products, the introduction of innovative ideas in the rubber industry by chemical manufacturers etc. The basic influences that led to different innovative developments have also been analysed in the latter part of the study.

A comprehensive study on the development of rubber cultivation in India, capital structure, marketing of rubber, area under small holdings and labour has
been carried out by the Plantation Inquiry Commission appointed by the Government of India in 1956 (Menon, Madhava, 1956).

A study on the problems of the rubber plantation sector, specially focusing on the conditions of the small holders was carried out by Small Holdings Economics Enquiry Committee appointed by the Government of India on 27 September 1967. The Committee has made an in-depth study of the economics of small holdings and suggested some measures to improve the existing situation in its Report (1968).

Raju (1990) analysed the development and problems of the rubber based industries in Kerala and suggested steps such as reorienting the tax structure to reduce the tax burden of producers and stabilise the prices of basic inputs to promote local rubber industries and produce goods at competitive prices.

Mannothra (1993) has stressed the utmost significance in India of farm research, technological advancement and scientific methods of tapping system for achieving higher level of productivity and better yield from natural rubber, by way of scientific methods of cultivation and tapping.

‘Facts for you’ (1993) reviewed the world rubber situation. In this paper a crucial question has been raised as to though the country has attained self-sufficiency in the supply of rubber, whether the rubber growers have attained self-sufficiency. Another debatable issue that has been pointed out in the paper is as to
how long the Government can protect the rubber growers by training them in agricultural production and allied activities.

Kumar A. and Pillai S. (1994)⁹ have made a detailed examination of the future prospects of rubber plantation industry in Kerala; including the trend in respect of the area under cultivation, production and productivity. The authors have observed that there existed only limited scope for the extension of the cultivation of natural rubber in the state of Kerala. Accordingly, for further development of this sector in Kerala state, the necessary option is that of increasing the productivity of rubber cultivation in the state.

Mani (1994)¹⁰ has studied economics of rubber plantation in India, and according to him rubber plantations is in the declining stage. The study has proved that even though for the time being cultivation of rubber is viable, its future needs a careful watch due to the entry of synthetic rubber and other substitutes.

Ushadevi (1999)¹¹ has analysed the institutional and organisational arrangements in the development of technology, rate of technical adoption in rubber cultivation in Kerala, effect of technical adoption in yield and cost and evolution of natural rubber marketing, its structure and implications in technical adoption. The study concluded that the diffusion and adoption of modern technology in rubber cultivation has played a significant role in the development of the Kerala economy, especially simplifying the problems of small growers.
Tinker, and Jones (1998)\textsuperscript{12} have focused on environment issues in various stages of rubber production viz. as a raw material, in processing, in service as a product and finally recycling. The authors have put forward various methods like product life extension, amelioration, retreading to reduce environmental pollution caused by rubber as a product in service.

Henk L.M. Kox (1999)\textsuperscript{13} has suggested that the positive factors of Hevea cultivation on environmental aspects could be a motive for providing international assistance for its cultivation. It has been suggested that a proper evaluation of domestic policy cannot concentrate solely on exports, but has to include wider domestic welfare impacts of the measures. Besides, it has been pointed out that some environmental measures may be beneficial both from the point of view of the exports sector, and the social welfare point of view. He found out that gains could be made by output-reducing and price-rising effects of tax; and has observed that countries have ample scope to apply domestic environmental policies in rubber sector without disastrous effects on export earnings.

J.Lalithambika (1997)\textsuperscript{14} has suggested that the Government could intervene and promote eco-friendly methods of rubber production and provide financial and technical assistance for such methods. Preference for such products results in higher demand and price. According to her, the whole life cycle of rubber production need environmental auditing, and it could be translated to cost, as suggested by Rahaman (1994)\textsuperscript{15}. But, who bear the cost of the effort to internalize the environmental costs, remains open.
Menon P.M. (2002)\(^{16}\) has outlined the history of introduction of rubber tree from Amazon region to the East and particularly, India. In this paper, the growth and development of rubber plantation industry in the country is dealt with three phases viz. pre-independence era, post-independence phase upto 1955, and the period thereafter. It has been pointed out that the industry was in a dismal state after the World War II and upto 1955. Thereafter, there has been accelerated all-round growth, development and prosperity, the like of which no other agricultural commodity has attained. The paper has attempted to examine as to how the above success could be achieved, the major contributing factors in the above direction and also what the foreseeable future could be considered to hold good for natural rubber in India.

Kadir, A.A. S. A. (2002)\(^{17}\) has studied the role of Research and Development (R&D, in short) in the prospects of rubber industry. In the history of development of rubber cultivation and processing there have been many instances of technological advancements through research and development. The establishment of Rubber Research Institutes in Malaysia, Sri Lanka and Indonesia provided impetus for advanced R & D covering all aspects of rubber cultivation. The paper has examined in detail the major research achievements, challenges and future directions for R & D in rubber growing countries. The biotechnology, agro-management practices, value-addition of products, transfer of technology etc. are dealt in detail.
Jacob, James (2009) has made a study of the scientific research facilities that are available in India for research on natural rubber. The significant contribution made by Rubber Research Institute of India (RRII) on the natural rubber plantation industry of the country has been highlighted in the paper. It has been pointed out that the R & D strategy of the institute has been remoulded towards development of more and more new clones of rubber trees. The effort of the institute towards extension of rubber to agro-climatically less congenial and non-traditional regions of the country has also been pointed out in the paper. The author has suggested that an area that can make significant impact on the society is rubber technology and rubber manufacturing industry. The need for complementing applied field research with a strong and sound basic science has been underlined towards the end of this paper.

Varghese, Sunny et. al (2009) have observed that the implementation of Rubber Plantation Development schemes (RPDS) has brought about faster expansion of area under rubber in India. The financial and technical assistances provided under RPD schemes for new and replanting are dealt in the paper. Going by the above procedure, the authors make an exploratory and analytical study with a view to assess the growth and productivity of rubber between the participants in the scheme and non-participants. Accordingly, an evaluation of the effectiveness of the RPD scheme is made by the authors. It has been observed that the RPD scheme as a means to provide extension support is still relevant. But the extension
machinery of the Board, however, has to be further strengthened to ensure its more effective implementation.

2.3. Studies on Price and Price Variations of Natural Rubber

Kanbur and Morris (1980) have made an effort to study the measurement of natural rubber price cycles prevailing in the important markets of the world. The authors have analysed the short term fluctuations in natural rubber prices and have observed the existence of cyclical fluctuations of thirty months’ duration in the market prices of natural rubber.

Umadevi (1989) has examined the short run and long run supply response of natural rubber to price movements in Kerala during 1948-1982. Based on her study she has arrived at regression equations separately for output response, yield response, output response for holdings and output response for estates to analyse the short term response, the tapping decision. For estimating long term response, planting decision models viz., Fistherian model of declining weights specification, Nerlovian model and Logarithmic model have been used. This study has revealed that there has been significant response of output to current price in the tapping decisions with low price elasticity. However, in the long run with high price elasticity, the planting decisions have been observed to be influenced by the more recent prices.

Mani, (1982) has done a study to assess the behaviour of natural rubber prices and the market structure. He has divided the post phase (1969-70) into two sale periods viz. (i) from 1969-70 to 1974-75 and (ii) from 1975-76 to 1978-79. It
has been noted that in the first sale period, there has been marked seasonality in prices, while the second period has been observed to have wide fluctuations because of market uncertainties. Besides, the author has formulated an econometric model for price behaviour and found that the monthly price movements are determined by variables like production, consumption and manufacturers share in total stock. It has also been found that domestic natural rubber prices are much higher than the natural rubber prices in other countries of the world and that the natural rubber prices are found to be lower than prices of other raw material. The author has observed co-operative marketing to be unpopular among small holders. Besides, it has been noted that estates have been able to realise better price than small holders because of product differentiation.

Hartely et. al., (1987)\textsuperscript{23} have analysed the replanting responses of growers against price movements of natural rubber in Sri Lanka. The authors have analysed the replanting response by expressing its rate as a function of actual price of rubber, long term expected price of rubber, and area eligible for replanting in each year. Their empirical analysis has led to the conclusion that replanting response with respect to long run expected normal price is significant and positive with elasticity + 1.7.

Mani (1984)\textsuperscript{24} has studied the intra-year variations in natural rubber prices during 1970s, and has observed uncertainty and instability in the Indian rubber market due to the export and import policies. It has been noted that these prices are influenced by the interests of both rubber growers and manufacturers. After
evaluating production, consumption and stock of natural rubber the author has concluded that price stabilisation through buffer stock requires more rational approach.

Raju (1993)\textsuperscript{25} has made a detailed examination of the trend and pattern of rubber cultivation in the state of Kerala. The author has observed that Kerala accounted for as high as 85.10 per cent of the total area of cultivation and 93.30 per cent of the total production of natural rubber in the whole of India and that the cultivation of rubber in Kerala is dominated by small holders. It has been pointed out that the Rubber Board has made several appreciable efforts to modernise the rubber plantation in India. Based on the study, the author has suggested that the fortunes of natural rubber would appear to be swinging between the market forces of demand and supply, something which is beyond the control of ordinary rubber cultivators.

Lekshmi et.al (1996)\textsuperscript{26} have analysed the price movements of natural rubber during a period of 26 years viz.1968-'69 to 1994-'95; the period being divided into two phases viz. 1968-'69 to 1984-'85 and 1985-'86 to 1994-'95. Among the different economic variables (viz. production, consumption, stock, import and international price) the production of natural rubber has been found to be the most significant variable influencing the price of natural rubber. It has been shown that the natural rubber price does not show any significant pattern of consistent movement in a particular direction in the long run.
Budiman, A.F.S (2002) has studied the global trend in respect of the price of natural rubber (NR). It has been pointed that the price of natural rubber is the most significant issue of the global rubber industry and trade, as natural rubber has become more of a social commodity affecting the livelihood of over 30 million smallholders worldwide. It has been further observed that the fundamental factor affecting natural rubber price is still the supply and demand balance, and hence the natural rubber prices have been relatively well managed within a certain price-band under the longest ever international commodity agreement INRA, which collapsed only in 1999 after the unprecedented Asian currency crisis. It has been noted that short-term price forecasting is fraught with many uncertainties, as a result of a myriad of impinging factors such as world and regional economic developments, currency movements, market interventions, climatic conditions in major producing countries and prices of synthetic rubber feed-stocks. Consequently, even the one year ahead IRSG forecast has been under constant review almost every month, as presented in the rubber industry report.

2.4. Studies on Factors Affecting the Price of Natural Rubber

Ipe and Prabhakaran (1988), in their study of "Price response of a perennial crop: A case of Indian natural rubber" have found that the long run elasticity with respect to the expected price and the changes in the expected yield of rubber and coconut are 0.0855, 0.0297 respectively. It has been pointed out that the increasing prices and yield of rubber, fall in the productivity of coconut due to pests and diseases, and the subsidy scheme for planting rubber might have
accelerated on the planting of rubber in new area and substitution of coconut by rubber. Apart from the above reasons, other factors that might have accelerated rubber cultivations have been noted to be the differential slab rates and exemptions provided in the Agricultural Income (an Act in Kerala and the plantation labour act which did not apply to holdings below 10-17 hectares. Besides, it has been pointed out by the authors that the Agrarian relations Bill of Kerala which exempted rubber and other plantation crops from the ceiling level might have resulted in the conversion of large areas into rubber.

Sreekumar et. al (1990) have studied the share of the rubber grower in the consumer’s price of natural rubber in India. It has been observed that the authors have realised 92 per cent of the terminal market price for sheet rubber and 88 per cent of the terminal market price for scrap rubber as farm-gate price.

Kuttaiah (1999) has studied the overall development of the Indian rubber industry since independence and has pointed out that the EXIM policies adopted during the liberalisation period have adversely affected the growth performance of rubber industry in India. The author has also pointed out the close inter-relationship between the import and domestic prices of natural rubber in India.

George Tharian et.al (1999) found that liberalisation and globalisation policies of the government adversely affected the price of natural rubber and by enhancing the consumption of natural rubber the domestic price could be increased which needs long-term perspective plans. Liberalisation and globalisation policies of the Government have paved the way for international
competition in the domestic market together with the opening of new marketing avenues abroad. During the pre-liberalisation period rubber price in India has been influenced by production and consumption of natural rubber and the price of synthetic rubber (SR). But during the post-liberalisation period, international price of natural rubber emerged as the main variable that exerts much influence upon the domestic price.

A study on the international commodity agreements, with special reference to natural rubber by George Tharian (1986)\textsuperscript{32} shows that natural rubber prices exhibit a higher degree of instability in the international market and this exposes the fragility of the framework, in which many of the commodity agreements are operating.

2.5. Impact of Policies and Schemes on Production, Industries and Trade of NR

Battacharya (1976)\textsuperscript{33} evaluated the performance of the new subsidy scheme for rubber plantations proposed by the Rubber Board in 1957 and shows that the subsidy rate was low, notified price rates were not realised and the impact of the scheme was different for the small holdings and estates. He concluded that an alternative subsidy scheme for small holdings is necessary.

Kulkarni (1999)\textsuperscript{34} has made a study of the challenges and opportunities of Indian rubber industry in the wake of liberalisation and globalisation of the economy. The author has drawn a clear picture of the present global rubber scenario vis-a-vis the Indian and South East Asian rubber scenario. The author is of the opinion that Indian rubber industry could maintain a sound growth rate with
the support of easy access to major raw materials, rapidly expanding internal market, adequate government support and technically qualified and experienced man power. The author has concluded that the rate of growth of production in natural rubber (NR) would remain subdued with no prospect of growth in non-traditional areas of rubber production in India. He has also stressed that the import of natural rubber would become inevitable if domestic supply falls short of the demand.

Gulati et.al (1999)35 analysed the impact of Agreement on Agriculture (AOA) in World Trade Organization on market access, domestic support and export competition in India and the associated problems in agriculture sector and their solutions. Gupta (2000)36 analysed the implications of GATT Agreement and Dunkel Report on agriculture, textile industry, pharmaceutical industry, trade and service sectors and trade related investment measures of the Indian economy. The GATT agreement provides an opportunity to each country, to work under a rule-based, multilateral and transparent trading system and India will be a part of global market and it cannot keep aloof from other countries of the world.

The Study Group Series-8 of United Nations University (UNU) World Institute for Development Economics study various scopes and potential of co-operation in trade, manufacture and services between India and Sri Lanka in various industries including natural rubber [Indo-Sri Lanka Economic Co-operation (1993)]. The study group’s analysis on natural rubber sector, uncovers the situation of rubber production, export and import in both countries during the period of 1989-
1991. The study explains the reasons behind why India didn’t import rubber from Sri Lanka and suggests methods to improve the rubber trade between two countries. The study also points out both countries already have technical co-operation in the field of rubber production and more co-operation could be made in terms of rubber scrap trading, rubber products trading and rubber wood furniture, which is mutually profitable for both countries.

Internalisation is very important for a country as it increases resource efficiency and lessens environmental costs and waste as stated by M. E. Cain (1997)\(^3\). A survey conducted by Ulrich Hoffmann (1997)\(^3\) on possible unilateral internalisation on 415 commodities, only cocoa and natural rubber remained possible candidates. Internalisation of environment and health cost is essential for a thorough change in production and consumption methods. Key environmental issues that could be addressed by internalisation include promotion and preservation of natural rubber, enhanced development and prolong tread wear of tyres, promotion of recycled tyres, environment friendly tyre derived fuel etc. There are numerous opportunities for making natural rubber more competitive in elastomeric market, eg. through environment friendly products and production methods. Yeboah I.K suggests that, internalising environment cost into its international prices should be taken carefully as customers may choose cheaper substitute if they go higher.

Goldar (1995)\(^3\) assesses the impact of India’s unilateral tariff reductions and lowering of Quantitative Restrictions (QR) as part of trade liberalisation on
items including rubber since 1991. He also finds out the major reasons why there was only limited increase in imports with QR removal.

The current trends and future prospects of rubber products manufacturing industry in India has been addressed by Mathew N.M. (2000)\textsuperscript{40}. The implementation of International Rubber Regulation Agreement and the entry of foreign companies in rubber product manufacture, together with the support from the government, helped the growth of rubber product manufacture in India. The large population and the large manufacturing base, particularly in the automobile industry and the availability of competitive labour, offer great opportunities for rubber product manufacture in India.

Achyuthankutty and Arunkumar (2009)\textsuperscript{41} have studied the evolution of clusters among the small holdings cultivating natural rubber in India. It has been pointed out that the various constraints of this sector (like small-holding size, inability to raise huge capital, lack of sufficient awareness on planting, maintenance, harvesting, post-harvest processing and marketing) are successfully overcome by the clusters with the help of institutional linkages established among the various member units. Case studies have been made in this paper to nail down the relevance of clusters.

2.6. Studies on the Economic Aspects of Rubber Industry

Study on the economics of rubber plantation industry in Kerala was conducted by Jose (1979), whereas in Elamma (1981)\textsuperscript{42}, the focus was on the
rubber cultivation by small holders in Kottayam district. Jose (1979) concluded that the stability in the natural rubber price could be ensured by fixing a statutory minimum price. Elsamma (1981) estimated the cost of production sheet rubber and its pay-back period. A statistical approach using Box and Jenkins technique to forecast RSS1 and RSS2 prices has been developed by Daud (1983). The technique developed, begins with a generalised forecasting model followed by model specification namely, identification, estimation and diagnostic checking.

National Council of Applied Economic Research (NCAER) (1980) has conducted an evaluative study of the demand and supply of labour for ten years’ period from 1980-'81 to 1989-'90. The study has observed that the major factors influencing the rubber consumption include production of all kinds of tyres and tubes and other rubber products like storage batteries, conveyer and transmission belts, foot wears, various types of hoses etc. Demand for various products as above in turn has depended upon the production of all kinds of vehicles that use tyre and tube, and other economic indications like net national product, indices of industrial and production, etc. Based on the above indicators and using regression analysis they have worked out the demand for all kinds of rubber. They have forecasted demand for natural rubber as 2,16,411 tonnes and 2,98,447 tonnes in 1984-'85 and 1989-'90 respectively. The authors have projected the supply of rubber for the same period. Production of natural rubber is directly related to tappable area and yield per hectare for the respective year. They have also worked out the future levels of production of natural rubber by multiplying the values of
tappable area with the respective yield levels. The estimated production of natural rubber for 1989-'90 has been at the level of 2,16,225 tonnes.

A comprehensive study on the world rubber market structure and stabilisation was conducted by Tansuan (1984)\(^4\) where an econometric model of the world natural and synthetic rubbers market to explain natural rubber price and consumption share over time has been estimated. In this model of the world rubber market the influence of synthetic-rubber industry and oil price, where the latter being a key variable with great uncertainty, has been investigated.

Sekhar and Ravindran (1998)\(^5\) examined the natural rubber supply in India up to 2000 and concluded that the Indian rubber manufacturing sector is poised to expand at a significant rate in the next two decades and the existing natural rubber output will not be sufficient to meet the requirements of the manufacturing industry.

Chew (1984)\(^6\) has made an effort to measure the rate of technological changes in Chinese rubber small holdings from a micro economic viewpoint. A Cobb-Douglas production function was fitted into two sets of cross sectional data collected in 1963-'64 and 1978 and estimated the rate of technological progress in rubber small holdings in Peninsular Malaysia which was found to be about 1.2 per cent per year. The study has concluded with the observations that the technological changes in Chinese rubber small holding is the capital augmenting type.
Yee, Longworth and Strong (1983) have examined the nature and magnitude of shift in the derived input demand and cost functions associated with different levels of rubber growing technologies. The authors have analysed two different aspects of the problem, and have tried to answer the questions (i) whether the past research has produced technology based towards one or more input factors, (ii) what is the effect of past technology advances on the unit cost of producing raw rubber. They have assumed that the basic underlying production process may be explained by the Cobb-Douglas production function, and have used the data collected from the estate sector of the three years 1964, 1970 and 1976. They have concluded that (i) technological developments occurred in the past have played an important role in Malaysian rubber industry in increasing productivity and reducing unit cost of production, (ii) past research has not been based in favour of one or more inputs, (iii) the gains from research along the same lines as in the past appear to have diminished over time.

The development of Chinese rubber sector and its impact on the world rubber industry has been studied by the International Rubber Study Group in 2003. China’s increasing strategic importance in the world rubber industry, increasing reliance on imports, rising share of natural rubber consumption, positive prospects for the rubber industry, the extraordinary role of the rubber sector in the economy, rising trend of per capita consumption of rubber, issues and consequences of raw material supply and the possibility of world shortage of natural rubber and its impact on China are considered in this study.
Suryakumar, S. et al. (2009) has made an exploratory study of the shortage of rubber tappers in Kerala. The authors have observed that in spite of good job opportunities in the rubber sector and also the various incentives extended by the Government, the young generation is comparatively reluctant to take up the tapping jobs and the existing tappers are gradually leaving the profession. Inadequacy of tappers results in a number of problems. They are frequent changing of tappers by the growers, a single tapper serving many growers, tapping more trees beyond the optimum task, delayed tapping and poor quality tapping etc. Accordingly, the authors have suggested remedial measures to solve the above problem like providing facilities for carrying the latex to processing site, additional incentives for processing etc.

2.7. Studies on the Marketing Aspects of Natural Rubber

The marketing problems of the rubber, particularly those of small holdings, were examined by Reddy, a former officer of Madras Government in 1950 at the instance of the Rubber Board (Reddy, 1950). Jacob (1985) evaluated the performance of co-operative movement in the field of natural rubber marketing. He found that co-operative rubber marketing societies have been confronted with the problems such as over politicalisation, less accountability, lack of professionalism, competition from dealers and visual grading and suggested remedies such as professional orientation and professional representation in the Board of Directors of co-operative societies, strengthening the Apex Body and restricting memberships.
Kuriakose (1995) studied the marketing channels of natural rubber with special reference to co-operative marketing in Kerala. He found that the co-operative sector handle only less than 20 per cent of the rubber traded in the Indian rubber market but it needs to be strengthened to minimise the number of marketing agencies of natural rubber and remove problems such as lack of waiting capacity, lack of grading facilities and inadequate storage.

Acharya (1998) analysed the structure, conduct and performance of agricultural product markets in India. He is of the opinion that the current framework of Indian Agriculture can be divided into six components such as regulatory measures, marketing infrastructure, administered price regime, direct entry of public agencies, export and import regime and macro-economic policies. He concluded that the performance of the market depends on its structure and conduct which in turn is influenced by the above mentioned components.

Stifel (1975) has studied the efficiency of sheet rubber marketing system in Thailand in a framework of the structure-conduct-performance model from the field of industrial organisation. This analysis indicates that the government can make competition more practical by increasing producers’ bargaining strength and thereby improving the efficiency of the capital market, encouraging the standardisation of product quality and urging the construction of feeder roads into remote producing areas to increase the size of effective markets.

A study on the impact of economic liberalisation and globalisation on the marketing of natural rubber in India has been done by John K.K. (2002). In his
study, the problems of the Indian Rubber Market with the introduction of liberalisation and globalisation measures introduced in 1991-'92, such as high import of natural and synthetic rubber products in the post-liberalisation period, prolonged un-remunerative price of natural rubber not even to meet its cost of production, domestic rubber market facing problems of international competition, heavy import of synthetic rubber are analysed. Important suggestions to solve these problems are: government must motivate the small growers to invest more in rubber plantation by giving subsidy, promote export marketing of natural rubber, implement road rubberised programme, regain the status of natural rubber as an agricultural commodity to ensure the protections in the Agreement on Agriculture of WTO, effective functioning of the co-operative sector, exploit the market potentialities for the latex based rubber goods in the international market and scientific investigations to promote new uses, improve quality etc. which increases the demand of natural rubber.

Rubber Research Institute of Malaysia (RRIM) in its Annual Report 1975 has stated that tapping and collection cost continued to be the biggest element of cost which accounted for about 40 per cent of the total matured area cost per kilogram of rubber production.

Unni and Jacob (1970) have observed that majority of the small holders of rubber plantations used ordinary planting materials. The authors have noted inter-planting of other crops to be crucial in determining the yield of rubber. Most of the small holders have been observed to practice crude methods processing of
rubber like sun or kitchen smoking. Application of manures and adoption of various plant protection measures have been observed to be done regularly only in respect of 37.70 per cent of the total area of cultivation. Besides, the authors have revealed that the average yield per hectare in budded, clonal, and unselected areas were 641, 565, and 388 kilograms respectively.

Kerala State Co-operative Rubber Marketing Federation Ltd. (1980)\textsuperscript{56} studied on the working of co-operative societies in Kerala which deals with rubber. They stated that in the case of small holders it is possible only to process 80 per cent of its produce which they collect as liquid latex and sell it at reasonable price. The 20 per cent of their produce which is in the form of scrap rubber whose composition and dry rubber content vary considerably depending upon certain factors. They have to sell it to country dealers from whom it passes through a chain of middle men before it actually reaches the rubber consumers.

Kerala State Co-operative Rubber Marketing Federation Ltd. (1982)\textsuperscript{57} in a market study under its initiative undertaken by Beasent Raj Consultants (P) Ltd. has pointed out that out of the total cost of production of raw rubber, maintenance and upkeep expenses account for 26 per cent, tapping and collection expenses 39 per cent, general charge 6 per cent, development or amortisation cost 8 per cent, and processing, packing and forwarding costs account for the balance 21 per cent. It has further been observed that 56 per cent of the total cost of labour consists of plantation labour.
George and Joseph (1973) have analysed the feasibility of investment in rubber and examined the present value of future returns. For the above purpose, they have worked out the Internal Rate of Return (IRR) on capital employed in respect of rubber cultivation as 10 per cent. The Benefit Cost Ratio (BCR) has also been computed by the authors using a constant discount rate. BCR has been found to be 1.2 for rubber. Based on their study, the authors have estimated the pay-back period for rubber cultivation to be 14 years.

Thomas, Jose (1979) has estimated the cost of production of small holdings relative to estates. He found that the cost of production per 100 kg of rubber in estates had increased by 332.96 per cent between 1950-'51 and 1974-'75, whereas corresponding increase in holdings was only 236.56 per cent. It has been noted that during the entire period of analysis the actual cost of production of holdings remained higher than that of estates. Besides, the increase in the yield has been observed to be higher in the estates (155.91 per cent as against 139.77 per cent for holdings); the price rise observed during the period being 103.9 per cent. The author has computed the break even point of rubber cultivation. And found that estates are in a more advantageous position than the small holdings; both in physical and in its value terms. The author has studied in detail the response of production or supply to the changes in prices during the post-planning period.

Uma Devi (1981) has studied the short run and long run supply responses to the price, in the case of natural rubber in India for the period covering
1955 to 1980. Here, the short run supply elasticity is relating to the harvesting decision, while the long run supply elasticity relates to the planting decision. In the case of small holdings the short run elasticity has been noted to be only 0.578 which is positive and less than one. However, the respective figure in the case of estates is -0.345 which is very small. In the case of estates, it has been pointed out that existence of trade unions and other forms of rigidities would render it uneconomical to withdraw any latent force to reduce production in response to a fall in price. The author has estimated the long run supply elasticity by taking both estates and holdings together. In the case of long run supply planting decisions, there is positive response to price only if prices as far back as seven years are considered; or else a significant negative relationship has been noted between price and new planting activity.

Geevergees, P. V et. al (2009) have pointed out that the Indian rubber plantation sector is dominated by small holdings, which in turn makes this sector vulnerable to exploitation by middlemen and price fluctuations. The People’s Participation Programme with the involvement of RPSs has achieved considerable improvement in the quality of processed rubber and thereby helped in realising better price. The paper has discussed the advantage of group marketing viz. sharing, fetching higher price through switching over mechanism, quality improvement and better bargaining capacity. The paper has highlighted the price advantage obtained by the member growers of RPSs compared to non-members, and has discussed the significance of adoption of strategies to strengthen the
institutional linkage at the grass-root level to empower and modernise the smallholding sector.

2.8. Research Gap

In view of the foregoing discussions, it may be noted that though there have been a number of research studies relating to (i) the history of natural rubber, its production and trade, (ii) various economic aspects of rubber production and trade including its price and factors influencing price, (iii) policies and schemes on rubber production and trade, and (iv) marketing aspects; studies that seek to address specifically the growth pattern of natural rubber in India with special reference to Kerala along with a critical assessment of the adequacy of the promotional measures of the Government for the production and exports of natural rubber are very scarce in the recent past. It is in the above context that the present study seeks to look into the above research area.
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