CHAPTER 1
INTRODUCTION

Natural rubber obtained from rubber tree is the nature's most versatile raw material of vegetable origin. As a raw material it has multifarious uses and there is hardly any segment of life which does not make use of rubber based materials. Rubber, a substance with incredible properties has strength and softness, stability and adjustability, adhesion and elasticity, all enduring for a long period. It possesses a diverse and versatile range of physical properties such as long fatigue life, excellent resilience, tensile strength, tear strength, cut growth resistance, abrasion resistance, resistance to creep, electrical resistance, low temperature flexibility, good resistance to compression set, and fair impermeability to gases. Above all natural rubber is easy to process. The usages of natural rubber are numerous. It goes into the manufacture of more than 50,000 products essential for modern life, right from small bushes in electronic goods to the tyres of the earth movers and jet planes. Even a small domestic car consists of about 350 products made of rubber. A fighter tank might contain rubber components weighing up to one tonne, and in a fightership it is nothing less than 300 tonnes. Rubber manufacturing industries produce a variety
of specialised goods required for automobiles, aircrafts, railways, textile industries, pharmaceutical industries, sports goods, footwear, engineering goods, building materials and even for making roads. There is an ever increasing global demand for rubber, a versatile and strategic raw material. Natural rubber has a substitute, synthetic rubber. The production of synthetic rubber is not only costly, but also dependent on non-renewable, fast depleting and undependable resources. The rubber tree, on the other hand utilizes solar energy, an abundant and free resource for the production of natural rubber, and, in the process, confers several added benefits on the environment as well as economy. Therefore, natural rubber production promotion deserves high priority for such countries having favourable climatic conditions.

1.1. WORLD RUBBER ECONOMY AN OVERVIEW

Though, natural rubber can be obtained from the latex of over 695 species of plants, *Hevea brasiliensis* is the most important commercial source. It is a quick growing tall sturdy tropical tree crop grown over the region between 10°S and 5°N latitudes. It grows on many types of soil, provided the soils are deep and well drained. A warm humid climate
(21° to 35° C) and a fairly distributed annual rainfall of not less than 200 cm are necessary for the optimum growth of this plant. It can be grown up to an altitude of 450 to 600 meters from the sea level.

The global output of natural rubber totalled around 5.36 million tonnes in 1991. Though, natural rubber production takes place in tropical zones of three continents, output is concentrated on South East Asia. The major producers of natural rubber in the world are Thailand, Indonesia, Malaysia, India, China, Philippines, Nigeria and Sri Lanka. The three leading producing countries namely, Thailand, Indonesia and Malaysia together accounted for about 73.4 per cent of the total world output in 1991 (Annexure I). For all these countries, natural rubber is a major source of export earnings and export tax revenue. India is unusual in this respect, since the bulk of its output is consumed domestically. In addition to export revenue and foreign exchange earning role, it is equally important that the rubber industries in these countries provide income and employment for several million people in addition to contributing to industrialization, in terms of processing and manufacturing of rubber products. It was reported that in Malaysia over three million people were directly dependent upon natural rubber production and processing (of a total
population of around 13 million) with a similar number in Thailand (of a population of some 40 million) during 1976.

1.1.1. Consumption

The level of consumption of elastomer (natural and synthetic rubber) world wide, at any particular period depends upon several factors, some of which are conditions prevailing in particular countries, and others, based on international circumstances. Some of the major factors which influence the overall consumption of elastomer are the general level of microeconomic and industrial activity world wide, regionally or nationally. It includes factors such as trend in vehicle production and sales and therefore the requirements for new, replacement or retreaded tyres, availability of natural and synthetic rubber and the technological developments regarding the end uses, processability etc., of natural and synthetic rubber. Global consumption of natural and synthetic rubber together was 3.06 million tonnes in 1956 and the same increased to the extent of 14.34 million tonnes in 1991. Similarly, the per capita consumption of elastomer among the major consuming countries increased from 2.87 kg in 1954 to the level of 7.33 kg in 1989. Among the major consuming countries, the per capita consumption was lowest with respect to India (0.52 kg) and highest in case of Japan (14.29 kg) during 1989 (Appendix II).
1.1.2. Natural Rubber and Synthetic Rubber Competition

The local market shares of natural rubber in various consuming countries differ due to differences in the relative prices of natural and synthetic rubber. However, there is a world price for natural rubber more or less similar in different countries (the main differences being the costs of transportation to various centres of consumption). This is not the case with respect of synthetic rubber. The price differential between natural and synthetic rubber is relatively more in United Kingdom when compared to USA because of the cost of synthetic rubber is much lower in USA. As a consequence, there is less incentive to use synthetic rubber in those countries where the costs involved in the usage of synthetic rubber are the highest. The differences in the natural rubber market shares in various countries are also determined by the composition of the product lines in those countries. In certain cases natural rubber is used because it is the only rubber capable of performing the desired functions; in others, it is preferred because it results in a product which can command a premium over the synthetic rubber based product (for example, radial versus cross-ply tyres). Thus natural rubber and synthetic rubber compete in two main areas namely, cost and end use
performance including the overall costs of handling and processing. The consumption of natural rubber as percentage to the total customer is highest in case of India (78%) followed by China (64%). On the other hand, the consumption is lowest in CIS counties (6%). The relative shares of natural and synthetic rubber among the major consuming countries are provided in Appendix-Ill.

1.1.3. Types and Grades

Natural rubber traded in the world market may be categorised into two main types, namely, conventional grades and technically specified grades. The conventional grades consist of two main sub-types: (i) Sheets which may be either smoked (usually known as ribbed smoked sheets or RSS) or air dried or unsmoked sheets (USS) and crepes. There are five main grades of ribbed smoked sheets (RSS1 to RSS5, in descending order of quality) and around 30 grades of crepe rubber (various grades of thick and thin white, pale and brown as well as compo, blanket and flat bark crepes). They are usually known as 'conventional' because the grading in this case is mainly based on subjective factors.

In the second category of natural rubber, the technically specified rubber (TSR), there are again two main types. The first category consists of established TSR grades (namely EQ, 5L, 5LV, 5CV, 5, 10, 20 and 50), while the second
category consists specialty/developmental TSR grades. The important types belonging to this category are the oil extended rubber (OENR), methyl methacrylate grafted (MG) rubbers, superior processing (SR) rubber, enzyme deproteinised rubbers (DPNR), tyre rubber and so forth. In addition to these two main categories, there are various technically specified latex types and grades. The TSR are becoming increasingly popular in view of its applicability to specialised as well as diverse end uses. However, conventional grades continues to be the bulk of the total natural rubber production, trade and consumption, despite the fact that the production and consumption of the TSRs are steadily increasing over the years.

1.1.4. Marketing Network and Trade Pattern

The structure of the international marketing network for natural rubber is a highly complex one. It comprises a series of primary and terminal markets which, broadly speaking, cater for the interests of the producers and consumers respectively. In otherwords, a primary market provides services for, and covers those activities associated with the transfer of ownership and the eventual movement of the commodity from the producer sellers to the ports of shipment; whereas a terminal market, as its counterpart, covers similar activities from the ports of discharge to the
consumer factories.

Internationally, natural rubber is traded in two main ways. The first method involves the buying and selling of natural rubber on organised markets or exchanges according to the formal set of rules and regulations laid down by these exchanges. The second method of trading comprises the non-exchange transactions in which natural rubber is bought and sold outside the formal market channels. In organised markets trading generally takes place in terms of either physical and/or paper natural rubber. The objective of trading on the physical market is to deliver or to take delivery of actual physical rubber. Whereas, in case of futures (or paper rubber), the primary objective is not to make the contract, but to provide the buyer and seller a sort of protection or insurance against the price risk, involved in trading in a product, which over time is subject to frequent fluctuations. This operation of trading on the futures market in order to cover the price risk is termed as "hedging" and represents the bulk of the trading activity on natural rubber futures markets. Hedging is conducted only by traders who are involved in the trading of physical product, since it involves entering into two opposite contracts simultaneously, one in the spot market, and the other in the futures market.
The leading physical markets for natural rubber are located in London, Singapore, Kaula Lumpur and New York and also Hamburg, Tokyo and Kobe as exchanges of secondary importance in global context of natural rubber trade. Markets having futures trading facilities are located in London, New York, Singapore, Kaula Lumpur, Tokyo and Kobe. Only the authorised members can operate in these exchanges. For example, in Singapore and Kaula Lumpur, the membership is divided into three main categories, namely, ordinary, associate and overseas. Associate and overseas members assume lesser importance when compared to ordinary members.

Ordinary membership on both exchanges comprise a number of classes such as estates' selling agents, brokers, manufacturers' buying agents and dealers.

The role played by the dealers is most important on all markets, both primary and terminal markets. Dealers may be both buyers and sellers of physical as well as 'paper' rubber. They operate in all markets, and as a group, they constitute an essential element in the market trading. Dealers keep a constant watch on the market conditions and perform the delicate role in balancing market supply and market demand through their activities.

In both physical and futures trading dealers may act either as agents or principals. Dealers are the key link
between the market and consumers of natural rubber. Especially, the large dealers are always in touch with the pace and activities of organised natural rubber markets throughout the world, as well as, in touch with all factors such as economic, socio-political, climatic and psychological, that contribute to the actual and assessed market demand situation in natural rubber.

The nature and general terms of contracts on both the Singapore and Kuala Lumpur rubber exchanges are similar. Though, there are many types of contracts, the two major contracts which are in general use are the Rubber Association Singapore (RAS) f.o.b. ordinary and f.o.b. settlement contracts. These two contracts are the basis on which the bulk of the physicals and futures trading is carried out. The RAS also conducts auctions of natural rubber. Auctions are held weekly in the office of the RAS. Rubber is sold in lots, not less than 1000 lbs and each lot is sold separately at a certain price per pound. The Malaysian Rubber Futures (MRF) auctions are held on the basis of 25 tonne lots and the prices are quoted in Ringgist (M.8).

In London, unlike Singapore and Kuala Lumpur, there is no single contract on which trading of physical rubber is based. There are a number of contracts traded according to the rules and regulations of the Rubber Trade Association,
London (RTAL). The prices are formed on the basis of objective and subjective data, opinion and desire as to the current, and the prospective supply and demand situation in natural rubber. Therefore, the international rubber market is said to be competitive and is neither a monopoly nor a monopsony. RSS1 is the basic grade of natural rubber with which prices of other grades of rubber are compared, in terms of both quality and prices. It is said the prices of most grades move more in sympathy with RSS1 than they do with each other.

1.1.5. Prices

The long term price pattern of natural rubber in the world market was characterised by a secular declining trend, superimposed by short term fluctuations. The short term fluctuations are attributed mainly to changes in world business and industrial activities, as natural rubber is an essential industrial raw material, while the declining trend could be attributed to the downward pressure exerted by the competing synthetic rubbers. Thus natural rubber production in the developing countries in the past has faced serious problems owing to fluctuations in prices. In the pursuit of price stabilization, the major natural rubber producing countries have explored a number of measures such as buffer stock, supply rationalisation, compensatory financing etc.
Of these the most important mechanism considered to be the International Natural Rubber Agreement, 1979 (INRA 79), the first of the international commodity agreements to be set up under the auspices of United Nations Conference on Trade and Development (UNCTAD) integrated programme for commodities. INRA 79 had a combination of commodity stabilization and commodity development objectives. Stabilization of rubber economy was sought on several fronts, but more importantly, in regard to prices through buffer stock operation. It completed its first term of five years by October 1985 and subsequently extended by two years till October 1987. The new Agreement, INRA 1987 was signed on 29th December 1988 and came into force in April 1989 when the necessary requirements relating to the ratification was fulfilled. The new Agreement contains a number of modifications to the mechanism for the review and revision of prices. With the implementation of INRA not only the prices have recovered to more reasonable levels but also a marked degree of stability was attained in the natural rubber trade.

In the prevailing international context, given a stable price regime resulting from the operation of the buffer stock scheme, and given the requisite fiscal incentives and infrastructural support by the government, natural rubber producing countries will never lag behind in
implementing their dynamic production policies to increase production to meet the growing world elastomer market.

1.2. RUBBER ECONOMY OF INDIA

India is the fourth largest producer of natural rubber in the world and the only country with a sizeable production which is wholly absorbed by an expanding manufacturing industry. Among the major rubber consuming countries, India is the fifth largest consumer of natural rubber. It is also a main source of foreign exchange earner. The export earnings from rubber based manufactured products amounted to Rs. 2597.50 million during 1990-91. India is claimed to be producing 35,000 different manufactured products valued more than Rs. 4500 crores annually. Rubber cultivation on a commercial scale is practiced mainly in Kerala, Tamil Nadu, Karnataka and Andamans. It is also grown in Tripura, Goa, Andhra Pradesh and Maharashtra. The total area under rubber during 1992-93 was 4,99,374 ha which consisted of tappable area of 3,40,880 ha with a total production of 3,93,490 tonnes resulting in an average productivity of 1154 kg per hectare. India's share in the world production during 1992 was 6.99 per cent. Among the rubber producing States, Kerala ranks first both in terms of tappable area and production. The distribution of area and production of natural rubber among the different states in India is provided.
in Appendix IV. Kerala constitutes about 92 per cent of the total area as well as total rubber production in India.

Initially, rubber was cultivated on an extensive scale (estates) and gradually people with small holdings also started taking up rubber cultivation. Planting of rubber crop showed a consistent increase from 1951 onwards because of the increase in the price. The extent of increase was 204.82 per cent from 1955-56 to 1990-91. A great amount of structural change has also taken place during this period in the pattern of holdings. In 1951-52, 68.1 per cent of the total area was shared by estates and only 31.9 per cent by small growers, while in 1989-90 the figures changed to 17.50 per cent and 82.50 per cent respectively for estates and small holders. The number of rubber growing units during 1990 were around 6,61,000 out of which 350 were estates of area above 20 ha and others were small holdings of upto 20 ha.

Though, rubber cultivation on a commercial scale in India commenced in the beginning of twentieth century, practically the entire rubber produced in India was exported.

A few rubber goods manufacturing units came up in the 1920's but most of them were abandoned in the infancy stage itself because of the un congenial industrial climate. The real beginning of the industry can, however, be traced from 1930
with the International Rubber Regulation Agreement which came into operation in 1934. A large proportion of Indian rubber was left over in the country as a result of the quota system, introduced under the agreement. Thus, a large proportion of rubber was made available for domestic consumption at very low prices. This attracted a few of the large overseas manufacturers to decentralise their production and to establish subsidiary factories in India. With the result there was a steady increase in the domestic consumption of rubber and by 1947, it exceeded the production. Therefore, India became a net importer of rubber. This position continued till 1970 and thereafter import started declining for the following three years till the imports were totally banned in April 1973. Once again in 1973-74 and 1974-75 small quantities were exported to relieve the glut in the domestic market, and to assume better prices to the growers. However, this position did not continue for long. Once again, the country had to resume import of rubber from 1978-79 onwards due to the improvement in demand and the setback in production. Annexure-V provides an idea on production, consumption, import and export of natural rubber in India.

While the production is concentrated in three southern states, the rubber consumption is distributed all over the
country. Maharashtra is the leading rubber consuming state in India followed by West Bengal, Uttar Pradesh, Punjab and Kerala. Major rubber goods manufacturers acquire rubber from the producing centres through their own purchasing depots or through commission agents. In most cases the commodity reaches the vast majority of consumers through trade links.

The leading trade centres for natural rubber in India are Kottayam and Cochin, located in Kerala state. One special feature of natural rubber industry is the predominance of dealers over manufacturers. There were 4,881 manufacturers when compared to 7280 dealers during 1990. For the healthy growth of the industry, the production, sale and manufacturing of the commodity is regulated under the Rubber (Production and Marketing) Act 1947. Though, the sale and manufacture is regulated by the Act, the trade is in the hands of private agencies. Large growers generally sell their produce direct to the manufacturers. Small growers depend upon private dealers and cooperative societies to market their produce. Small growers produce over 80 per cent of the crop in the country. Almost 85 per cent of this is channelled through private trade links and the rest through the cooperatives.

Inspite of the total production of little over 3.9 lakh tonnes of natural rubber, the country still imports natural
rubber. During the year 1990-91, India imported about 52,000 tonnes of natural rubber. Meanwhile, the demand for natural rubber in this country is growing at a rapid rate as a result of steady demand from the rubber based industry. There is an increase in manufacturing activities using rubber during the recent years, following relaxation of government controls, easing of import restrictions and general improvements in investment climate, all resulting in annual compound growth of rubber consumption going up to 7.6 per cent against 6 per cent during the previous decade. Further, with the advances in the areas of transportation, industrial production and agricultural activities coupled with excellent potential for increased exports, the demand for rubber products in India is bound to increase. The consumption of rubber including synthetic rubber during 1994-95 is estimated between 5.93 lakh tonnes and 6.71 lakh tonnes and by 2000 AD it would be between 8.12 lakh tonnes and 10.03 lakh tonnes. Under the present pace of development, India may have to continue the import of natural rubber for a few more years incurring considerable amount of foreign exchange. Natural rubber has a substitute in synthetic rubber which started production in 1963. Its cost of production is high because it is a petroleum based product. The price of petrochemicals are
increasing at an alarming rate and its effect is of great concern, especially with the devaluation of the Indian currency. Therefore, in the context of policy of higher agricultural production and conserving foreign exchange, a developing economy like India can not afford to overlook the vital industry. In addition, it has ample potential in providing rural employment opportunities. The operations involved in planting, tapping the latex, and vulcanizing it are all labour intensive operations. The generation of natural rubber resources in the country should, therefore, be accorded top priority. India hopes to achieve self-sufficiency in natural rubber production by 2010 A.D. by extending the tappable area to the extent of 6.75 lakh hectares. This, perhaps might remain as a big task in the present context of liberalization and globalization of the Indian economy. This has a strong bearing on the future course of events since natural rubber, until now a protected sector, might be opened for global competition. The present policy has resulted in great deviation of the domestic prices from the international prices. The liberalization of the agricultural sector will not only expose the commodity to high price fluctuations prevailing in the world market, but also to increased competition. The future strategy would be production based on comparative advantage of regions in
agricultural production, and provide investment support for such enterprises. Therefore, the rubber economy has to confront the challenges of liberalised economy which is more competitive and demands a higher economic efficiency. The only way the efficiency can be enhanced is through increasing the productivity. In this background, it is important to understand the production variability, supply response, demand and price behaviour of the natural rubber market in India, in the context of achieving desired objectives. The present study is an attempt in this direction.

1.3. NEED FOR THE STUDY

In view of the importance, natural rubber as a strategic raw material, the Rubber Board has formulated a package of developmental schemes for the expansion of rubber industry in India. For a healthy development of the industry, one must consider the problem of matching the supply of rubber with the demand, under varying conditions. This necessitates the detailed examination of the demand for, and supply of, natural rubber. The demand for natural rubber is price inelastic and since the supply is dependent on the uncertainties of nature, changes in supply would cause fluctuations in prices. These fluctuations adversely affect the production, employment and income distribution and thereby hamper economic growth. Thus, there is a need
to introduce a certain degree of stability into the natural rubber economy. The analysis of growth and instability in production and price behaviour will explain the need for the stabilization measures by the Government. Rubber being in the private sector dominated by the small holder sector, prices play a dominant role in influencing the decisions of the rubber planter which in turn determines the success of the development strategy envisaged for the industry, and realisation of the target set for the industry. The present study is, therefore, motivated to gain an understanding of the sources of growth and instability in production, dimensions of demand and supply, and the behaviour of prices for natural rubber in India.

1.4. OBJECTIVES OF THE STUDY

This study on the production and marketing of natural rubber addresses to issues of growth, instability of production and supply response, related to the production; and market related aspects such as price behaviour, relationship between domestic and international market prices, imports and its impact, determinants of domestic demand and demand-supply balance in the future for natural rubber in India. The specific objectives are:

1. to estimate the growth and instability of natural rubber production in India;
2. to analyze the supply response of natural rubber;
3. to study the nature and behaviour of rubber prices and the impact of imports;
4. to estimate the demand for natural rubber in India; and
5. to assess the role of Rubber Board on production and marketing of natural rubber.

In consideration of the above objectives, the following hypotheses are formulated and tested:
1. the growth in production of rubber in India is associated with an increase in instability;
2. the rubber growers respond positively to changes in the prices of natural rubber;
3. the growers respond more to the increase in prices rather than decrease in prices;
4. rubber price behaviour is characterized by the absence of long term cycles in view of the intervention of the Rubber Board in pricing;
5. international market price fluctuations are not reflected in domestic prices due to protected market for rubber in India; and
6. imports of rubber have a direct impact on the domestic rubber prices.
1.5. NATURE AND SOURCE OF DATA

This study was mainly undertaken on a macro framework and has made use of time series data on the different variables such as area, production, price, imports, exports and other related aspects. The source being rubber statistics and other published statistics from Rubber Board of India and International Rubber Study Group, London.

1.6. ORGANISATION OF THE STUDY

The study is organised into eight different chapters as outlined below.

Chapter 1 deals with the significance of natural rubber as a strategic raw material of vital importance, an overview of the world rubber economy followed by rubber economy of India and the scope and objectives of the study.

Chapter 2 provides a review on the theoretical and empirical contributions related to the study, namely, output growth and instability, supply response of perennials, spectral analysis and its application to commodity price behaviour and demand for rubber. A review of past research not only aids in understanding the theory, conceptual issues and formulation of hypotheses but also enable the researcher to obtain accurate information and subject them to sound reasoning and meaningful interpretation.
In Chapter 3, an attempt is made to analyse the growth rates and components of production which have contributed to the increase in average production of natural rubber over two chosen periods. The method involved decomposition of production variance and covariances through statistical identities, to isolate their sources of change between two periods on the lines given by Mehra (1981) and Hazell (1982). Chapter 4 is devoted to understand the dynamics of natural rubber supply. The supply of perennials hinges on their long gestation and production life span which are fundamental to understanding the investment and production behaviour in natural rubber industry. There is a vast amount of literature on the methods to estimate the supply for perennial crops. In the present situation the Nerlovean adjustment lag model is used. It is assumed that growers formulate expectations about the future based on current, lagged or distributed lag of past prices. The two aspects of supply namely, area and yield responses were analysed separately. In addition, the response of farmers to rising and falling prices in the allocation of resources was also examined.

The nature and behaviour of rubber prices are studied in Chapter 5. Prices perform the dual function of allocation and rationing. It serves as a guide to the entrepreneur in
the optimum allocation of scarce resources among the production activities and rubber prices may not be an exception to this rule. Because of the long gestation period between planting and tapping, the biological nature of production, and high dependence on the monsoon, the production fluctuates depending upon the planting/replanting cycles as well as vagaries of rainfall. The instability in production causes fluctuations in market supply. A fluctuating supply, with more or less constant demand results in wide fluctuations in prices of rubber. In addition to such annual fluctuations, prices are also subject to seasonal variations due to the nature of production and marketing of the crop. The analysis of price behaviour of rubber is important to identify the cyclical and seasonal patterns, so that the instruments of policy can be adequately used to reduce the intra and inter seasonal fluctuations to the minimum. The various components of rubber prices and production were estimated using wholesale prices of natural rubber of Kottayam market, and monthly production of rubber employing spectral analysis. Spectral densities for prices and monthly production were obtained and the results are discussed. In addition, relationship between domestic and international market prices were studied using cross-spectral analysis. Similarly, imports and
its impact on domestic prices has been studied by examining the causal relationship between the price series and quantity of rubber imported and the same is discussed.

Chapter 6 analyses the demand for rubber. The demand for rubber is a derived demand for final goods. About 65 per cent of the demand is from transport sector (mainly in the production of tyres and tubes) and the remaining 35 per cent from non-transport sector (from the production of consumer goods such as footwear and gloves). However, the volume of rubber consumed by each type of non-transport final goods is relatively small. Further, natural rubber has a substitute in the market, synthetic rubber, but its substitutability is limited to a narrow range under a given technology, and it is not a perfect substitute. The demand for rubber is estimated in terms of overall industrial activity, transport demand indices and technology using appropriate demand functions. An attempt is also made to assess the demand supply gap.

Chapter 7 examines the role of the Rubber Board in the development of the rubber industry. As far as rubber industry is concerned, the Government's objective is to exploit the natural rubber production potential to the maximum extent in order to meet the growing demand for rubber goods of a developing economy. Towards this
objective, they established the Rubber Board under the Rubber Act of 1947, which could solely devote itself for the furtherance of natural rubber plantation in India. In this section a brief description of the activities of the Rubber Board and its role in the development of the rubber industry is provided based on important criterion variables.

The final Chapter summarises the results of Chapter 2 to 7 highlighting the salient features of this study and policy implications.