AN ECONOMIC ANALYSIS OF BLACK TEA MARKETING IN INDIA

BY

S. MURALI GOPAL, M.Sc. (Ag.)

DEPARTMENT OF AGRICULTURAL ECONOMICS
CENTRE FOR AGRICULTURAL AND RURAL DEVELOPMENT STUDIES
TAMIL NADU AGRICULTURAL UNIVERSITY
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AN ECONOMIC ANALYSIS OF BLACK TEA MARKETING IN INDIA

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BY

S. MURALI GOPAL, M.Sc. (Ag.)

(ID.No: 04-801-003)

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CERTIFICATE

This is to certify that the thesis entitled, **“An Economic Analysis of Black Tea Marketing in India”** submitted in part fulfillment of the requirements for the degree of **Doctor of Philosophy** in **Agricultural Economics** to Tamil Nadu Agricultural University, Coimbatore is a record of bonafide research work carried out by **Mr. S. Murali Gopal** under my supervision and guidance and that no part of the thesis has been submitted for the award of any other degree, diploma, fellowships or other similar titles or prizes and that the work has not been published in part or full in any scientific or popular journal or magazine.

Place: Coimbatore (**Dr. N. RAVEENDARAN**)

Date : **Chairman, Advisory Committee**

APPROVED BY

Chairman : (**Dr. N. RAVEENDARAN**)

Members : (**Dr. T.R. SHANMUGAM**)

(**Dr. K.A. PONNUSAMY**)

(**Dr. R. PALANISAMY**)

Date: External Examiner:

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(S. Murali Gopal)

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AN ECONOMIC ANALYSIS OF BLACK TEA MARKETING IN INDIA

Mr. S. MURALI GOPAL, M.Sc. (Ag.)

Degree : **Doctor of Philosophy in Agricultural Economics**

Chairman : **Dr. N. RAVEENDARAN, Ph.D.,**

Professor of Agricultural Economics
Department of Agricultural Economics
Centre for Agricultural and Rural Development Studies
Tamil Nadu Agricultural University
Coimbatore - 641 003.

2008

Among the plantation crops tea is a very significant beverage crop in India. Tea industry is one of the most organised industries employing more than a million and a half people, of whom 50 per cent are women and generates revenue of about Rs.6000 crore in the country. Apart from the workers employed directly, the industry also supports many more in the ancillary activities of distribution, warehousing, retailing etc. The industry also plays a vital role in the economic and social upliftment of the country and provides a non-polluting atmosphere through miles and miles of lush green plantations. At the global level, this is one of the agricultural product in which India claimed world leadership till 2004. The year 2006 saw tea production in India recording a level of 956 mkg which was up by 28 mkg from the previous year. Despite this record production, India has been relegated to second position next to China in the Global production. The consolidation and modernization of the tea industry in China over the recent years had resulted in significant gains in production and made China regain its first position almost after 110 years. The country is not only the second largest producer of tea, but also one of the important exporters. In the export front in terms of share in the world market, India is lagging behind Sri Lanka, Kenya and China. The importance of tea industry cannot be undermined hence its performance will have far reaching consequences on the domestic economy as a whole. Recently the Indian tea industry is passing through troubled times, with declining tea prices, accentuated by a sharp fall in exports. Tea prices have fallen due to existence of imbalance between production and consumption and India is not exempted from this. To add further pressure, the domestic tea consumption is not increasing significantly. While the production costs are increasing, the realizations are falling, leading to negative contribution for most of the domestic players.

The studies available on Indian tea industry have largely been concentrated on specific aspects like supply, domestic consumption, prices and exports in a partial setting, which serve their limited purposes. This study seeks to concentrate on Indian black tea, in which the country ranks first as the producer, consumer and exporter. In the present study, keeping in view all the above aspects and the buzzword in this era of globalisation is competition and the bottom line is competitiveness, an attempt has been made to relate and analyse these aspects of the industry in a comprehensive manner. For this purpose, besides time series analysis, an integrated commodity model framework is used, integrating the export component with the domestic market in a competitive equilibrium setting. The specific objectives of the study are: (i) to assess the general trends of Indian tea industry, as well as the composition and direction of external trade; (ii) to evaluate the temporal and spatial dimensions of Indian tea exports; (iii) to study the overall performance of Indian tea industry; and (iv) to determine how black tea markets are integrated across the world.

Tea industry lost its importance in the national economy as an earner of foreign exchange, registered a declining trend in the share of export value of tea to total export value of all commodities for just 0.51 per cent in 2004-05 as against 18.46 per cent in 1961. Various reasons, both domestic and external were adduced to this trend. The distribution of area had been skewed between the regions, probably due to geo-environmental factors, with a significant expansion rate of 1.22 per cent. About 75 per cent of the total tea area is situated in North India while south accounted for about 21 per cent with a significant expansion rate of 1.64 per cent. In both regions the distribution of ownership was skewed, the average size of holding was decreasing over years to register 6.7 ha and 1.68 ha in north and south respectively. More than 44 per cent area had tea plants aged 50 years and above in the south while the proportion was 32 and 35 per cent for north and all India respectively. The replacement was even less than the annual expansion in area determining the industry to become progressively obsolete as far as tea plant stock was concerned. In both regions, the area seemed to have been significantly influenced only by long run forces as their lagged variables were found to have significant coefficients while the domestic and international prices did not indicate any influence. The productivity was growing in both regions, the rate at south being marginally higher and the overall growth rate worked out to 0.85 per cent. This was lower than the area expansion rate (1.22 per cent). In both regions the productivity per labour employed was decreasing. The production pattern was significantly seasonal and followed the geographical area distribution. There has been a notable shift towards CTC production. All value added forms put together accounted for only 5.16 per cent of total production.

Domestic consumption was growing at a faster rate of 3.43 per cent with the per capita consumption of 650 gms which was less than that of all major producers and most of the importers. The prices did not seem to have significant influence over the levels of consumption over the years, whereas the per capita income growth positively influenced the consumption levels. The autonomously growing domestic consumption turned the industry somewhat inward looking with the domestic prices growing at a rate of 7.6 per cent. Regression results indicated that stock-flow adjustment process was instrumental in the price formation process, besides the international prices. The domestic prices fluctuated with a notable seven year cycle which was associated with the fluctuations in exports, external prices and domestic stocks held. The fluctuating levels of stocks which had a significant relationship with domestic prices were nevertheless growing at a rate of 4.40 per cent. The growing stocks suggested that neither supply management nor total demand management was effectively implemented.

The Indian tea exports was stagnating with the quantum of exports hovering around 200 mkg over the past three or four decades and her share in the world exports was declining at a significant rate of 2.27 per cent while the total trade was growing at a rate of 2.31 per cent. The value realised on exports was however increasing over years due to the appreciating international prices. Over decades there had been significant changes in the spatial distribution of Indian tea exports. India had lost much of her market among the developed block countries to the relatively new entrants like the African producers and gained to some extent among the West Asian and East European former Soviet block countries. The developed consumers consistently diversified their sources of imports and similarly major exporters also diversified their destinations. India was hardly able to convert 21.58 per cent of her exports into value added forms. The study indicated that exports were significantly influenced by international market conditions and domestic policies, though not influenced by price factors directly.

A seven equation commodity model explained that except the price formation equation, all other equations contained both domestic and international prices as explanatory variables but were consistently associated with non significant coefficients. In the consumption equation the endogenous variable GNP alone was significant. In both south and north bearing area equations their lagged variables and the average estate size were found to have significant coefficients, all with positive impacts. Additionally in the northern case, excise duty levied had a significant negative influence. Exports was significantly influenced only by endogenous variables rest of the world supply and direct exports through private sales and forward contracts. The price formation equation was significant in the entire model in the sense that the endogenous variables stocks, consumption and production combined significantly through the 'stock flow' adjustment mechanism to determine the domestic prices. They were significantly aided by the international prices. Since the model was highly aggregative in nature, the components of the industry were behaving independently and were out of the controlling hands of market prices. The stocks and prices were mainly bearing the responsibilities of clearing the market. The market in general was plagued by excess supply. The industry as a whole was aging and needed conscious revitalisation efforts. The industry's stock vintage improvement appeared to be shortsighted. Concrete steps to regulate domestic consumption, export promotion especially in value added form and more importantly steps to regulate the supply through organised stock operations were generally overlooked.

Integration of markets is a good indicator of efficiency in the marketing system. Integration of global markets with the domestic markets for black tea were studied in Johansen's multiple cointegration frame work for the presence of short run and long run relationship between the domestic and international black tea auction markets and associated price transmission in the domestic markets for black tea. The world black tea auction markets price transmission to the domestic markets was analyzed through estimates of the VECM frame work. Results of Johansen's multiple cointegration tests revealed that the domestic black tea auction markets of Cochin, Coonoor and Coimbatore were integrated with international black tea auction markets. The estimates of error correction coefficients were significant for the black tea auction markets of South India and their signs were negative indicating the short run price movements along the long run equilibrium path was stable. About 30.4, 24 and 32 per cent disequilibrium corrected with one month lag in the Cochin auction market prices with relation to Coonoor, Coimbatore and Colombo auction market prices respectively. The coefficients of own lagged price of Cochin auction market was found significant and revealed that the impact of its own price took place with two month lag period indicating the short run price movements along the long run equilibrium path was stable. Whereas, the coefficient of own lagged price of Coimbatore auction market price was found significant and revealed that the impact of its own price took place with one month lag period and the speed of convergence was marginal at 27 per cent with short run price movements along the long run equilibrium path.

In the long run, the coefficients of own lagged price of Coonoor, Coimbatore, Colombo and Mombassa auction market prices were found significant and the impact of Cochin price took place with one month lag period, while in Limbe auction market the impact took place with two months lag period as a result of shock of both Cochin and Coimbatore auction market prices. The shock in Colombo and Mombassa auction market prices revealed that the impact in prices of Coimbatore auction market took place with one month lag period. The coefficient of own lagged price of Limbe auction market was found significant and revealed that the impact of its own price took place with one month lag period marginally.

The relatively higher cost of production coupled with low productivity due to existence of aging plantations and poorer quality of our output has affected the competitiveness of our tea industry. It is therefore felt that the Indian tea industry would need to take drastic measures to improve productivity and also take up replantation/rejuvenation on a war footing to improve competitiveness and long-term viability. On the export front, diversification of export market portfolio, targeting value addition and niche segment opportunities in specific markets, etc are warranted at once. Indian tea in the domestic and the international markets requires new initiatives from the tea industry for meeting emerging challenges.

The importance of tea industry cannot be undermined hence its performance will have far reaching consequences on the domestic economy as a whole. Keeping in view all these aspects, in a nutshell, the industry is required to take a pause to look into its own activities, study the behaviour of the industry dispassionately, organise its priorities, discontinue schemes and strategies that are inherently limited in scope, and implement specific result oriented strategies. A little introspection on the part of all concerned, might serve the interests of the industry in a better way.

INTRODUCTION…

CHAPTER I

INTRODUCTION

India, the world's largest democracy and the second most populous country, is the seventh largest in terms of land area in the world. It has a land frontier of about 15,200 km. The total length of the coastline of the mainland, Lakshadweep Islands and the Andaman & Nicobar Islands is 7,516.6 km. With a land mass of 3.29 million square kilometers (IMF Country Profile, 2007) which is 2.3 per cent of the land area of the world, the share of the arable land is 11.8 per cent with the largest share of 23.6 per cent irrigated area (Naik, 2001) and a population of more than one billion. India represents a nation rich in diversity in terms of its culture, people, language, geographic and climatic conditions and natural resources.

Agriculture is one of the most important sectors of Indian economy. About 43 per cent of India's geographical area is used for agricultural activity. It is the means of livelihood of almost two thirds of the work force in the country (Indian Economy, Agriculture in India, iloveindia.com 2007). India, with its favourable agro-climatic conditions and rich natural resource base, has become the world's largest producer across a range of commodities. India is the largest producer of coconuts, mango, banana, milk and dairy products, cashew nuts, pulses, ginger, turmeric and black pepper. It is also the second largest producer of tea, rice, wheat, sugar, cotton, fruits and vegetables (IBEF Newsletter, 2007).

[Quoting Victor Hugo], "no power on earth can stop an idea whose time has come"…"and the emergence of India is one such idea. We have come far and this idea…is now an accepted axiom. "

Prime Minister Manmohan Singh, October 2006.

The pride of our nation is reflected from the quoting because of the fact that India has emerged as one of the world's fastest-growing economies and is on the fulcrum of an ever increasing growth curve. The opening up of the Indian economy in 1991, unleashed the latent entrepreneurial talent of the Indians and in less than two decades India has established itself as the next economic superpower of the world. Today, India has the fourth largest economy in terms of purchasing power parity (PPP) behind only the USA, China, and Japan. It is slated to overtake Japan and become the third major economic power in the next ten years (Indian Economy, iloveindia.com 2007).

India's Gross Domestic Product recently crossed the trillion-dollar mark for the first time and with this India has joined the elite club of 12 countries. Countries that have breached trillion-dollar Gross Domestic Product level in the past are the US, Japan, Germany, China, UK, France, Italy, Spain, Canada, Brazil and Russia (Indian Economy, iloveindia.com 2007).

The Gross Domestic Product growth has been around eight per cent for four years running. According to the economic data released for the year 2006-2007, India's Gross Domestic Product grew at an impressive 9.2 per cent and the percentage share of agriculture in the Gross Domestic Product at factor cost declined to 18.5 per cent from 32 percent in the year 1990-91 at 1999-2000 prices. Though the share of Indian agriculture in the Gross Domestic Product has steadily declined, it is still the single largest contributor to the Gross Domestic Product and plays a vital role in the overall socio-economic development of India (Economic Survey, 2006-07).

Agriculture occupied an important position in the arena of world trade by commanding a share of eight per cent in the total world merchandise trade in 2006. Out of the internationally traded agricultural products, nearly 80 per cent are food products while the rest are agricultural raw materials. Compared to the 1980s, the proportion of trade in agricultural goods had declined from 14.5 per cent to just above eight per cent. In qualitative terms also, the complexion of the trade has undergone a transformation with processed goods occupying the prime position vis-à-vis unprocessed (cereals, oil seeds, cotton etc.,) and semi-processed goods (vegetable oils, flour, refined sugar etc,) (WTO, 2007).

Among processed foods segment, world trade in packaged foods was worth US$ 1322.4 billion in the year 2000. World market for functional foods (Bakery Products, Drinks, Beverages, Dairy Products, Functional Confectionery, Functional Bread, Eggs, Tomato-based Products etc.,) was worth US$ 31,661 million in 1999, where again USA, Europe and Japan contributed to the major share. However, in growth terms, European markets are the fastest growing. Among functional foods segment, the world trade in the refreshing beverage crop of tea is increasing (WTO, 2002).

India’s share in world merchandise exports, after remaining unchanged at 0.8 per cent between 2003 and 2004, reached 1.0 per cent in 2005. This increase was due to India’s exports growing at more than double the rate of growth of world exports since 2005. India's merchandise exports increased from US $ 53 billion in 2002-03 to US $ 103 billion in 2005-06. The sustained high growth rate of merchandise exports at more than 20 per cent during the last four years is more than twice the current growth of Gross Domestic Product. It is expected that the export target of US $ 125 billion for 2006-07 will be met at the current rate of growth of exports (Economic Survey, 2006-07). Export market share remains modest, but prospects for brisk export growth bodes well for a rising market share over time. Exports are growing apace as well, reflecting India’s increasing integration into the global economy.

Though agriculture and allied exports registered reasonably good growth of 19.8 per cent in 2005-06 with a share of 10.2 per cent of the India's merchandise exports, the share had eroded alarmingly to half of total export in 1987-88 (21.18 per cent). Even though in quantity and monetary terms the same was increasing, the share of agriculture and allied products to total primary products export had declined from 81.02 per cent in 1987-88 to 62.23 per cent in 2005-06 but the quantum of export of horticultural products had increased five folds and also its share to total export of agriculture and allied products had declined to more than half (Table I). The items with large potential, in which India had not yet made a mark, include processed food items (RBI Monthly Bulletin, 2006).

As a proportion of GDP, on Balance of Payment (BoP) basis, exports, which had grown from 5.8 per cent in 1990-91 to 12.2 per cent in 2004-05, grew further to 13.1 per cent in 2005-06. The corresponding rise in imports was from 8.8 per cent in 1990-91 to 17.1 per cent in 2004-05 and further to 19.5 per cent in 2005-06. Trade deficit as a proportion of GDP, which had actually declined from 3.0 per cent in 1990-91 to 2.1 per cent in 2002-03, widened to 4.9 per cent in 2004-05 and further to 6.4 per cent in 2005-06. Imports grew rapidly and the trade deficit widened sharply, particularly in 2004-05 and 2005-06, because of higher outgo on import of petroleum, oil and lubricants (POL) with large increases in international POL prices. Overall balance of payments recorded a surplus of US$ 36.6 billion during 2006-07, as against US$ 15.1 billion in 2005-06 (Economic Survey, 2006-07).

Agricultural exports from India consist mainly of traditional items like tea, jute, coffee, cashew, spices, etc., and recently non-basmati rice has become a major export commodity. However, India's export accounts for only about two per cent of the total agricultural exports of the world (Naik, 2001). While the major items of India’s export basket consists of these traditional items, the world trade is high in vegetables, fruits, meat and meat preparations, fish and cereals. In the traditional export items such as tea, coffee, tobacco and spices, India is losing its share. Having considerable experience in these markets sustaining its share is more important for India.

In the agricultural sector horticulture occupies an important place contributing nearly 27.18 per cent in the total agricultural GDP. Acreage under horticulture which includes fruits, vegetables, spices, floriculture and plantations is estimated to be 20 million hectare in 2006-07 which is marginally less than one per cent of total cropped area in the country (Economic Survey, 2006-07). But the striking fact is the importance of plantations in South India, since it accounts for 67 per cent of the total area under plantations. Plantation crops are high-value crops of great economic importance and provide huge employment opportunity, especially to the womenfolk throughout the year. Of around 13.4 lakh growers and 22.8 lakh labourers who are involved in raising plantations in India, nearly 87 per cent of growers and 58 per cent of labourers are from South India. To be specific, about 11.7 lakh growers - most of them small and tiny - cultivate the plantation crops in South India in 10.4 lakh hectare providing round the year permanent employment to nearly 12.6 lakh labourers. This corroborates the sector's catalytic role in the developmental process of underdeveloped regions in the country - where these crops are invariably grown.

Total value of the plantation commodities in 2005-06 is estimated at Rs. 14,100 crore, which account for nearly two per cent of the India's total agricultural GDP, while the export realization is estimated at Rs.3,750 crore accounting for nearly nine per cent of the total agricultural and allied product exports. The share of South India in the total value is estimated at 64 per cent whereas its share in the export value is 72 per cent. The relative importance of the plantation sector vis-à-vis other sub-sectors in agriculture is evident from the fact that its share in agricultural GDP is more than two times of the share in gross cropped area (UPASI, 2006).

Importance of Tea

Among the plantation crops, tea is a very significant one in India. Tea industry is one of the most organised industries employing more than a million and a half people, of whom 50 per cent are women and generates revenue of about Rs.6000 crore in the country. Apart from the workers employed directly, the industry also supports many more in the ancillary activities of distribution, warehousing, retailing etc. The industry also plays a vital role in the economic and social upliftment of the country and provides a non-polluting atmosphere through miles and miles of lush green plantations. With 31 per cent of total tea produced in the world, India continues to maintain its leadership in the International market. Since the country's independence, the production of tea has increased from 285 m. kg. (1951) to about 956 m. kg. (2006(E)), an increase of more than 300 per cent with the additional land availability of only 40 per cent (Jhawar, 2000).

This study seeks to concentrate on Indian black tea, in which the country ranks first as the producer, consumer and exporter. Among all her traditional exports, tea has been an important foreign exchange earner contributing to about Rs.2000 crore to the export basket. In India tea is grown in about 0.523 million ha. employing about two million workers, besides sustaining a large workforce through forward and backward linkages. The Indian share in global production and exports is around 27.13 per cent and 12.9 per cent in 2006, remained around 31 per cent and 28 per cent respectively during early eighties; the position was alarmingly lower as compared to the share of 38.89 and 45 per cent respectively in 1951.

Many reasons are adduced for this decline, of which the uncertainty of international and domestic prices due to excessive supply in the world market is the major one. Relatively new suppliers in the international tea market with advantages of vintage in production and technology enjoy cost advantages over the established nations. Thus the East African countries and China together increased their export share from a low of 5.8 per cent in 1951 to about 48 per cent in 2005 in global tea exports. Besides, domestic consumption in India has grown almost on par with production leaving exports to stagnate with little increments, despite maintaining her lead position in productivity among the major exporters.

It is widely criticised that there has been a large outflow of capital from the industry leaving obsolete stocks and production technology resulting in cost disadvantages. Most of the tea plants in India, for several decades, are reported to have been planted half a century back. Rejuvenating the Industry, thus calls for massive planned efforts. However, the achievements in this sphere, have not been encouraging as the Tea Board itself admits. Many of the Nineth Plan targets of the Tea Board could not be achieved (Tea Board, 2007).

The production target of 1000 m. kg. in 2001-02 fell short by 146 m. kg. and the achievement was only 85.4 per cent of the target. Actual exports worked out to only 70.5 per cent of the targets, i.e., 187.4 m. kg. against 265 m. kg. Similar trend was observed with respect to area extension and replanting targets.

These short falls notwithstanding, the Tea Board has set, perhaps, a very ambitious programme during its Nineth Plan. For example, the perspective Seventh Plan projected a production of 1277 m. kg. on the high and 1084 m. kg. on the low in 2000 AD which were 218.29 and 185.30 per cent respectively of the actual production of 585 m. kg. in 1983. Whereas, the achieved production was only 847 m. kg. in 2000 thereby falling short of 237 m. kg. (21.86 per cent) on the lower side of the projection. Similarly the export was projected to be around 360 m. kg. which was about 160 per cent of the average export of 225 m. kg. in the early eighties. But the achieved export was only 207 m. kg., thus registering a shortfall of 153 m. kg. (42.5 per cent) of the projection which was even lower than the absolute average export in the early eighties by 18 m. kg. Clearly, a better understanding of the workings of the industry would throw more light on the feasibility of such plans and if so, the areas within the industry to be manipulated.

Present Crisis

At the global level, this is one of the agricultural product in which India claimed world leadership till 2004. The year 2006 saw tea production in India recording a level of 956 m. kg. which was up by 28 m. kg. from the previous year. Despite this record production, India has been relegated to second position next to China in the Global production. The consolidation and modernization of the tea industry in China over the recent years had resulted in significant gains in production and made China regain its first position almost after 110 years (Banerjee, 2007).

The country is not only the second largest producer of tea, but also one of the important exporters. In the export front in terms of share in the world market, India is lagging behind Sri Lanka, Kenya and China. The break down of USSR, strained relationship with Pakistan and the problems in Iraq had adversely affected the Indian export in the last decade. The problem with Indian exports is the highly concentrated market portfolio or rather heavy dependence on Commonwealth of Independent States (CIS). In the light of economic recovery in Russia, there is a considerable shift noted in the consumption/buying pattern favouring orthodox tea. Sri Lanka has taken advantage of the changed consumption/buying pattern in Russia and is increasingly establishing its foothold in that market. On the other hand, the Russian market is price driven in the CTC segment, where cheaper teas from rivals like China and Vietnam are edging out Indian teas. Moreover, logistical advantages favour these countries vis-à-vis India (Medaiah, 2004).

The importance of tea industry cannot be undermined hence its performance will have far reaching consequences on the domestic economy as a whole. Recently the Indian tea industry is passing through troubled times, with declining tea prices, accentuated by a sharp fall in exports. Tea prices have fallen due to existence of imbalance between production and consumption and India is not exempted from this. The downturn in tea industry that started four years ago, reached alarming proportions in 2003. The magnitude of the crisis is stunning if the price realisation is compared with the cost of production. The average tea price in estate sector in South India during 2003 was only Rs. 45.50 a kg, whereas the average cost of production was estimated around Rs. 63 a kg (Medaiah, 2004).

To add further pressure, the domestic tea consumption is not increasing significantly. While the production costs are increasing, the realizations are falling, leading to negative contribution for most of the domestic players. Imports of tea into India have increased substantially since the removal of quantitative restriction in April 2001, besides allowing tea imports into India for export purposes. Another disconcerting fact is the low unit price of imports from certain countries into India, for instance Vietnam's unit price of tea imports into India during January-March 2004 was just Rs. 26.88 per kg. Imports for re-exports have two implications: First re-exporting sub-standard teas in the guise of Indian tea would tarnish the image of Indian teas. Secondly, import for re-export would result in additional pressure on supply position in the domestic market, as otherwise this tea could have been exported (Medaiah, 2004).

In this era of globalisation, India has to learn to manage production in a cost effective manner and come up with a concrete policy on import and export to regain its export share and realisation of higher prices in the export trade with better quality tea.

Growth in both the population and income is expected to increase the demand for food and other agricultural produce in the coming years. Domestic demand for most of the agricultural products is expected to increase at an annual rate of 2.75 per cent of which 1.75 per cent on account of population growth and one per cent on account of increase in per capita income (Naik, 2001). Therefore, to capitalize the foreseen opportunities, increase in tea production should match the growing demand in order to prevent large-scale imports. The required growth rate in output should take place in a cost effective manner so as to compete effectively with the imports as well as global exports.

On the other hand, although the domestic market is large, the per capita consumption in India is one of the lowest in the world. Therefore, Indian growers, processors, and traders could focus their attention to cultivate and expand the domestic market as a buffer against the vicissitudes of export performance (Deodhar and Vijay, 2002).

Having all the above said favourable settings like availability of abundant natural resources, strong economic fundamentals, India's emergence as an economic power, increasing exports, sufficient foreign exchange reserves, satisfactory balance of payment position, availability of huge labour force, increasing population and purchasing power of the people, changing taste and preferences of the consumers, desire of the state and central governments to extend their resources for the upliftment of the Indian Tea Industry paved a strong base. Utilising this base, Tea Board and the industry should look forward in the direction of modernization to increase production, productivity, demand in both internal and external markets, product differentiation and minimizing the cost of production to square the competitors, so as to regain the market share and the supremacy in world tea economy once enjoyed by India.

In lieu of the following facts and importance, the present study is focused on the marketing of black tea in India. 'Made tea' or tea manufactured from green tea leaves is generally classified into two types namely, black tea and green tea. Green tea is different from Black tea since fermentation of green leaves is arrested in manufacturing green tea. Again black tea is of two types namely orthodox tea and CTC tea. The manual orthodox method of tea processing had increasingly given way for technically advanced CTC (Crush, Tear, Curl) processing to nearly 94 per cent. The description of what black tea is and how it is processed are elaborately discussed in Chapter IV. Among the major tea varieties produced in the world, the output of black tea accounts for more than 70 per cent. In spot market trading, 80 per cent is contributed by black tea only. These markets are located mainly in Sri Lanka (Colombo), India (Kolkata, Guwahati, Siliguri, Cochin, Coonoor and Coimbatore), Bangladesh (Chittagong), Indonesia (Jakarta), Kenya (Mombasa) and Malawi (Limbe). It is therefore, black tea is of prime importance as far as international tea trade is concerned. Another important factor to note is that, world over, the consumers of tea including the Indians, drink the very best of CTCs and are prepared to pay a premium for quality. The CTC element of Indian consumption is over 94 per cent.

The studies available on Indian tea industry have largely been concentrated on specific aspects like supply, domestic consumption, prices and exports in a partial setting, which serve their limited purposes. In the present study, keeping in view all the above aspects and the buzzword in this era of globalisation is competition and the bottom line is competitiveness, an attempt has been made to relate and analyse these aspects of the industry in a comprehensive manner. For this purpose, besides time series analysis, an integrated commodity model framework is used, integrating the export component with the domestic market in a competitive equilibrium setting.

Hypotheses

The above background and problem focus have led to hypothesise the following

1. There is a positive growth in all aspects of Indian tea industry.
2. The Indian tea export is both temporally and spatially well established.
3. There is scope for expanding both domestic and export market performance, and
4. There exists market integration between the various tea auction markets in and outside India.

The specific objectives of the study are:

i. to assess the general trends of Indian tea industry, as well as the composition and direction of foreign trade;
ii. to evaluate the temporal and spatial dimensions of Indian tea exports;
iii. to study the overall performance of Indian tea industry; and
iv. to determine the integration of black tea markets across the world.

Scope of the study

This particular study has been undertaken in view of the magnitude of the present crisis in Indian tea industry and the results of the present study would indicate areas for policy considerations.

Limitations of the study

An economic study of this nature has few limitations partly relating to the quality of data that are collected for different purposes and mostly of the researcher in various respects. The results of this study are, of course, subject to these riders.

The presentation of this report is organised under six chapters as follows:

Chapter I	:	Introduction-deals with the background, problem focus, specific objectives, scope and limitations.
Chapter II	:	Concepts and Review - review of the past related studies and the conceptualisaton of the same for the study on hand.

Chapter III	:	Methodology - The method of data collection and the various methods of analyses employed to explore the study are discussed.
Chapter IV	:	A profile of the Indian Tea Industry and World Tea Scenario - Brief description of the various components of Tea Industry with particular reference to the study area has been attempted.
Chapter V	:	Results and Discussion - The results of the analysis undertaken are presented, discussed and interpreted.
Chapter VI	:	Summary and Conclusions- Findings of the study are summarised, conclusions are drawn and the policy implications have been indicated.

REVIEW OF LITERATURE…

CHAPTER II

REVIEW OF LITERATURE

In any research, it is important to look into the past studies conducted on the related problems in order to find out the present status of research in that area and identify the gaps if any in these studies. Further the knowledge of these studies would inturn help the investigator to give an appropriate direction to the study on hand. Keeping these things in view, the following concepts and past research work related to the present problem are briefly reviewed in this chapter under the following sections.

Concepts

1. Growth rate
2. Production and productivity

3. Market
4. Market integration
5. Horizontal integration
6. Vertical integration

Review of past studies

1. Theory and applications of commodity models or Studies related with simultaneous system of equations
2. Studies on Area (Acreage) response or Supply (Yield) response
3. Studies on Consumption (Demand) response
4. Studies on Export response
5. Studies on Price formation process
6. Studies on Market integration
7. Past Studies related to tea

Growth rate

Growth is the nature of change of the economic variables in the long run. Growth rates are used to measure the past performance of the economic variables and describe the trends in the variables over time.

Blyn (1967) used the linear, semi-log, log inverse and double log functional forms to estimate the trend in area and yield under oil seeds in different states of India. The normal statistical procedure to obtain a measure of growth of area and production of crops over a period is to postulate a hypothetical function which would adequately describe the series of area and production over time and to estimate its parameters which would offer a measure of growth over the period. Growth rate is generally expressed in two forms, viz., linear and compound. The linear form is obtained by fitting a straight line to the yearly data and estimating the parameters. The compound growth rate is obtained by fitting a straight line to the logarithms of the data and estimating the slope of the line.

Growth rate can either be arithmetic (simple) or geometric (compound). The simple growth rate is expressed in either absolute terms or in relative terms, while the geometric (compound) growth rate is normally expressed in percentage terms.

Mohan and George (1993) defined growth rate as the rate of change per unit time, usually a year. The growth rate was measured statistically by estimating different functional forms of growth over time, such as linear, semilog, Gompertz curve, logistic curve etc.

Jesy Thomas (1996) has defined growth rate as the rate of change per unit time and worked out the compound growth rates based on exponential, log quadratic and linked exponential models for studying the acceleration or otherwise for the different periods under question.

In the present study, growth rate has been defined as the rate of change of a variable over time, the time being usually a year. Both linear and exponential forms were used to study the growth rate of area, production, productivity, domestic consumption, prices-domestic and international and unit value realized on exports and quantity exported.

Production and Productivity

Smith (1934) defined production as the creation of utilities or commodities and services in order to gratify human wants.

Heady (1952) used the term productivity to denote physical productivity.

Black (1953) considered productivity as a power to contribute to a product and remarked that capacity and efficiency were the two dimensions of productivity.

Bhattacharjee (1955) defined productivity as the output per unit of farm business.

Bishop and Toussaint (1958) emphasised production as a process whereby some goods and services called inputs were transformed into other goods and services called outputs.

Saxon (1965) defined productivity as the ratio of total output to all inputs including intermediate products.

According to Heathfield (1971), a productive activity may be defined as one which increased the degree of compliance between the quantity, form and distribution of commodities and the given preference pattern.

Kargaonker (1977) defined productivity as the ratio of output to input.

Pandya (1977) considered agricultural productivity in terms of output per unit of input. In otherwords it was the output for every kilogram of improved variety of seed grown, for every litre of irrigation water used, for every kilogram of fertilizer applied, for every litre of herbicides and insecticides applied and for every unit of power employed for farm operation.

Singh (1977) reckoned productivity as yield per hectare of land.

Acharya and Nair (1978) defined productivity as the contribution of all the inputs they being combined in the same composite fashion.

Costa (1980) defined production as an activity, which changed a good into a different good.

Saini (1980) stated that productivity was the output per unit of land and it could be measured as output per unit area rather than gross cropped area because the former would automatically take care of the effect of intensity of cultivation of land associated with different size classes of farms.

Singh (1980) observed productivity as the outflow per unit of resource (input).

Endosomwan (1987) regarded productivity as a simple and universal concept which reflected the relationship between outputs and inputs expended in any work situation.

According to Ayoola (1990), productivity referred to the output per unit of input in physical terms. Therefore it is a trite economic assumption that productivity applied to each and every productive unit.

Verter and Eyler (1990) defined productivity as a measure of performance of production activity and referred to the amount of output produced per unit of input and according to them inputs stood for weighted sum of various inputs whereas output stood for weighted sum of various products.

According to Monga (1991), productivity involved comprehensive holistic phenomena encompassing all elements required to improve products or output satisfaction of customers and inputs, optimisation of resources and inputs.

According to experts of the Department of Productivity and Labour Relations of U.S. (1992), total productivity was the optimal achievement of economic and social benefits through the appropriate use of labour, capital and other resources to provide quality goods and services. The three elements which contributed to total productivity included labour productivity, capital productivity and social productivity.

Labour productivity was the ratio between output of quality goods and services and the labour input required to produce that output. It involved the level of employee's skills and knowledge and the use to which these were put in order to produce the goods and services of the organisation.

Capital productivity was the ratio between the output of quality goods and services and the capital input required to produce that output. It referred to the quality and quantity of building plant equipment, technology and the resources devoted to research and development.

Social productivity was the relationship between socially desirable outcomes and the way in which all the resources were utilised in producing quality goods and services. It referred to the social impact of the processes involved in producing goods and services and the processes involved in producing goods and services and social impact of these goods and services themselves.

In the present study, productivity has been conceptualised as the yield of green tea leaves per hectare.

Market

Adlowe (1953) defined market as the entire area within which the forces of demand and supply of a given commodity or services were interacting in effective exchanges in establishing prices. Thus whenever and wherever buyers and sellers are brought together and whatever the means of achieving communication, market would exist.

According to Pyle (1956), the concept of market includes both place and region in which buyers and sellers were in free intercourse with each other.

The American Marketing Association (1960) defined market as an expression of the aggregate forces or conditions within which buyers and sellers would make decisions resulting in the transfer of goods and services consequent to the aggregate demand of the potential buyers of a commodity or service.

As per Clark and Clark (1962), a market would be found at every point at which a specific commodity would be concentrated for sale. A market would be a centre about which or an area in which the forces leading to exchange or title to a particular product operate and towards which and from which the actual goods would tend to travel.

Bell (1966) defined market as a public place in which goods and services were brought and sold.

Bain (1967) referred market to a closely inter related group of sellers and buyers.

Cundiff and Still (1968) followed the definition of The American Marketing Association.

Elling (1969) defined market as a place where physical transfer of merchandise would take place.

Lipsey (1971) considered market as an area in which buyers and sellers negotiate the exchange of a well defined commodity.

Narver and Savitt (1971) referred the term market to the contract between demanders (buyers) and suppliers (sellers) for transferring ownership or use of a factory, goods or services.

Rosenberg (1972) observed the economic reality of a market and defined it as "the gap which would separate producer and consumer".

Mamoria and Joshi (1975) opined that the term market was derived from the latin word marcatus meaning merchandise, traffic, trade or a place where business was conducted.

Bressler and King (1980) defined market as an area of setting within which producers and consumers would be in communication with one another, where supply and demand conditions operated and title of goods were transferred.

Hill (1980) described market as some sphere or space, where the forces of demand and supply would be at work, the price would be determined or modified, the ownership of goods or services would be transferred and certain physical and institutional arrangements would be exchanged.

Arvind (1982) viewed market as a set of all actual potential buyers of a product.

According to Freeman (1983) a market need not be a place but a group of individuals or firms that would communicate regularly among themselves for the purpose of conducting exchange. They neither need to meet face to face to carry on exchange, if other means of communication existed nor need to meet the physical transfer of goods exchanged; because what was exchanged was only the right of ownership and not necessarily the possession.

Stanton (1984) and Nair et al., (1986) defined market as concentration of people with needs to be satisfied, money to spend and willingness to spend on it.

Samuelson et al., (1995) referred market as a mechanism by which buyers and sellers would interact to determine the price and quantity of a good or service.

According to Saravanan (1995), market was described as a place where exchange of commodities took place between sellers and buyers.

Kerr et al., (1997) defined market as a social institution that would facilitate the free exchange of commodities between buyers and sellers, usually for money, but sometimes for barter too. Markets in this sense do not refer to a specific location where goods and services would be exchanged, but rather the process by which the exchange would take place.

Ramakumar (1998) referred market as the entire sphere of social and institutional arrangements within which the forces of demand for and supply of a commodity and its products would operate.

In the present study, market refers to the market for black tea. The study is specific to the Kolkata auction market since it is the oldest market for tea in India and volume of transaction is very high as compared to any other black tea auction markets, both domestic and international.

Market Integration

Market integration is defined as the degree of price transmission between two, either vertically or spatially, related markets. The degree of measurement of spatial integration between spatially separated markets had evolved over time. Many of the early studies applied to agricultural markets in developing countries appealed to the simple idea that prices in spatially separated markets should be highly correlated.

Cummings (1967) opined that integration implied the association of prices between markets. Association of prices over time show seasonal integration of prices and association of prices between markets show spatial integration of prices.

Granger and New Bold (1969) typically conducted causality tests within the vector auto-regression (VAR) models framework. The approach was used to test for spatial price integration in terms of lead and lag relationships among dynamically interrelated prices.

According to Lele (1971), market integration was the interrelationship between price movements in the two markets. The degree of correlation can be taken as an indicator of the extent to which the markets were integrated.

Rao and Subbarao (1976) considered that the markets were integrated over space when the territorial price difference did not exceed the transport costs plus the remuneration for the services of the trader.

Harris (1979) found that the use of correlation coefficients to test for market integration had many flaws because common components like population growth, climatic patterns, and inflation might induce systemic effects across markets. Other synchronous common factors such as monopoly procurement of agricultural products at identical prices from different markets might also induce systemic effects in price series.

Monke and Petzel (1984) used regression-based procedures to test spatial price integration.

Delgado (1986) defined market integration as the existence of stable price spreads among markets in a given season, despite considerable variation in prices.

Dynamic regression models, notably pioneered by Ravallion (1986), were alternatives to dynamic versions of standard regression models and Granger Causality tests. If the difference in prices between the two regions was only because of transport cost then the markets were said to be spatially integrated.

Arshad (1990) studied the applicability of the Ravallion method and causality tests in measuring market integration and ascertaining the nature of price relationships in the Malaysian crude palm oil market and found a highly integrated market in the short-run. Local factors were proved statistically insignificant. Pierce causality tests indicated an instantaneous or feedback relationship. This suggested that each region absorbed new information as and when it became available. The reason for this attribute was the setting up of palm oil futures market in Kuala Lumpur, which had increased the accessibility of market information.

Gemtessa (1991) analysed the integration of Ethiopian coffee prices with world prices using the correlation coefficient. The bivariate correlation coefficient between the two market prices of coffee revealed that they moved together in the same direction. The lagged cross-correlations of domestic prices and world prices of coffee for the period 1979-80 to 1987-88 indicated that the world prices of coffee had a stronger influence on the domestic prices than that of domestic price influence on world prices.

Time-series analysis techniques were widely used to test for the dynamic nature of interregional commodity trade and arbitrage activities. These tests typically used one or more techniques such as Granger Causality tests (GC), dynamic regression tests, Impulse Response Analysis of structural or non-structural vector autoregression (VAR) models and cointegration analysis.

According to Taddesse (1992), market integration was the inter-relation between the prices of the concerned commodities over time and it mostly relied on the nature and extent of competition in the market.

Mundlak and Larson (1992) and Gardner and Brooks (1994) found that the use of regression-based tests had several shortcomings. The models were intrinsically static in nature because adjustment lags were not explicitly recognized and contemporaneous arbitrage conditions were assumed to hold. Also, non-stationarity of price data might invalidate standard econometric tests thus giving misleading results regarding the degree to which price signals were being transmitted from one to another market. The limitations related to the neglect of transaction costs and price variation within the transaction cost band also applied to regression tests.

Acharya and Agarwal (1994) defined three basic kinds of market integration viz., horizontal integration, vertical integration and conglomeration.

Horizontal Integration: This occurred when a firm or agency gained control of other firms or agencies performing similar marketing functions at the same level in the marketing sequence.

Vertical Integration: This occurred when a firm performs more than one activity in the sequence of the marketing process. It is a linking together of two or more functions in the marketing process within a single firm or under a single ownership.

Conglomeration: A combination of agencies or activities not directly related to each other when it operates under a unified management might be termed as a conglomeration.

Alexander and Wyeth (1994) utilized the empirical applications of GC tests for their study. Granger causality tests might provide some inferences about the existence of statistically significant lead/lag linkages among prices. However, GC tests indicated only whether the relationship between contemporaneous and lagged prices was statistically different from zero. Inferences from GC tests did not reveal the nature of the relationship. Thus, it was necessary to supplement Granger causality test results with other inferential procedures. Other limitations associated with correlation coefficients and standard regression approaches to testing for market integration could also be applied to GC tests.

Silvapulle and Jayasuriya (1994) demonstrated the use of multiple co-integration technique as a test for spatial market integration. They argued that this technique would overcome many of the limitations of previous methods. An application of the technique to Philippines rice markets indicated that, the markets were generally well integrated in the long-run with Manila as the dominant market.

Amanulla and Kamaiah (1995) examined the Indian stock market efficiency using two approaches, namely, the Ravallion and co-integration and error correction approaches. The results showed that there was no evidence in favour of market efficiency of Mumbai, Chennai and Kolkata stock exchanges, while contrary evidence was found in case of Delhi and Hyderabad.

Baharumshah (1995) studied the market integration on the prices of wet cocoa beans in different major regional markets with a non-parametric observation known as Phillips-perron test. The results suggested that region-wise markets were segmented or less than fully integrated. This lack of market integration in intra-regional trade was not specific to particular commodity but rather a market specific problem. Integration could be enhanced, focussing on transport and communication linkages.

Mendoza and Rosegrant (1995) examined the dynamics and efficiency of Philippines maize markets through the application of autoregressive conditional heteroscedasticity model (ARCH), to time series data. The findings of the study revealed that there existed imperfect market integration for Philippine maize markets and indicated that there may be substantial benefits (1) in developing better infrastructural facilities to effectively link production and market centres and (2) in improving market knowledge by providing more relevant, accurate and timely public market information.

Mohanty et al., (1996) used the fractional co-integration analysis for nine pairs of international commodity price series. The results showed that these series were fractionally co-integrated even when the hypothesis of co-integration has been rejected. Of the nine cases, fractional cointegration supported the existence of the law of one price in eight cases, compared with three cases in the standard co-integration process.

Taylor (1996) used the co-integration analysis to address the pricing and informational efficiency of United States and Thai rice markets for the period 1987-91.

The findings of the study indicated that the long-run equilibrium in the international rice markets was influenced by the Thai, Texas and future markets.

According to Baharumshah et al., (1997), there existed a stable equilibrium relationship between the price series whose linear combination are stationary even though they may be individually non-stationary. But the non-cointegrated time series did not move together in the long-run and were inconsistent with the law of one price.

According to Knetter and Pinelopi (1997), a perfectly competitive market should be fully integrated. Lack of integration is referred to as segmentation. A market is said to be geographically segmented, if the location of the buyer and seller influences the terms of transaction in a substantial way.

Sairam et al., (1999) defined market integration as the inter relationship between price movements in different markets.

The present study considers market integration as the inter relationship between the domestic and international black tea auction market prices.

Horizontal Integration

Narasimham et al., (1988), Nasurudeen and Subrmanian (1995) and Rafiulla (1995) defined horizontal integration as integration between different oil prices, in their analysis on prices of oilseeds and oils.

Ostrow and Smith (1988) explained horizontal integration as the ownership achieved by acquisition or internal expansion of additional business units at the same channel of distribution level.

Pearce (1992) considered horizontal integration to take place when the firms at the same stage of the production process would merge to form a single business organisation.

Acharya and Agarwal (1994) opined that horizontal integration would occur when a firm or agency gains control over other firms or agencies performing similar marketing functions at the same level in marketing sequence. In this type of integration, some marketing agencies would combine to form a union to reduce their effective number and the extent of actual competition in the market. However, in most markets, there would be a large number of agencies which do not effectively compete with each other.

Nasurudeen and Subramanian (1995) and Rafiulla (1995) considered horizontal integration as the inter relationship between price movements of different commodities in one and the same market over a period.

Kotler (2000) found horizontal integration as a company's move to acquire one or more competitors to increase the business's sales and profits, provided that the government does not bar this move.

The Money World Dictionary (2002) quoted horizontal integration as the merger of two or more companies which are in the same line of business. If the merged business went on to take over Safeway, which would be more 'horizontal' integration.

The Google Lexicon (2002) found that horizontal integration would occur when a company expands its business into different products that are similar to current lines.

In the present study, horizontal integration is defined as the relation between prices of different Indian tea auction markets among themselves and with international tea auction markets.

Vertical Integration

Narasimham et al., (1988) defined vertical integration as the relationship between the prices of different forms of one and the same commodity. To be more specific, they argued that vertical integration would occur in oil market when the prices of the raw material viz., oilseed and that of final products namely oil and cake were inter-related in one and the same market.

On the contrary, Ostrow and Smith (1988) explained vertical integration as the ownership achieved by merger or internal expansion of the marketing channel intermediaries connecting the manufacturer / producer with the consumer.

Pearce (1992) followed the same and defined vertical integration as a situation wherein the activities of a firm would extend over more than one successive stage in the production process of transforming raw materials into final goods.

Anita (1993) defined vertical integration as the inter-relationship between price movements of a commodity at lower level markets and the terminal market.

Acharya and Agarwal (1994) followed Narasimham et al., and explained that vertical integration would occur when a firm performs more than one activity in the sequence of the marketing process. It would be a linkage between two or more functions in the marketing process within a single firm or under a single ownership.

Nasurudeen and Subramanian (1995) and Rafiulla (1995) followed Narasimham et al., in their definition on vertical integration.

Kotler (2000) referred vertical integration as the strategy of the companies to integrate backward or forward to earn profits in their business. Vertical integration would often lower costs and the company would gain a large share of the value added stream.

Courtland and John (2002) defined vertical integration as the process of developing a marketing system that would include both the source of production and the distribution capabilities.

The Money World Dictionary (2002) quoted vertical integration as the extension of a firm's activities into earlier (backward integration) or later (forward integration) stages of production of its goods or services. It also opined vertical integration as the process by which a firm would acquire a business or carry out a business which would make it its own supplier, or its own distributor.

A study by Baffes and Gardner (2003) described that with respect to transmission of world price changes to domestic markets during the global trade reform process, there were so many evidences around the world for price transmission into domestic commodity markets. Ghana’s rice, Madagascar’s wheat and rice, Egypt’s maize, Columbia’s maize and Argentina’s wheat were few examples for the penetration of world prices.

Nielsen (2005) used a Vector Auto Regressive (VAR) model in Error Correction form (ECM) to analyse landing prices among the main fishing nations, using co-integration tests and tests for the Law of One Price (LOP) to determine the degree of market integration. A partially integrated European first-hand market for whitefish was identified and as a part of this, a perfectly spatially integrated cod market. The existence of this relatively loose market integration was explained by the presence of rigidities on the supply side. The implications were discussed in relation to reductions in EU whitefish Total Allowable catches and quotas and the market policies applied.

In the present study, vertical integration is defined as the extent of association of wholesale prices of black tea in major markets with Kolkata auction prices and also the association of retail prices of tea in these markets with Kolkata auction prices.

Past Studies on Measurement of Horizontal Integration

Aulakh and Singh (1979) examined the price spread in wheat for selected markets of Punjab. Their analysis was based on market structure approach. They have studied the spatial market integration in two ways: Firstly, the absolute price differential between two markets had been compared to the cost of shipment from one market to another. The price spread effect between the two markets, under assumptions of competition, was expected to be equal to zero, when the price spread between the two markets was no greater than the cost of shipment. The second approach, also based on competitive market structure model, insisted in determining the correlation coefficient of prices in the two markets as a measure of spatial integration. Their study showed that the price spread effect was close to zero and also that the correlation coefficients between market prices were high, which led them to conclude that the wheat markets in the Punjab were reasonably well integrated.

Kumar and Singh (1979) evaluated the extent of market integration and efficiency in paddy marketing in Varanasi District and tested the hypothesis. The investigation led them to support their hypothesis that wholesale and terminal markets for agricultural commodities were closely inter-related.

Nadda and Swarup (1979) examined the extent of market integration in apple markets in India. The value of correlation coefficient was considered as a measure to judge spatial integration and two markets were considered as perfectly integrated when the correlation coefficient of prices ruling in the two markets is one. The study revealed that the primary and terminal markets for apple varieties like royal delicious were reasonably well integrated.

Delgado (1986) used the variance components approach to test the food grain market integration in Northern Nigeria and arrived at three conclusions. First, the differences in price behaviour between the adjacent projects of Funtua and Gusau were sufficiently great so as to preclude pooling them jointly for consideration as a unified market system. Second, within each project, there were apparent seasonal differences in food grain market integration between the harvest and post harvest periods. Third, markets were clearly not well integrated in Funtua or Gusau in the harvest period. The reverse conclusion is not necessarily valid for the post harvest period, but atleast the evidence is consistent with the hypothesis of market integration thus defined. A fourth result is the finding that the variance of detrended and deseasonalised food grain prices was different in the harvest and post harvest seasons. One immediate consequence is to suggest caution when using bivariate correlation coefficients as a statistical technique to investigate market integration. Even when used with detrended and deseasonalised data, their statistical interpretation is based on the assumption of constant variances for each series. Thus, even a low value cannot be used as an argument to show the absences of integration, since under these circumstances there is no criterion of what is low.

Narasimham et al., (1988) studied the relationship in prices between various oils and relationship between the prices of oil and oil cake with its own seed in Bombay market. Daily prices for one year of edible oils, oilseeds and its cakes and non-edible oils, oilseeds and cakes were considered for the study. The hypothesis of complete oil price integration was not fully accepted. Price integration in many cases was found to be unidirectional indicating that substitution would be possible only in one direction and not both ways. The study indicated that although the market share of groundnut oil was the largest, its price varied with changes in the prices of other oils, while its own price influenced other oils to a limited extent. Only cottonseed oil and linseed oil prices appeared to be dependent on groundnut oil prices. The study also depicted that price interactions between different products could be unidirectional, bi-directional or non existent.

Arshad (1990) studied the applicability of the Ravallion method and causality tests in measuring market integration and ascertained the nature of price relationships in the Malaysian Crude Palm Oil Market and suggested a highly integrated market in the short run. Local factors were proven to be statistically insignificant. Both Sims and Haugh-Pierce causality tests indicated an instantaneous or feed back relationship. This clearly showed that each region absorbed new information as and when it became available. The reason for this was attributed to the setting up of Palm Oil Futures Market in Kuala Lumpur, which had increased the accessibility to market information.

Shah and Habibullah (1994) tried to determine whether the prices of black and white pepper in a market were in parity with prices in a reference market. Co-integration tests were applied to spatial price relationship among markets. The results proved that regional pepper markets in Malaysia were highly integrated. They found that the distance between the markets was not an impediment to efficient adjustment of price to new information.

Nasurudeen and Subramanian (1995) and Rafiulla (1995) attempted to estimate the extent of horizontal integration of oil prices using the Koyck's distributed lag model. The analysis revealed that the assumption of complete oil price integration could not be fully accepted.

Ramakumar (1998) attempted to examine the spatial integration of coconut markets in Kerala using the co-integration analysis. The results showed that the three major regions in Kerala were integrated spatially for coconut, copra and coconut oil implying that any change in price in one market would immediately influence the other markets. The author used cointegration tests to test the market integration.

Borah and Dutta (2000) tried to explain the variation in prices over years and market integration of jute in five major markets of Assam. The results showed that the seasonal price variations were occurring with some regularity within the year. The trend in agricultural prices was associated with the general price level. There existed a high level integration between the markets under study.

Past Studies on Measurement of Vertical Integration

Narasimham et al., (1988) studied the relationship of prices of oilseeds with its own oil and oil cakes in Bombay market. Daily prices for one year of oilseeds, oils and oil cakes were considered for the study using Koyck's distributed lag model. The results indicated that groundnut kernel prices, castor seed prices, linseed prices, gingelly seed prices and kardi seed prices were influenced by their own oil prices. But only groundnut kernel, linseed and kardi seed prices were influenced by their own oil cakes.

Gupta and Arora (1991) attempted to examine the various quantitative relationships between prices of oils and oilseeds by estimating the degree of vertical integration of oilseed prices to prices of oils and oilseeds. The Koyck's distributed lag model was used to analyse the data obtained from Kanpur market in U.P. The results gave a clear, identification of oils and oil seeds where in unidirectional, bidirectional or no interaction existed in price formation.

Ravi et al., (1991) studied the price behaviour of groundnut in wholesale markets of Karnataka. The study made use of time series data on prices and arrivals of wholesale groundnut markets in Karnataka and oil and oilcake prices in Bombay terminal market. Regression method was attempted. The analysis indicated that market price of groundnut was influenced to a large extent by groundnut oil and oilcake prices rather than the local market arrivals. This explained that stabilisation of groundnut prices would not be possible by regulating the market arrivals without stabilising the edible oil prices.

Anita (1993) examined how oil prices at lower level markets would adjust with a change in oil price in the terminal market, the extent of short run and long run effects and the lags in adjustment to realize the long run effects. Koyck's distributed lag model was used, so that the adjustment lag in days would be known between local market and the terminal market. Correlation coefficients were computed between the prices at the local market and the prices in the terminal market with various lags. The study was confined to four selected markets in Gujarat. Daily price data were used. The results justified the hypothesis that the groundnut oil prices in a given market would be influenced by groundnut oil prices in the immediately high level market. Thus the groundnut oil prices were proved to be integrated vertically.

Nasurudeen and Subramanian (1995) attempted to estimate the extent of market integration of oil and oilseed prices in Bombay market using the Koyck's distributed lag model. The results of vertical integration confirmed the hypothesis that changes in oilseed price was linked to changes in its oil and cake price. The Bombay oilseed market showed the characteristics of perfect market condition by its quick adjustment to price changes.

Rafiulla (1995) examined the integration of groundnut and gingelly oilseed prices to their oil and oilcake prices in Tamil Nadu. The results of study indicated the existence of integration between the prices of groundnut and gingelly seeds with prices of concerned oil and previous day's prices of respective seed. In other words, there existed a vertical integration between oilseed and concerned oil prices in Madras market of Tamil Nadu. Koyck's distributed lag model was used for analysis of market integration.

Past Studies in Theory and Applications of Commodity Models

Adams (1973) of the opinion that the classical analysis had been relying upon partial equilibrium analysis to understand the economic behaviour of any commodity. Yet, even if not in the true Walrasian sense, any model, purporting to suggest pragmatic policy measures in the regulation of a commodity, needed to be cast in an elevated environment, covering atleast its supply, demand, prices and inventories in their entirety.

Labys (1973) in his study indicted that the commodity models had emerged as a distinct category of analytical tools to meet this requirement to some extent. They were sufficiently general in their simultaneous explanation of the various aspects of the commodity market in consideration and yet partial when compared with the economic system of which they form a part. Besides being analytically manageable, they had the solid backing of the neo-classical microeconomic theory.

Because commodity models are so diverse, Labys (1973) began with a fairly broad definition. A commodity model is a formal representation of a commodity market, industry or firm, where the behavioral relationships included would reflect the underlying economic, political and social institutions.

Labys (1973) viewed that, in practice, it is widely considered that commodity models tend to be overidentified, since the majority contain many predetermined variables relative to the typically small number of endogenous variables.

Tryfos (1974) developed a model by which the interdependence between livestock supply and inventories are clarified. Data for 1951 to 1971 was used to obtain Three Stage Least Squares (3SLS) estimates of supply and stock formation functions for cattle, calves, sheep lambs and pigs. Sensitivity of meat production to price and feed cost changes was examined.

According to Labys (1975), commodity model is built to explain market behavior or market history, to analyze commodity policies, to make commodity decisions, or to forecast and predict important commodity variables. Although this depends on the inherent structure of a model, knowledge of the following is usually required:

1. The actors involved in the market and their decision-making framework, e.g., the competitive versus noncompetitive nature of a market.
2. The surrounding economic political, social, and legal institutions.
3. Technical, social, and other forms of constraints which influence production

processes, consumption patterns, etc.

4. Relevant principles of economic theory which can be applied to explain production, consumption, inventory holding, etc.
5. Methodologies which can be appropriately employed, including their relative advantages and disadvantages.
6. The availability and accuracy of market data.

With the above information the following procedure is normally employed:

1. Identification of the policy problems to be solved.
2. Adoption of a modeling approach to their solution based upon available methodologies or the design of new ones.
3. Specifications of the model incorporating the above institutions and constraints; selection of the most appropriate model based on statistical and judgmental observations.
4. Validation and refinement of the model so that it best reflects reality and best meets the requirements of the user.
5. Application of the model to the policy problems selected.

Following are the forms of commodity analysis which have been of most interest in studies recently carried out or planned for the near future.

1. Market stabilization analysis involves finding of those control mechanisms or forms of market organization which lead to more stable prices or equilibrium positions.

2. Market planning analysis relates to the forecasting of long run outcomes, depending on the policy problems or market strategies of interest.

3. Agricultural process analysis explains that farm level decisions, technology, aggregate demand and prices have the influence on agricultural output.

4. Industrial process analysis describes the relationship that exists between national activities, technical transformation processes within industries, and commodity input demands.

5. Analysis of trade patterns requires the application of international trade theory at the commodity level so that impacts of tariffs, quotas, or pricing policies on commodity flows can be determined.

6. Economic growth analysis can solve problems of planning for growth where

commodities represent the "engine" or primary sector of country growth. Analyses such as the impact of investment or exchange rate changes on commodity development also fall into this category.

7. Analysis of interdependent systems implies consideration of commodity markets in relation to other important, related spheres of activity such as biological or social systems, or consideration of the future international distribution of commodity resources.

Adams and Behrman (1976), in their study argued that the flexibility of these models allow the handling of a variety of institutional arrangements, through various behavioural specifications and structural restrictions at various levels of disaggregation. It was also possible to incorporate the dynamic and stochastic components of the commodity market system into this analytical framework.

According to Koutsoyiannis (1979), generally the number of variables that (economic) theories have to embody in describing an economic phenomenon is extremely large. It is, however, hoped that from the accumulation of inductive evidence, and with the refinement of the tools and methods of testing hypotheses, the relevant structural components of the models could be identified, specified and integrated into a framework, flexible enough to permit partitioning for developing the specialised models to suit the purpose of the particular research.

Wonnacott and Wonnacott (1979) viewed that the Two-stage least squares is perhaps the most popular of the simultaneous equations estimators since it offers a consistent estimator which is asymptotically efficient as compared to instrumental variables or indirect least squares, but which is relatively transparent and easily implemented. The two-stage least squares estimator is a single-equation or limited information estimator. Greater efficiency might be achieved by using more information, such as zero restrictions in other equations or covariances of disturbances across equations, concerning the model as a whole rather than simply the list of its predetermined variables. Systems or full information estimators achieve asymptotic efficiency by taking such information into account and estimating all equations in a model simultaneously.

According to Colman (1983), the econometric market form of commodity model was considered first because it generally provided a basis from which the process, trade, and other methodologies follow. Its particular characteristic was that it contains a set of relationships pertaining to the demand for a commodity, its supply and, in some cases, the inventories held. Each of these relationships is influenced by the level of commodity prices. When prices decline, demand normally would increase or, alternatively, the supply to the market would decrease. The effect of either of these adjustments, however, would be to force prices upward thereby causing the market to return to a condition of equilibrium.

In his study Hwa (1985) stated that the first level of sophistication was normally brought into this model by accepting that inventories exist and that they explicitly influence price determination. Alternatively, it was possible to specify that inventories were explicitly influenced by prices and that at equilibrium, demand for stocks equal the supply of stocks.

Hallam (1986) viewed it basically as an equilibrium model, designed to explain the interrelationships among the various facets of the commodity in question, in the paradigm of a closed competitive economy. Contrary to the general practice of economic theory, consumption and production occupied the places of demand and supply respectively, which was incorrect in strict theoretical sense. However, the data availability and their reliability, the smaller amounts of stocks held by producers and consumers vis-à-vis the comparatively larger market behaviour and the fact that it was (agricultural) production and consumption which were made the focus of study rather than supply and demand in the broader sense, justify such a substitution.

Further he added that, given the basic model, it was possible to relax the assumption of closed economy, if exports and imports were treated as components of production and consumption, respectively with corresponding adjustments in stocks, provided it could be established that the causal factors tally and allow for such a clubbing.

Houck and Mann (1987) viewed that many commodity models, particularly those designed to explain international markets, require that a distinction be made between production and exports. Specifying export equations would obviously require that the explanatory variables be demand oriented, including factors such as export price measured relative to the prices of competing countries, policy instruments, pressure of demand in importing countries and/or certain dummy variables describing devaluations.

Fair and Jaffee (1989) viewed in the conventional sense that apart from the explicit specification of an export equation, another possibility was to accommodate the market structure. The market clearing identity of the model essentially implied a competitive equilibrium framework, through the imposition of the restriction, that there be instantaneous market clearing. In traditional models of the sort specified earlier, price signals were the sole sources of communicating necessary information to bring about appropriate responses. This sounds rather unrealistic and attempts had been made to substitute quantity signals as well in the process of information communication, which resulted in disequilibrium models. To bring about this change, the market clearing identity was dropped and the price specifications were postulated to have adjustments based on some expectations. And in such cases the conventional methods of estimation might have to be replaced by other sophisticated methods.

Hallam (1990) further explored the modifications of the above model that it would involve introducing difference and differential equations in the model specification to dynamise the system along with expectations of certain variables. Thus when entering into the realms of uncertainty, yet another advance step was to consider second and higher moments of the probability based random variables to account for the inherent risks of opting certain states of such variables. These were but a few possible extensions of the basic framework of commodity models.

He also indicated that where the number of predetermined variables excluded exceeds the number of endogenous variables included less one an equation is overidentified, and indirect least squares estimates of the structural coefficients will not be unique.

Martin and Peter (1994) investigated the importance of relative commodity prices, factor endowments and technical progress for changing sectoral GDP shares of agriculture, manufacture and services. The economy was divided into three sectors, and two independent share equations were estimated. The two chosen were agriculture and service sectors. The first pair of equation was estimated by Ordinary Least Squares (OLS) while the second group was estimated using Two Stage Least Squares (2SLS).

According to Boubaker (1997), commodity modelling is a methodological and complete technique that provides a powerful analytical tool for examining the complexities of commodity markets. Generally, commodity models can be used for three levels of analysis, viz., market analysis, policy analysis, and as a forecasting tool.

In order to complete the process of model development (Ferris, 1998; Pindyck and Rubinfeld, 1998), the model was simulated over the historic period and the Gauss-Seidel algorithm was used to solve the model's simultaneous system of equations. Now the estimated system of equations was validated based on four criteria. These are: the Root Mean Square errors (RMSE %); the Mean Error percentages; Theil's Inequality Statistics; and finally the response of the system to exogenous shocks, which was referred to as impact multipliers.

A single equation approach is used in the first stage of the estimation procedures. Ordinary Least Squares (OLS) produces the best linear unbiased estimators for a single equation (Pindyck and Rubinfeld, 1998). Once the behavioural equations have been estimated, they will form part of a system of simultaneous equations that will express the interdependence of variables, which influence the supply and utilisation of the commodity in question. The equations in the model are estimated using the Two Stage Least Squares (2SLS) estimation technique for the period of study.

Vlachvei and Oustapassidis (1998) analysed the structure, conduct and performance of the food and beverages manufacturing industries in Greece. Three Stage Least Squares (3SLS) method was used to estimate the parameters of profitability, concentration and advertising model for a sample of 38 industries in 1994. The results showed that profitability was determined by advertising which in turn was affected by both profitability and concentration while the latter was determined by economies of scale.

The convenient and efficient methodology developed by the Food and Agricultural Policy Research Institute (FAPRI, 2002) for conducting policy analysis research, was particularly pertinent to the approach used for modelling the market and policy alternatives for the LDCs wheat sector. Ordinary Least Squares (OLS) was used to estimate single equations, which were collapsed into one system and estimated simultaneously using the Two Stage Least Squares (2SLS) estimation method. After the validation of the model's performance it was used to make baseline projections for the LDCs wheat sector.

This study by FAO (2003), aimed to provide a forward picture for world tobacco leaf consumption, production and trade in the year 2010. The projections took an account of the various factors that influence tobacco consumption, production and trade. The study analysed, first, trends and determinants in tobacco consumption, production and trade during the period 1970 to 2000, and it provided consistent projections to 2010 by using a double log form of a standard commodity model approach. The behavioural equations were estimated by OLS method.

In the present study considering all the above and the reality of overidentification of the structural and the reduced form equations, Two Stage Least Squares (2SLS) method was adopted for estimating the coefficients of the variables.

A brief review of the developments in the specification (behavioural relationship equations) of each component of the basic model is presented in the following sections.

Area (Acreage) response or Supply (Yield) response, Consumption (Demand) response and Export response

In a study by Narayana and Shah (1984), employing ARIMA estimations of expected prices and yields, Nerlovian response functions were estimated for large and small farms in Kenya. Results showed that (expected) yield levels, rather than expected prices affect the supply response of small farms, whereas large farms react more strongly to prices.

As per Lahiri and Roy (1985), Agriculture in many developing countries was predominantly rain-dependent and unless rainfall was introduced into the supply-response functions carefully the equations could be mis-specified leading to bias in the computation of elasticities. Rainfall was modelled carefully in this study in a non-linear fashion which took into account the detrimental impact on output of both droughts and floods. The new specification had the added advantage that 'optimum' rainfall requirement could be estimated from the structure. It was also possible to construct a rainfall index to capture the 'pure' effect of rainfall after accounting for changes in other variables such as prices and irrigation.

Rao (1989) in his study surveyed the literature on agricultural supply response to prices in developing countries. Empirical estimates of elasticities depended both on the methodology adopted and on country- specific factors relating to technology, economic structure and macro constraints. This study established some general conclusions on supply responsiveness within these limitations. Supply response to output prices at the aggregate and at the crop levels was considered first. Crop-specific acreage elasticities ranged between zero and 0.8 in the short run while long-run elasticities tend to be higher- between 0.3 and 1.2. Yield elasticities were smaller and less stable than acreage elasticities. Clearly, inter-crop pricing could be relied upon to effect shifts in the commodity composition of agricultural output. Evidence also suggested that supply elasticities vary systematically with such factors as price and yield risks, multiple-cropping, the importance of the crop, farm incomes, farm size, tenancy and literacy.

Muscatelli et al., (1990) investigated the debate regarding the robustness of estimates of export demand and supply elasticities for Less Developed Countries (LDCs) and Newly Industrialised Emerging (NIEs) obtained by recent empirical studies. The empirical findings reported in the paper suggest that price elasticities of demand were indeed low, and that there were strong and significant income effects on export demand. Furthermore, using a variety of modelling approaches, they demonstrated that the choice of estimation method and normalization need not lead to drastically different conclusions regarding the size of the price elasticity of demand for NIE exports. While this point against the "small-country assumption" usually made regarding LDC/NIE exports, they argued that the preferred development strategy for LDCs need not necessarily be an inward-oriented.

According to Diebold and Lamb (1997), estimates of the response of agricultural supply to movements in expected price displayed curiously large variation across crops, regions, and time periods. This anomaly may be traced, at least in part, to the statistical properties of the commonly-used econometric estimator, which has infinite moments of all orders and may have a bimodal distribution. They proposed an alternative minimum-expected-loss estimator, establish had its improved sample properties, and argued for its usefulness in the empirical analysis of agricultural supply response.

Since the Information on supply price elasticities are acknowledged as being very important for decision makers at the macro and micro levels, Omezzine and Al-Jabri (1998) took an empirical investigation of vegetable growers' responses to prices in Oman. They developed a single supply response function incorporating adaptive expectation model for prices. Results indicated that growers adjust relatively fast to changes in expected prices. However, these adjustments were rather low for some crops in the short- and long-run. Growers' production decisions had also shown a significant response to prices of other products competing for farm space and other production resources. These results supported efforts aimed at market development and crop enhancement programs.

Söderling (2000), in his study, examined a sample of 38 manufacturing firms from Cameroon for the period 1980-95. A production function and an export function were estimated in order to study the determinants of Total Factor Productivity (TFP) and export performance. The results demonstrated a mutually reinforcing relation between productivity and manufacturing export performance. Moreover, the study provided evidence indicating that adequate management of the real exchange rate was a crucial factor for the promotion of manufacturing exports. The performance of the manufacturing sector in Cameroon had deteriorated substantially since the mid-1980s. This decline was to a large degree explained by Dutch disease symptoms and inward-looking policies for the manufacturing sector, resulting in a highly overvalued real effective exchange rate (REER). Based on the estimated export and production functions, a simple dynamic model was constructed to assess the cost of this REER overvaluation, in terms of both productivity and exports.

Coxhead et al., (2002) examined ways in which development policies interact and influence incentives for agricultural expansion in frontier areas. They developed a model of household response to economic and technical stimuli, conditional on agronomic and household characteristics. The model was evaluated empirically using survey data gathered from low-income corn and vegetable farms near a national park in the southern Philippines. The results exhibited that within farms, land allocation was responsive to relative crop prices and yields. However, different crops elicited different responses. In particular, some crop expansion took place primarily through land substitution and intensified input use, while changes in prices or yields of other crops induced an expansion of total farm area. Land and family labor constraints bound at different points for different crops. These results suggested that because multiple policies interact, environmental policies must have multiple strands in order to replace incentives to further land expansion.

According to Kanwar (2006), the realisation that the wage-goods constraint, if binding, could stall the growth process of a developing country, prompted policy makers to encourage wage-goods production by various means. The success of public policy, however, depends on how strongly agents respond to the incentives provided. Using a large panel data set pertaining to Indian agriculture, no evidence of a perverse price-response for coarse grains, contrary to results in the existing literature was found. Further, the results prompted to conclude, that among all things considered, the preferred policy for augmenting the production of wage-goods in the long-run should be to emphasise the shifter variables in preference to the price instrument.

Price Formation Process

Tada (1991) analysed the process of producers' expected price formation through the estimation of supply functions, using vegetables and green tea in Japan as an example. At first, theoretical analysis showed that the factors which transformed the producers' expected price formation from the lagged expectation to the rational expectation were as follows: decrease in information price, increase in managerial ability and/or organizational innovation, rightward shift of supply curve and increase in price elasticity in supply curve. Second, supply functions were estimated by using the price expectation formation which included the rational expectation and the lagged expectation as its extreme form.

The authors', Pieri and Moschini (1999), intention was to contribute to the empirical knowledge of the Italian tomato market. They had estimated supply functions for five different production areas and for Italy as a whole, in addition, demand functions for fresh consumption and for processing purposes. The supply elasticity was calculated taking into account the price of tomatoes and labour costs and the demand elasticity with the price of tomatoes. Supply equations were estimated using both OLS and Hildreth and Lu's procedures. The demand estimation was calculated with a simultaneous equation model by applying the 2 SLS procedure.

Colman et al., (2005) estimated short-run own-price response elasticities from two samples of panel data for specialist dairy farms in the Northwest and Southwest of England. Although these farms were subject to milk marketing quotas, the free tradability of quotas enabled them individually to adjust the output quite rapidly. Model specifications had been chosen to test the ability of panel data to directly reveal behavioral responses without the imposition of theoretical restrictions. Significantly, the two independent samples generated quite similar results, especially in terms of supply response measures. Stable and promising estimates were obtained with simultaneous models giving higher elasticities than single equation models.

Review of Past Studies

Sarkar (1968) used the Hirschman index to measure the concentration of tea export markets and observed that there was a high degree of concentration of world tea exports. However he felt that the concentration decreased over the period owing to increased diversification of tea markets.

In a study on the export promotion of tea, Goswami (1969) concluded that several factors like cost of cultivation, manufacturing and marketing, central and State government taxes, commission to marketing agents and the profit to share holders will have to be taken into account in fixing tea prices in the market.

Sharma (1969) has found that the world import demand for Indian tea was uncertain as it had not shown consistent and significant response to the changes in price due to the role of non price factors such as quality and promotional efforts.

Awasthi (1975) found that in tea industry under the given technology, the cost of production tended to increase with steady increase in the prices of factors of production. The challenge of rising cost would be more severe to smaller units as compared to larger ones.

Lingan (1981) noted that high cost of fertilizers, non-availability of fertilizers round the year, supply of inputs by the Industrial Co-operative factory based on the savings by farmers in the factory, high cost of plant protection chemicals, non-availability of financial help, lack of technical assistance, non-remunerative price and non-existence of support price were the main problems faced by the tea farmers.

Bandyopadhyay (1982) found that the growth rates of India's share in world tea exports declined constantly during the period 1964 to 1978. The reasons attributed were low productivity, high demand for tea in the domestic market and high cost of production.

Brorsen et al., (1984) illustrated the use of univariate and multivariate time series analyses in the integration of dynamic relationship among selected weekly import prices of rice of the European community from the USA, Thailand and Argentina. The results revealed that Argentinean and USA prices moved together and reacted quickly to changes in Thailand prices.

Kavoussi (1984) argued that in a large and heterogenous sample of developing countries, higher rates of economic growth were associated with higher rates of export growth and growth rates of exports and Gross National Product were positively correlated in these economies.

According to Ajjan (1987), the price of green tea leaf as fixed by the bought leaf factories was the major determinant of the economic viability of small tea gardens. Green tea leaf price had steadily declined since 1977 in sympathy with the auction prices of 'made tea' which had adversely affected the economy of small growers.

Kailasam and Hirian (1987) and Rangaiah (1987) found that facilities like supply of high quality clones, shade and fruit plants, fertilizers, plant protection chemicals and equipments and sub-soil injectors were provided to small farmers at 50 per cent subsidised cost towards crop diversification in the Nilgiris tract under Hill Area Development Programme.

Roberts (1989) analysed tea production based on duality and separability theories and suggested that reducing tea export taxes and thereby increasing estate prices would be a strong impetus to increased tea production and a policy of higher worker wages would alternatively decrease the production. The ideal organisation would be the estates with 300 to 400 hectare producing green leaf for large central factories.

Khanna et al., (1990) noted that the tea sector had vital role in the development of national economy from the angle of its contribution to foreign exchange earning and employment generation. But the small tea gardens did not perform well mainly because of non-availability of required financial support.

Mohanasundaram (1990) found that in tea cultivation, the input-output relationship revealed sub-optimal level of resource use in general and their further use would enhance production with the exception of manures and fertilizers on large farms which were over utilising the same.

A study by National Bank of Agricultural and Rural Development (1990) stated that the development efforts of various Government agencies and financial institutions encouraged a large number of small farmers to undertake capital intensive tea cultivation. However the overall rate of financial return from the investment on tea crop provided a barely adequate return. The low rate of return was due to low plant density, high mortality and low productivity caused by improper maintenance.

According to Pai (1990), tea exports from India faced intense competition from Sri Lanka and Kenya and so inorder to augument its share in the export market, cash compensatory support and duty drawback benefits must be allowed for the exporters.

Reddy (1991) analysed the growth rate of tea exports for various countries during the period 1974 to 1990. He concluded that the tea exports in India and Sri Lanka were stagnant, whereas in China and Kenya it increased sharply to the extent of 8.66 and 6.97 per cent per annum respectively.

Singh (1991) found that at the aggregate tea consumption level, population was the significant variable and price variable did not appear to be of much significance in attributing the fact that tea was cheaper as compared to other beverages and its consumption was a necessary. Therefore, the author concluded that increasing domestic production of tea would serve the twin objectives of catering to the requirements of domestic demand and strengthening the country's capacity to increase the exports of tea.

Reddy and Narayanan (1992) attempted to examine the performance of India's agricultural exports during the past two and a half decades (1960-85) and found that even though the share of agricultural exports had been declining over the period, the trade policies forced to depend on traditional export crops like tea and tobacco mainly due to internal factors like production and per capita availability rather than external factors like prices and foreign exchange rate which appeared to be less important.

Misra (1994) argued that the failure of Indian salesmanship was responsible for the stagnation of tea export and adoption of uninational promotional scheme would be more appropriate in the present circumstance. He also suggested rationalisation in different estates should be adopted which might increase productivity and reduce average cost of production.

Sinharoy and Nair (1994) used the co-integration analysis to estimate the long-run equilibrium relationships between international pepper prices. The results pointed out the fact that, due to the open trade status for pepper, prices had moved synchronously indicating integration of world pepper market. The integration process also implied that domestic-supply variables were responsive to international market conditions.

Diakosauvas (1995) examined the market integration between Australian and United States beef prices at the farm gate level using the co-integration analysis. He used the monthly data over the period 1972-1993. The results indicated that the Australian and United States beef prices were co-integrated, albeit not fully, and that the degree of convergence between the various price pairs had not substantially increased over time.

Pearce (1995) in his study, observed producers' price expectations were found to approach the rational expectations in the case of Chinese cabbage, lettuce and green tea, whose supply curves show high price elasticities, and whose producers' organizations gather price information and monitor the production more than other crops under question.

Perera (1995) used an econometric model to evaluate the impact of change in international tea price on the Sri Lankan tea sector and found that favourable international prices enhanced the long-term prospects of the tea industry in Sri Lanka.

According to Prabirjit (1995), the growth in exports in the liberalisation period was actually a continuation of that of the earlier period. There was nothing in the exports behaviour in the earlier period that called for a change of regime. There was no direct evidence that the exchange rate behaviour exerted any influence on the dollar value of exports and imports during the period of liberalisation.

Thakur et al., (1995) analysed that the demand for tea by the consuming countries had increased continuously; but supply was not proportionate to their demand, which indicated the shortage of tea. Efforts were to be made to improve the quality of the product and should identify the potential tea consuming markets in order to arrest the decreasing trend of tea prices.

Mallick (1996) applied co-integration and error correlation models to examine the nature of causation between exports and economic growth in India. The results revealed the existence of strong co-integration and Granger feedback between income and exports growth. Further the error correction models provided consistent evidence of unidirectional causation running from income growth to exports growth. Expansion of productive capacity through income growth could raise exports and the increased profitability of exporting could induce increased saving and thereby capital emplacement, which gave rise to high economic growth.

The long run co-movement of vegetable oil prices was analyzed by Francis and Inder (1997). In their study, the world prices of eight vegetable oils over a period of time were scrutinized under multivariate cointegration framework and found that the edible oil price series were integrated in the long run.

Nilanjan (1998) in his study of Indian exports to Sri Lanka found that cotton yarn fabric made up, transport equipment and machinery and instruments made an impressive growth rate of 45.6, 39 and 36.3 per cent respectively during the initial three years of liberalisation mainly because the exports were made cheaper due to devaluation of currency and world market looked bullish during the initial years of liberalisation.

In order to increase the tea exports, Damodaran (1999) suggested a new marketing approach of creating a new classification scheme of global tea. It would tackle the changing global scenario and form as the basis for Indian tea in international tea markets taking into consideration of the changing preferences for tea in the beverage segment of the global market.

Kutty (1999) found that it was the shift in the consumer's preferences or habits, which decreased tea consumption in UK, Ireland, Australia and New Zealand during 1987-97 and therefore it was imperative for the tea exporting countries in the world to launch an intensive, generic promotion in these markets.

Edgar (2000) analyzed the market integration for agricultural commodities before and after the trade reform period and found that there was disequilibrium in the groundnut market prices in Mumbai and Chennai in the pre reform period.

Ghosh (2000) had investigated intra-state and inter-state spatial integration of rice markets in India using the maximum likelihood method of co-integration. The results indicated that there was no evidence in favour of the Law of one Price for the coarse / common variety of rice, marketed in Bihar, Orissa and West Bengal, even though the regional rice markets were found to be integrated. Integration of markets ensured regional food security, i.e. regional balance among food-deficit, food surplus and non-food cash crop producing regions.

Kumar (2000) found that in general overall agriculture and allied products have shown 14 per cent growth rate, while rice and coffee came up as the most promising exportable commodities with compound growth rates of 27.72 and 26.55 per cent respectively for the period 1990-91 to 1997-98.

According to Sundar (2000), an increase in tea exports could take place only through an aggressive marketing of quality tea, mostly in new centres.

A study by Dharmaraj (2003) examined the role played by cooperative tea factories in improving the economic viability of small-scale tea growers in Tamil Nadu, India, and assessed the growth performance of the industrial cooperative tea factories. It was concluded that the cooperative tea factories, offering higher prices for tea leaves, were the real solution to the weak bargaining power of small-scale tea growers in Tamil Nadu. It also revealed that the cooperative membership and the tea area covered by cooperatives had increased gradually over the years.

According to Deodhar and Intodia (2004), although India was a leading producer of tea, her export share was declining and her per capita consumption was extremely low. As a buffer against sluggish exports, managers of tea industry might want to expand domestic market. They might want to understand the valuation of the consumers place on quality attributes of tea. In this study using exponential form of Box-Cox transformation, hedonic price analysis to price and quality attributes of 43 Indian tea brands were applied. Consumers attached more importance to aroma and colour. Attribute magnitudes might be enhanced through selective plantation, processing, and blending of teas before marketing it through generic promotions or brand advertisements.

Ganewatta et al., (2005) revealed that Governments in many developing countries, influenced by the experience of the East Asian newly industrialized countries, had adopted policies to enhance domestic processing of primary commodities as a tool for accelerating employment growth, export revenues, and development. Sri Lanka had traditionally exported tea in the form of bulk (commodity) teas, but "value-added" teas such as packaged teas, tea bags, etc., had expanded in recent years. The article examined factors affecting the processing of value-added tea products in Sri Lanka by modeling export supply behavior. Estimates of the long-run relationship and short-run dynamics of export supply were presented and discussed. The price of value-added tea relative to bulk tea, and industry capacity, were identified as the main determinants of export supply, while exchange rate changes had no discernible effect. The policy implications of the analysis for enhancing further expansion of such value-added teas were presented. These were of interest for both policy makers and development analysts. In particular, the reasons that undermine the effectiveness of exchange rate policy as an instrument to stimulate value addition of primary products had much relevance for similar developing countries.

Savadatti (2007) undertook the task of verifying the various factors influencing the supply of pulses and to develop suitable demand relations by focusing on two important pulses grown in the country namely gram (chick pea) and tur (pigeon pea).

Using Nerlove's adjustment lag model as the basic framework, supply aspect had been studied at the regional and national level, based on the time series data covering the period 1965-66 to 1998-99. Demand aspect had been discussed at the national level only for the same period. Acreage response results revealed that in rainfed areas farm harvest prices and good weather conditions positively influenced the area allocation decision of the farmers. But yield turned out to be an insignificant factor in influencing the farmers' decision to allocate land to either gram or tur. It was clear from the analysis that even though farmers were price responsive and farm harvest prices of pulses were much higher than the farm harvest prices of competing crops like cereals, farmers did not realise reasonable returns for their outputs because of lower and also unstable yields of gram and tur. Production of pulses (gram and tur) mainly depended on area under the crop. Technological factor represented by time trend turned out to be positive. But growth trends in production of gram and tur suggested that existing technology had not been able to bring desired increase in production of gram and tur so as to meet increasing demand. Demand analysis revealed that price elasticity of demand being less than one in the case of both gram and tur, indicating that in situations of scarcity, there would be heavy pressure on prices of pulses and hence, the sufferers were weaker section of the society.

CHAPTER III

METHODOLOGY AND MODEL

Consistent with the hypotheses and objectives set forth, the methodology is designed in any research study. In this chapter, methods of collection of data and analytical techniques employed in the present study are outlined. This study primarily focuses on the use of time series techniques in understanding the time related properties of tea area, production, productivity, average size of the tea plantations, domestic price, international price, central excise duty, export duty, stock holding, domestic consumption, exports, rest of the world supply and tea auction market prices around the world. Traditional econometric techniques are utilized and at the same time when these traditional econometric techniques are found to be inadequate when trying to make inferences with time ordered observational data, other techniques are used.

Based on the theoretical development of commodity models, an integrated empirical model to study the performance of the Indian tea industry is specified. Prior theory traditionally suggests the explanatory variables that should go into a model. However, theory is developed using the *ceteris-paribus* assumption. When "all other things" are not fixed, as is the case with experimental data, researchers must rely on less "structured" models. In this study, prior theory to suggest variables to be studied is used, but relies on empirical patterns in their time sequence to specify explicit relationships among each variable. Besides, a brief account of various other quantitative tools, broadly categorised as time series methods in the literature, used in the present analyses is also presented.

Sources of Data

The present study was carried out based on secondary sources of data. The secondary data were collected from the regional office of Tea Board, Coonoor, United Planters Association of Southern India (UPASI), Coonoor and UPASI-Krishi Vigyan Kendra, Coonoor. The data relating to tea area, production, productivity, size of tea plantations, domestic price, international price, central excise duty, export duty, stock holding, domestic consumption, exports, rest of the world supply and auction market prices over the years (1975 to 2005) were collected from the Tea Statistics and Tea Digest published by the Tea Board, Kolkata and International Tea Committee, London. The data on gross national product and per capita income were collected from Hand Book of Statistics on Indian Economy published by Reserve Bank of India, Mumbai. The rainfall data were collected from the data archive of Indian Institute of Meteorology, Pune.

Tools of Analysis

An account of the tools of analysis employed in the present study is given below:

Percentage analysis was carried out to study the domestic consumption to production, export to production, Indian tea export to world tea export, tea export earnings to total Indian export earnings, export earnings to GNP and similar other parameters.

Growth rates

The slope of a linear trend is a fixed value per unit time period. Often, particularly over long span of time, this is an inadequate description. A time series increasing by a constant percentage has the growth properties of compound growth rate. In the present study, the area under tea, production, productivity, domestic consumption, volume of export, export earnings, domestic auction prices and export auction prices for 30 years, were analysed for growth trends with the help of the model,

$$Y_t = Y_o \left(1+r\right)^T e^u$$

Where, Y_t = Value at time't'

Y_o = Initial value

r = growth rate

T = Time in years 0, 1, 2 ……..30 and

u = is the random error term

For the purpose of estimation, the equation was expressed in logarithmic form:

$$\ln Y_t = \ln Y_o + T \ln \left(1 + r\right) + u$$

$$Y_t = a + b\,T + u$$

Where, $Y_t = \ln Y_t$

$a = \ln Y_o$

$b = \ln (1 + r)$

Then steeper the regression line that is - the larger the value of b - the higher the compound growth rate, r. The value of r was readily obtained as follows.

Since, $b = \ln (1 + r)$

$$e^b = 1 + r$$

$$r = e^b - 1$$

The standard error of regression coefficients 'a' and 'b' were obtained by using the formula,

$$Su = (1 - r^2) \, . \, n \, . \, (\sigma^2 \ y)$$

$$SE\ (a) = \sqrt{\frac{1}{n} + \frac{\bar{X}^2}{n\,\sigma^2\ X}} \, . \, \sqrt{Su}$$

$$SE\ (b) = \sqrt{\frac{Su}{n\,\sigma^2\ X}}$$

The t-value to estimate the significance of r value was obtained by,

$$t = \frac{r^2\ \sqrt{n - 2}}{\sqrt{1 - r^2}}$$

Time series analysis

The basic aim of the present study is to understand the pattern underlying the components of the Indian tea industry and use the knowledge for forecasting. To this end, some of the time series tools are applied and each of them are discussed below. The time series analyses were to be carried out to study the temporal price variation. The time series referred to a sequence of measurement of movement of economic variables over time. In the present study, the average domestic auction prices for tea, the export auction prices for tea, production, productivity, volume of export, export earnings and the like were the subjects for time series analysis. The generally identified four major components, namely, trend factor (a), cyclical factor (b), seasonal factor(c) and a fourth irregular variation (d) have been applied to reveal the hidden patterns. A functional approach was employed in studying these variations, in the present study.

Secular trend

Trend is a quantitative description of the central tendency of past values. It is a smooth, regular, long-term movement of the data showing the tendency to increase or decrease over a long period. In the present study, the tea prices (annual average domestic and export auction prices) for 30 years, from 1975-76 to 2004-05, were plotted on scattergrams, and the trend for annual average export auction price was observed to be linear. And hence a linear trend equation was fitted, of the form,

$$Y = a + b\,t + u$$

Where, Y = Price of tea per unit

t = the time variable, in years 1, 2, 3 . . . 30 and

u = random error term.

for the entire period of 30 years in the case of annual average export auction prices and annual average domestic auction price, 'a' and 'b' are parameters to be determined through least squares method.

However, a quadratic equation was also fitted of the form

$$Y = a + b\,t + c\,t^2 + u$$

Using the same variables to find if that could explain the variation better; however, with an additional parameter ‘c’ to be estimated.

The Seasonal Factor

The widely used, conceptually simple method to distill the seasonal factor is the method of moving averages with constant weights equal to 1/(2m+1), (2m+1) being the length of fluctuations. In the case of seasonal fluctuations, it is generally 12 months. The moving averages were computed as,

$$X'_t = \frac{\sum_{i=-m}^{m} X_{t+i}}{2m+1}$$

The above procedure is equivalent to fitting a straight line to (2m+1) consecutive observations by the method of least squares.

In terms of X = T * S * C * I, the process of the above equation implies the separation of the trend and cyclical factors, the seasonal and random factors being averaged out. In other words, omitting time subscripts in the above equation, transforms X = T * S * C * I to

$$X' = T * C.$$

Dividing X = T * S * C * I by X' = T * C results in seasonal and random factors being separated from X = T * S * C * I as,

$$X'' = \frac{X}{X'} = \frac{T * C * S * I}{T * C} = S * I$$

The random factor in the above equation was removed by averaging over the corresponding seasons, finally resulting in the seasonal component. This fluctuates around 100 per cent and any slight discrepancy is corrected by uniform algebraic manipulations in all seasons.

The Cyclical Factor

Fourier analysis is used for the analysis of cyclical factor and the same is followed in the present study. This tool provides an assessment of the amplitude as well as periodicity of the cycles based on some parametric tests.

Harmonic Model

The harmonic model was applied to the annual price data in order to detect the presence of any long term cycles in the tea prices. In order to test the length of the cycle, Fourier coefficients need to be computed. Given a time series $X_1, X_2, X_3, \ldots X_n$ with a period of length T, the deviations of the actual value from the trend value could be represented as,

$$Y_t = 1/2\ A_0 + \sum_{j=1}^{n} (A_j \text{ Cos } (360j / T) + B_j \text{ Sin } (360j / T))$$

Where Y_t = the price series;

T = time,

A_0, A_j and B_j = constants given by,

$$A_0 = \sum_{t=1}^{n} X_t / N$$

$$A_j = 2 (\sum_{t=1}^{n} X_t \text{ Cos } (360j / T)) / N$$

$$B_j = 2\left(\sum_{t=1}^{n} X_t \ \mathrm{Sin}\,(360j / T)\right) / N$$

In practice, it was found more convenient to group the data as shown below for investigating a given period P, where mp was equal to N or the nearest integer below N.

	X_1	X_2	.....	X_p
	X_{p+1}	X_{p+2}	.....	X_{30}
	$X_{(m-1)(p+1)}$	$X_{(m-1)(p+2)}$	.....	X_{mp}
Sums	U_1	U_2	.....	U_P

If a term of period P was present in the series, the column total (U_P) would indicate the periodic effects, but if the remaining element was random, the effect of summing 'm' rows would be to reduce the relative contribution of that element to the column totals.

Similarly, if there are other elements with different periods, they will be out of phase in successive rows and tend to cancel out in the totals. Hence, if there were enough rows, the total (U_P) would reveal the periodic effects and would reduce marking effects, if any, resulting from random components or oscillatory components of different periods, which would prevent discernment of the periodic effect in the primary series. The Fourier coefficients A_p and B_p were computed from the formulae.

$$A_p = \left(2 \sum_{j=1}^{n} (U_P \ \mathrm{Cos}\,(360j / p))\right) / mp$$

$$B_p = \left(2 \sum_{j=1}^{n} (U_P \ \mathrm{Sin}\,(360j / p))\right) / mp$$

The squares of the amplitude R_p^2 was obtained by adding Fourier coefficients A_p^2 and B_p^2. Hidden periodicities were found out by periodogram analysis. The Fourier analysis helped to compute the square of amplitude for each specified period by assuming several periods. The significance of the amplitudes were tested by periodogram. The procedure for testing involves first to compute the square of the amplitude (R_p^2).

If no periodic fluctuations were observed, then mean square amplitude for a random series without periodic fluctuations would be arrived at by,

$$Rm^2 = \sigma^2 / N \text{ ………….Length of the cycle.}$$

Then the indicator of the cycle, k was calculated as follows,

$$K = R_p^2 / Rm^2$$

The above conceptual framework provided a detailed account of trends and their determinants in tea consumption, production and trade over the past 30 years.

Commodity Model Approach

This section focuses on studying the overall performance of Indian Tea Industry in an integrated framework. The methodology is based on a standard commodity model. The model is built using the theoretical developments in relevant structural components of the model and expectations formation hypotheses. Then, the results are to be examined at the country level for conformity with a priori knowledge about developments in the country's production policies, consumption trends and restrictions, as well as trade flows. The consistency of trade flows with production and demand will also be ensured.

The module on production of black tea includes tea bearing area and tea yield equations that determine domestic production. The impact and significance of various factors such as black tea auction price, technology, irrigation, possible competition with other beverage crops (coffee), etc., are examined and their importance in modeling is considered. If data on stocks are available then it will also be considered or else will be used as a balancing item.

The demand for Indian black tea is usually modeled as a function of gross national product, domestic price of tea, price of the substitute commodity coffee, per capita income, international prices of tea, promotional expenditures, etc. The aggregate consumption of tea throughout the country is dependent more on population growth and improvements in income distribution than merely on the per capita income. In the absence of time series data on the improvements in income distribution, per capita income might be incorporated into the above specification as a proxy. Yet neither GNP by itself, nor the per capita income would adequately capture the implications of the income distribution that spreads the purchasing power of individuals from whom the demand originates. These proxies are most likely to take up the effects only along the demand curves.

The model on the productivity of tea examines the impact and significance of various factors such as domestic price of tea, international prices of tea, average holding size of the tea plantations, rainfall, change in bearing area, etc. The empirical implementation of bearing area response function includes factors like domestic price of tea, price of the substitute commodity coffee, international prices of tea, the government realization of central excise duty, average holding size of the tea plantations, etc. Assuming a competitive equilibrium, the determination of prices was specified explicitly in the present study. This was largely because significant stock holding existed which was residual in character over domestic consumption and exports since these inventories influenced the price formation process. The variable like the government realization of central excise duty appears to be a relevant variable in the price formation process. The specification of exports includes variables like the international price for tea, domestic price of tea, export duty realized, rest of the world supply, etc.

A Standard Commodity Model

A standard commodity model (basic version) can be specified either in linear or in logarithmic form. The model is specified in A in linear form and in B in logarithmic form (double log). The model has seven equations with five endogenous variables, 16 exogenous variables and two identities. The model can be specified as a simultaneous or a recursive model. In this study, it is specified as a recursive model.

A. Commodity model in linear form

1. $A_t = a_0 + a_1 P_t^D + a_2 P_{t-1}^S + a_3 P_t^I + a_4 CED_t + a_5 AHS_t + a_6 A_{t-1} + u_t$

2. $Y_t = \beta_0 + \beta_1 P_t^D + \beta_2 P_t^I + \beta_3 AHS_t + \beta_4 \Delta A_t + \beta_5 RF_t + \beta_6 T + u_t$

3. $D_t = \gamma_0 + \gamma_1 GNP_t + \gamma_2 P_t^D + \gamma_3 P_t^S + \gamma_4 P_t^I + \gamma_5 PI_t + \gamma_6 PEI_t + \gamma_7 C_{t-1} + u_t$

4. $$E_t = \delta_0 + \delta_1 P_t^D + \delta_2 \frac{P_t^I}{P_t^D} + \delta_3 EDR_t + \delta_4 RWS_t + \delta_5 PEO_t + \delta_6 E_{t-1} + u_t$$

5. $$P_t^D = \varepsilon_0 + \varepsilon_1 \frac{S_t}{D_t} + \varepsilon_2 \frac{S_t}{Q_t} + \varepsilon_3 CED_t + \varepsilon_4 P_{t-1}^D + u_t$$

with the identities,

6. $$Q_t = A_t * Y_t$$

7. $$S_t = Q_t + S_{t-1} - D_t - E_t$$

B. Commodity model in double log form

1. $$\ln A_t = a_0 + a_1 \ln P_t^D + a_2 \ln P_{t-1}^S + a_3 \ln P_t^I + a_4 \ln CED_t + a_5 \ln AHS_t + a_6 \ln A_{t-1}$$

2. $$\ln Y_t = \beta_0 + \beta_1 \ln P_t^D + \beta_2 \ln P_t^I + \beta_3 \ln AHS_t + \beta_4 \ln \Delta A_t + \beta_5 \ln RF_t + \beta_6 \ln T$$

3. $$\ln D_t = \gamma_0 + \gamma_1 \ln GNP_t + \gamma_2 \ln P_t^D + \gamma_3 \ln P_t^S + \gamma_4 \ln P_t^I + \gamma_5 \ln PI_t + \gamma_6 \ln PEI_t + \gamma_7 \ln C_{t-1}$$

4. $$\ln E_t = \delta_0 + \delta_1 \ln P_t^D + \delta_2 \ln \frac{P_t^I}{P_t^D} + \delta_3 \ln EDR_t + \delta_4 \ln RWS_t + \delta_5 \ln PEO_t + \delta_6 \ln E_{t-1}$$

5. $$\ln P_t^D = \varepsilon_0 + \varepsilon_1 \ln \frac{S_t}{D_t} + \varepsilon_2 \ln \frac{S_t}{Q_t} + \varepsilon_3 \ln CED_t + \varepsilon_4 \ln P_{t-1}^D$$

with the identities

6. $$Q_t = A_t * Y_t$$

7. $$S_t = Q_t + S_{t-1} - D_t - E_t$$

Endogenous Variables

A_t : Bearing Area at time‘t’

Y_t : Yield at time‘t’

D_t : Demand or Domestic Consumption at t^{th} time period

E_t : Export at t^{th} time period

P_t^D : Domestic Price at t^{th} time period

Q_t : Production or Supply at t^{th} time period

S_t : Ending Stocks at t^{th} time period

Exogenous Variables

P^I : International Price of tea

P^S : Price of Substitute Commodity, Coffee

T : Time Trend

GNP : Gross National Product

$\frac{P^I}{P^D}$: International Price relative to the Domestic Price

CED : Central Excise Duty

EDR : Export Duty Realised

AHS : Average Holding Size

RWS : Rest of the World Supply

RF : Average Rainfall

ΔA_t : The first difference of the plucking area

PI : Per Capita Income

$\frac{S_t}{D_t}$: Ending stock relative to domestic consumption

$\frac{S_t}{Q_t}$: Ending stock relative to production or supply

PEI : Promotional expenditure in India

PEO : Promotional expenditure outside India

The other lagged Endogenous Variables.

In the above specification of various equations, no specific form was assumed for the functions. Strictly speaking the decision on appropriate form should be decided <u>ex post</u> based on summary statistics like the coefficient of multiple determination and levels of significance of the coefficients estimated. Besides, the estimated functions might have to satisfy a host of conditions like the absence of multicollinearity, autocorrelation and independence of the error terms. However, the choice of functional form is not much diverse in practice. In the present case, the choice to forms were restricted that somehow could be made amenable for Ordinary Least Squares (OLS) estimation. This consideration alone has narrowed down the choice of functions to linear equations.

The single market assumption implied that the causal factors remain almost the same spatially throughout the tea producing regions of the country. However, there were important structural differences between North and South Indian tea producing regions (discussed in detail in chapter five) that necessitated recognising the differential influences of the causal factors in the model specification. The distinction for example, was evident from the fact that while the average size of a tea plantation was about 125 ha. in North India, it was only about eight ha. in South India. This diversity indexed all related structural parameters collectively classified under 'the economies of scale'.

Unless empirically refuted, there is reasonable assurance that the production parameters would be different between the two regions. Hence, though the specification remained the same, the empirical implementation was done separately for the two regions viz., North India and South India under area response and productivity. Since, it was found that all the equations in the model were over identified; as such the Two Stage Least Square procedure (2SLS) which is relatively simple and widely used estimation procedure was adopted in the present study. Briefly, this technique consists of replacing Y_t in the above equations by an OLS computed $\hat{Y}_t$ and then performing another OLS regression of Y on $\hat{Y}_t$ and X_t. The treatment of the error terms vector is an important area wherein the econometric developments are very vast. However, for obvious reasons, in the present study it was assumed that the vector satisfied the classical assumptions, i.e.

$$E(u_t) = 0;\ (t = 1,2,...,T)$$

$$E(u_t' u_t) = \sigma_{tt}, \forall t = t'\ (t,t' = 1,2,...,T)$$

$$= 0 \quad , \forall t \neq t'\ (t,t' = 1,2,...,T)$$

and

$$E(X_t u_t') = 0$$

Variables and their Definitions

The above system of seven equations of which the last two are the identities involved seven unknowns viz., bearing area, productivity, consumption, domestic prices, exports, production and stocks held. Besides, the system included 12, predetermined (exogenous) variables and five lagged endogenous variables. Altogether, the system was represented by a set of 27 variables.

The economic statistics available in India are generally relevant to administrative requirements. These time series data are inconsistent, have different definitions and different modules in compilations at different time periods. Hence fine refinements should be done to match the requirements in the collection and compilation of orderly data to be empirically meaningful. In this context, it's essential to specify certain amount of reflections on the data available and definition of variables.

Endogenous Variables

Bearing Area (A_t)

Reliable data on removals and extensions were not readily available and the data provided by the Tea Board under the categories 'extensions', 'replacements' and 'replantings' were not consistent with the major area statistics.

The time series data on area was treated as the bearing area for all practical purposes by the Board and the first difference of the series provided no resemblance to the data under categories of extensions as one would expect. While even assuming a time lag of four to six years before the new plantings become to be classified under bearing area, did not resolve the inconsistencies. Hence as suggested by French and Mathews (1971) a reduced form specification, directly in terms of bearing area response was attempted in this study.

The bearing area response might be long-run in nature when brought about by new plantings as a result of producer decisions and the gestation period of the plants before they become economically productive. On the other hand, there may be short run adjustment brought about by removals. While new plantings are thought to be mostly determined by economic criteria, removals might be influenced partly by non-economic factors like diseases. However, the removals being very meagre - in any case even the aggregate removals data were not available - such considerations were forced to be kept out of the specification.

Under these limitations, the better alternative of reduced form of bearing area response was adopted both for North and South India. Area was measured in ha. The available data on area, for all practical purposes, was treated as the bearing area by the Tea Board and also in this study. To the extent data were available on 'extensions', they were utilised for supporting time series analysis, rather than incorporating into the econometric model.

Productivity (Y_t)

Productivity measured in kg. / ha. posed no problem and was based on the All India level bearing area.

Production (Q_t)

Production measured in million kg. also posed no problem and was based on the All India level bearing area and productivity.

All India level bearing area, productivity and production are all derivable through identities. It was done and wherever, inconsistencies and missing values were noticed, they were rectified.

Stocks (S_t)

Measured in million kg., data on stocks held, with opening and closing balances were available from the 'Tea Statistics' volumes published by the Tea Board.

Exports (E_t)

Export data measured in million kg. were also similarly available from the publications of the Tea Board.

Demand (Domestic Consumption) (D_t)

Consumption was measured in million kg. The publications of the Tea Board contain estimates for the domestic consumption and the Board's estimates were checked for consistency and corrected wherever discrepancies arose and missing values were noticed by inverting the stocks identity.

Domestic Price (P_t^D)

In this study, the existence of a single domestic price was assumed that was relevant for consumption as well as production. But in the real world, significant differences between the prices realised by the producer that affects production and the prices the consumers face that determines consumption existed. In different auction centres different prices existed within the country. These spatial differences in prices could be tackled by assigning quantities as the weights in calculating the weighted index of prices, explicitly recognising the marketing margins. Alternatively, the specifications could be disaggregated to synchronise with spatial differences.

The market being relatively well developed and much of the tea transactions were based on Kolkata auctions, the annual average Kolkata auction prices had been adopted as the domestic prices in this study. Statistically, the correlations between Kolkata prices and auction prices or wholesale prices elsewhere in the country were found to be uniformly high, above 90 per cent, and the assumption seemed to have been justified. Domestic prices were measured in rupees/kg.

Exogenous Variables

Among the exogenous variables included in the model, the definition and measurement of realisation of export duty on tea (EDR) and realisation of central excise duty (CED) appears to be relevant proxy variables representing the state intervention. The rainfall (RF) was added as a proxy to represent the weather factors and average size of holding (AHS) as a proxy for factors representing economies of scale. The first difference of the bearing area (ΔA_t) was added as an additional variable to take care of the vintage effects of investment in stocks that are newly added to the bearing acreage.

The world trade in tea was expanding and it was important to assess whether India had been sharing this expansion. These effects might be collectively captured by including the rest of the world supply (RWS) as a variable. Along with the time variable, all the above mentioned variables have found to be quite straight forward. The data over years were gathered from the publications of the Tea Board, UPASI, The International Tea Committee (London) and Reserve Bank of India.

The data series on coffee prices (P_t^S), measured in rupees/kg. faces similar conceptual problems faced in defining the domestic prices of tea. The annual average wholesale prices, collected from various volumes of the 'coffee statistics' published by the Coffee Board of India were used in the present study.

The problems in defining a single international price of tea (P_t^I) became predominant because of the closure of the London auction since July, 1998. Fluctuations in the exchange rate of the individual principal producing and exporting countries coupled with the spatial distribution of the trade were quite complex. The world tea trade originated almost entirely at London auction. The constant exchange rate of Indian rupee with British pound-sterling would have been the relevant international price of tea (P_t^I). Exchange rates, as the present international monetary system operates, did fluctuate independent of prices and hence might well be introduced into the model explicitly. Alternatively, the unit value of realisation on exports might be used as a proxy for international prices.

It was likely that the aggregate consumption of tea throughout the country was dependent more on population growth and improvements in income distribution than merely on the per capita income. In the absence of time series data on the improvements in income distribution, per capita income (PI_t) might be incorporated into the above specification as a proxy. Yet neither GNP_t by itself, nor the per capita income would adequately capture the implications of the income distribution that spreads the purchasing power of individuals from whom the demand originates. These proxies are most likely to take up the effects only along the demand curves.

GNP measured in real terms and prices deflated appropriately would perhaps provide a better understanding of the effects of relative prices on consumption. On the contrary, general price rise is complex and no deflator might adequately represent the purely monetary effects without distorting the results arbitrarily, to the extent the deflator chosen and its computations are arbitrary. Hence, the prices of tea, coffee were specified at current prices, and GNP was measured at factor costs.

Market Integration

The present study aimed to estimate the price transmission between the domestic and international black tea auction markets. The time series on the black tea prices are deflated to form real price series. In the case of domestic black tea auction market prices, the series are deflated by wholesale price index for tea. The US $ deflator taken from Oanda Corporation, an online international For-Ex dealing organisation [Internet address http://www.oanda.com (accessed on July 17, 2007)] was used to deflate the international black tea auction market prices. Then the prices are converted into domestic currency using official foreign exchange rate.

Stationarity

Before analyzing any time series data, testing for stationarity is a prerequisite since econometric relation between the time series has the presence of trend components (Davidson and Mackinnon, 1993). This involved testing for stationarity of the variables using tests such as Augmented Dickey Fuller (ADF) test. A stationary series is one whose parameters are independent of time, exhibiting constant mean and variance and having autocorrelations that are invariant through time. If the series is found to be non-stationary, the first differences of the series are tested for stationarity. The number of times (d) a series is differenced to make it stationary is referred as the order of integration, I (d). The ADF test mentioned above considers the null hypothesis that a given series has a unit root, i.e., it is non-stationary. The test is applied by running the regression of the following form:

$$\Delta Y_t = \mathrm{B}\beta_1 + \delta Y_{t-1} + \alpha_i \sum \Delta Y_{t-1} + e_t \qquad (1)$$

If the coefficient δ is not statistically different from zero, it implies that the series have a unit root, and, therefore, the series is non-stationary. The determination of order of integration of each variable is required for any time series analyses and, more importantly, for error correction equations, because each variable involved in the estimation of these models must be first differenced stationary series. To verify that the first differenced price series are indeed stationary, Augmented Dickey-Fuller (ADF) unit root tests are used. The null hypothesis of non stationarity is tested using a t-test. The null hypothesis is rejected if estimated variable is significantly negative.

The black tea auction market price series of domestic and international markets were tested for stationarity in the above equation(1), where Y_i denoted price series of domestic and international markets and $i = 1, 2, ., 10$ (1-KOLKATA; 2-GUWAHATI; 3-SILIGURI; 4-COCHIN; 5-COONOOR; 6-COIMBATORE;7-COLOMBO; 8-JAKARTA; 9-MOMBASSA and 10-LIMBE)

The critical values for this test are negative and larger than the standard t values and are given in Engle and Yoo (1987) and Mackinnon (1991). If the computed value (at level) is smaller than the critical 'tau' statistics, we do not reject the null hypothesis of non-stationary series. In this case, the individual series may be integrated of order 1 or 2 i.e. I(1) or I(2) and may be more than this order. Once the variables are checked for stationarity and are of same order, integration between them can be tested using methods such as Augmented Dickey Fuller Test or Johansen Maximum Likelihood Test in a bivariate as well as multivariate framework. If the estimated value of error term exceeds critical values at one per cent, five per cent and 10 per cent levels of significance, the conclusion would be that the residual term is stationary and hence the two individual series, though non-stationary, are cointegrated in the long run.

Johansen's Multiple Cointegration Framework

It is possible that individual time series of the commodity prices may be nonstationary in levels, but a linear combination of them may be stationary indicating a long run equilibrium relationship between them (Engle and Granger, 1987). If a linear combination of two nonstationary series is stationary, then the two series are considered to be cointegrated. To test whether or not the residual term of the regression between the two time series in question is stationary, cointegration tests start with the premise that for a long-run equilibrium relationship to exist between two variables it is necessary that they should have the same inter temporal characteristics.

The ADF test is supplemented by Johansen-Juselius Maximum Likelihood Method. This test is considered to be better than other cointegration approaches as it addresses endogeneity and simultaneity problems being faced in other methods in bivariate models. Also, it is important when cointegration is tested between more than two variables. In this technique, the hypothesis of presence of cointegration vector is formulated on a group of non-stationary series, as the hypothesis of reduced rank of the long-run impact matrix. Likelihood ratio and maximum likelihood tests are applied to derive test statistics for the hypothesis of given number of cointegration vectors and their weights. Inference concerning linear restrictions on the cointegration vectors and their weights is performed using usual chi square methods (Johansen and Juselius, 1990 and Johansen, 1988). First, the order of integration is the same for each time series of prices, and then test for cointegration. Only variables of the same order of integration qualify for the pair wise cointegrating relationships. The specific linear combinations tested are the residuals from a static cointegrating regression such as:

$$Y_{ti} = \beta_i + \beta_i X_{ti} + Z_i \qquad (1)$$

where Y_{ti} and X_{ti} are ($i = 1,2,.,6$) price series in levels and Z_{ti} is the residual term. Testing for cointegration implies testing stationarity of the residual term Z_{ti}. In the current study, the dependent variable Y_{ti} are ($i = 1,2,.,6$) prices of different black tea auction markets ($i = 1,2,.,6$) and the independent variables X_{ti} are ($i = 1,2,.,5$) prices of other five black tea auction markets.

For example, the cointegration equation for Cochin black tea auction market prices with the other five black tea auction markets prices is represented as follows:

$$COC = \beta_1 + \beta_2 COO + \beta_3 COI + \beta_4 COL + \beta_5 MOM + \beta_6 LIM + Z_t$$

In the current study, the relationship between the different black tea auction markets prices are studied through the multiple cointegration analysis under error correction framework. The integration of global markets with the domestic markets for black tea auction market prices are studied in Johansen's multiple cointegration frame work. The world black tea auction markets price transmissions are analyzed through vector error correction procedures. The time series econometric analyses are carried out using E-views 3.1.

Error Correction Mechanism (ECM)

An Error Correction Model (ECM) is a neat way of combining the long run, cointegrating relationship between the levels variables and the short run relationship between the first differences of the variables. It also has the advantage that all the variables in the estimated equation are stationary; hence there is no problem with spurious correlation. The last step in cointegration analysis involved application of error-correction mechanism. Since the procedure of differencing results in loss of valuable long-run information in the data, an error correction (EC) term is introduced in the theory of cointegration that integrates or ties short run dynamics of a series to its long run value. The residuals obtained from the linear equation are introduced as explanatory variable into the system of variables in levels. The error correction term, thus, captured the adjustment towards long-run equilibrium.

Engel and Granger (1987) demonstrated that once a number of variables are found to be cointegrated, then there existed a corresponding error correction representation which implied that changes in the dependent variable are a function of the level of disequilibrium in the cointegrating relationship (captured by the error correction term) as well as changes in other variables. The importance of including a constant term without a time trend has been addressed by Dickey, Bell and Miller (1986) and Miller and Russek (1990). Based on their suggestions, ADF equations are estimated with an intercept and no time trend.

If the price series are I (1), then one could run regressions in their first differences. However, by taking first differences, we lose the long run relationship that is stored in the data which implied that use of variables in levels as well. Advantage of error correction methodology is that it incorporates variables both in their levels and first differences. By doing this, ECM captures the short run equilibrium situations as well as the long run equilibrium adjustments between prices. Even if one demonstrates market integration through cointegration, there could be disequilibrium in the short run. I.e., price adjustment across markets may not happen instantaneously. It may take some time for the spatial price adjustments. ECM can incorporate such short run and long run changes in the price movements. A generalized ECM formulation to understand both the short run and long run behaviour of prices can be considered by first taking the autoregressive distributed lag (ADL) equation as follows:

$$Y_t = a_{01}X_t + a_{11}X_{t-1} + a_{12}Y_{t-1} + \varepsilon_t .$$

By adding and deleting Y_{t-1} , $a_{01}X_{t-1}$, rearranging terms, and using the difference equator, the above equation can be written in the ECM format as follows:

$$\Delta Y_t = a_{01}\Delta X_t + (1-a_{12})\left[\frac{(a_{01}+a_{11})}{(1-a_{12})}X_{t-1} - Y_{t-1}\right] + \varepsilon_t .$$

The generalized form of this equation for k lags and an intercept term is as follows:

$$\Delta Y_t = a_{00} + \sum_{i=0}^{k-1} a_{i1}\Delta X_{t-1} + \sum_{i=1}^{k-1} a_{i2}\Delta Y_{t-1} + m_0\left[m_1 X_{t-k} - Y_{t-k}\right] + \varepsilon_t$$

$$\text{where, } m_0 = \left(1-\sum_{i=1}^{k} a_{i2}\right), \text{ and } m_1 = \frac{\sum_{i=0}^{k} a_{i1}}{m_0} .$$

If all the variables are I(1), i.e., they are integrated of order 1, they are stationary in first difference. Therefore, all the summations in the above equations are also stationary. Moreover, if the variables are cointegrated, the ECM term, i.e., the linear combination of variables represented in parentheses is also stationary. The a_{ij} coefficients capture the short run effects and m_j coefficients represent the stationary long run impacts of the right hand side variables. The parameter m_0 measures the rate of adjustment of the short run deviations towards the long run equilibrium. Theoretically, this parameter lies between 0 and 1. The value 0 denotes no adjustment and 1 indicates an instantaneous adjustment. A value between 0 and 1 indicates that any deviations will have gradual adjustment to the long run equilibrium values.

So the Vector Error Correction Mechanism is used to distinguish short term from long term association of the variables included in the model. When the variables are not integrated, then in the short term deviation from this long term equilibrium would feed back to the changes in the dependent variable in order to force the movement according to the long run equilibrium relationship. The long term causal relationship among the black tea auction markets is implied through the significance of the ‘t’ tests of the lagged error correction term as it contains the long term information because it is derived from the long term relationship. The coefficient of the lagged error correction term is a short term adjustment coefficient and represented the proportion by which the black tea auction markets market adjusted in response to the long run disequilibrium.

Before computing the error correction mechanism, the order of lag for the variables to be included in the models is to be ascertained. The orders of lag for the variables are chosen by the smallest Akaike Information Criterion (AIC)/ Schwartz Bayesian Criterion (SBC) of the black tea auction markets price series. In the present study, all the variables are found to have minimum AIC/ SBC values at the first lag. Hence throughout the analyses, first lag of the variables are included wherever necessary.

The commodity prices are said to be integrated because of the globalization process. In view of that, the price linkages between the domestic black tea auction markets and the international black tea auction markets prices are studied through cointegration and VECM approach.

A PROFILE OF THE INDIAN TEA INDUSTRY AND THE WORLD TEA ECONOMY…

CHAPTER IV

A PROFILE OF THE INDIAN TEA INDUSTRY AND THE WORLD TEA ECONOMY

A brief account of the origin of tea plant is presented at the outset and then the forces that have led to the present level of development of the tea industry in India in its international perspective are outlined and analysed. This would help to broaden the perception of the organization and functioning of the tea industry in India.

> "*Tea is better than wine for it leadeth not to intoxication; neither does it cause a man to say foolish things and repent there of in his sober moments. It is better than water for it does not carry disease; neither does it act like poison as water does when it contains foul and rotten matter*."

This ancient saying from China gained widespread acceptance in Europe during the course of the eighteenth century. At this juncture, it is perhaps desirable to define 'Tea'. As per the provision of Tea Act, 1953 'Tea' means the plant *Camellia sinensis* (L) 0. Kuntze as well as all varieties of the product known commercially as tea made from the leaves of this plant including green tea (Dwibedi, 1999). As per the specification of the Prevention of Food Adulteration Act, 1954 (PFA Act), "Tea means, tea other than

Kangra tea derived exclusively (from the leaves, buds and tender stems of plants) of the Camellia genus and the species (and includes leaf, brokens, fannings and dust)" (Ramamoorthy et al., 1997).

EVOLUTION OF THE TEA INDUSTRY

History of Tea Leaf

Tea has brought cheer to people across the world for over 4500 years. The origin of the tea bush has been contested by scholars. It is native to certain areas ranging from the interior of Southern China to the border of Assam. According to legend, in 2737 B.C. Shen Nong, an early emperor was a skilled ruler, creative scientist, and patron of the arts. His far-sighted edicts required, among other things, that all drinking water be boiled as a hygienic precaution. One summer day while visiting a distant region of his realm, he and the court stopped to rest. In accordance with his ruling, the servants began to boil water for the court to drink. Dried leaves from the near by bush fell into the boiling water, and a brown liquid was infused into the water. As a scientist, the Emperor was interested in the new liquid, drank some, and found it very refreshing. Therefore, according to legend, tea was created. (This myth maintains such a practical narrative, that many mythologists believe it may relate closely to the actual events, now lost in ancient history.) The ancient Chinese first drank it for its medicinal value, and later, from the third century onwards, as a refreshing beverage.

Another legend associates the origin of tea with Daruma who founded Ch'an school of Buddhism. Traveling to China from India by 520 A.D. he started meditating for years together. Infuriated at his sleepiness after some years, he cut off his offending eyelids and where they fell on earth arose the tea plants.

It came to the light in Fourth century and by about 650 A.D. during the TS'ang dynasty the growing popularity of tea induced farmers in most provinces in China to cultivate Tea and subsequently became an article of commerce. In the early years of 780 A.D., Lu Yu commissioned the first book on tea entitled Ch'a ching a tea classic. The first printed reference by a European writer about the mysterious Chinese drink was dated to 1559 A.D. Japan was the only other country where the growing and drinking of tea took early root, the Japanese raising tea drinking to a fine art in their tea ceremonies. The popularity of tea spread to other parts of the world after the seventeenth century.

Tea into the West

The knowledge of tea travelled slowly from East to West. The successful social upheaval, throwing out the traditional institutions of the monarchy sort in the European countries in the sixteenth century injected new vigour into the people who broke away from all traditional clutches. There was a longing for freedom and adventure in every walk of life. Technological breakthrough gradually improved the productivity and materialism began to overtake fatalism and subsistence. Market controlled capitalism took distinct shape. And the leader among them in all these activities was England.

Initially, Venice evolved as the distinct geographical and commercial meeting centre between East and West, controlled by the Arab traders. Trade in the oriental luxuries like silk and spices flourished. And, in the process, news of tea percolated to the west through the missionaries, explorers and travelers who brought back tales of the strange, slightly bitter beverage, tea. As the awareness and desire grew, the western countries turned to China to obtain tea and other luxuries.

Dutch were the first to perfect the long-range sailing ships by the middle of the sixteenth century, following the success of navigator-adventurers Bartholomew Diaz and Vasco da Gama. Though Chinese were suspicious of the 'foreign devils' (as they called them), they nevertheless allowed the Dutch to establish a trading centre at Canton in 1557. Thus Venice was snatched of its prominence as a trade centre because of sea transport becoming cheaper. Dutch merchants were the link between the orient and the West trading in the luxuries, including tea. Meanwhile, tea had grown to be a symbol of England for centuries to come and perhaps to this day. The first consignment of tea from China was transported to Benton in 1606 and from there it was shipped to-non-tea-conscious Europe. By the mid-1650s, a quick brisk trade in tea was made with Holland. In France, the future of tea was linked with the Sterling Company.

The tea trade took a new turn when a sharp rise in the price of pepper from Dutch merchants led to the birth of the British East India Company which reached Canton in 1637 and successfully established direct trade with China against the challenge of the Dutch.

In England, tea received royal patronage when King Charles II married the Portuguese princess Catherine of Braganza, who was an inveterate tea-drinker. Britain was engaged in a war with France between 1756 and 1763, and obliged to levy several taxes to maintain its standing army in America. Following protests by the colonists, the British government withdrew all the taxes except that on tea. This did not appease the colonists, who boarded a ship in Boston harbour loaded with chests of tea, and threw them overboard into the sea as a protest to proclaim that there could be no taxation without representation in the British parliament. This event was described then and ever after as the 'Boston Tea Party'.

The 'Boston Tea Party' fracas led to the American Revolution and the declaration of American Independence in 1773. Thus it was tea that played a key role in altering the course of history. Through the centuries, tea has also symbolized warmth, friendship, mutual respect, and caring. Ralph Waldo Emerson wrote in the eighteenth century, 'there is a great deal of poetry and fine sentiments in a chest of tea'. Meanwhile, tea was moving overland from China to Russia through the caravan trade and by the beginning of the eighteenth century became a common drink in Russia.

Amongst the fierce trade competition, the trade with China began to pose considerable payment problems since China imported virtually nothing. But the East India Company which had by that time well established in India at Madras, Bengal and Bombay was able to survive by illegally transmitting the Indian opium, on which it had a trade monopoly to China for which there was heavy demand. The competition gradually withered and the company consolidated its hold, until its monopoly was to end in 1833.

By the end of eighteenth century, the spread of tea in the west was complete against heavy odds. Italy, Portugal and Holland had taken turns dominating the Trade. It also caught on Russia and was becoming a way of life in England.

BEGINNING OF TEA IN INDIA

While consumption of tea had been expanding, production was still concentrated in China, till the end of nineteenth century. This was mainly because, the existence of tea plants outside China was doubtful. By far, till the end of sixteenth century, tea remained an internal resource to China, with all the refinements in its cultivation and social affiliation, assuming a religious sanctity of its own. Moreover, the Chinese never allowed foreigners to venture into the tea producing interiors that would have facilitated learning the arts of production. Their movements were restricted within the trade centres in Canton port.

In the late eighteenth century, attempts to seriously explore alternative sources of tea supply began which eventually resulted in the evolution of tea industry in India, beginning in Assam. The forces that led to this development were manyfold. While the habit of tea consumption was becoming increasingly common, with mounting demand in the West, the traditional sources of supply, namely Japan and China, were not responding appropriately. Further, the company with its monopoly began to exploit the situation resulting in large scale smuggling, adulteration and confusion, which combined together with the evolving entrepreneurship led to the Indian tea era.

However, by the mid-sixteenth century, when tea became popular in the West, it was weakened in Japan by the warring feudal lords and political disunity. But, towards the middle of the seventeenth century, Japan achieved political unity and increasingly harsh restrictions were placed on western trade. Following a conflict with Dutch missionaries, all her ports were closed in 1637-38 and Japanese travel abroad was fore bidden. And with this, one source of tea was alienated from the West.

As for China, its cultural isolation and the long distance from the West were the two main reasons due to which tea remained inside its boundaries until the late 1800s.

The intricate processing of tea before shipping was never disclosed and always haunted the westerners, even while they were serious in the propagation of tea in India in the later periods.

Meanwhile, the artificially high prices generated by the monopoly power of the East India Company began to be challenged by dual winds of change blowing through the West; free trade and free government.

Infact, India was found suitable for tea growing much earlier. John Albrecht Von Mandelso, in his 'Travels into the East Indies' published in 1662 extensively discussed about the use of the beverage. The Dutch and the Company officials grew tea plants ornamentally with Chinese seeds and English naturalists grew experimental plants in Calcutta and Saharanpur Botanical Gardens.

Though there are three distinct races of tea viz., the China, the Assam and the Combodian types, there has been some confusion as to whether Assam is really a place of origin. And the question has not yet been conclusively settled. The discovery of indigenous tea in Assam in 1823 led to the origin of the tea industry in India. However, the Calcutta Agricultural Society differs from the above opinion. It has consistently held that in the early 1700's, the ships of the East India Company frequently brought the tea plants in the country by way of curiosity. Col. Kyd, a resident of Calcutta and a famous botanist, saw tea plants growing in his garden in 1780. This information was sent to Sir Joseph Bank and in 1782 his garden was handed over to Botanical Garden of Calcutta. In 1788, Sir Joseph Bank recorded the existence of indigenous tea growing wild in Coochbehar and Rangpur districts of Bengal and suggested the cultivation of this plant. The wild teas of Coochbehar confirmed the first discovery of indigenous tea in India.

Inspite of these indisputable proofs, the East India Company successfully blocked the efforts to grow tea in India, to preserve its monopoly and the demand for free trade grew stronger among British merchants. The campaign of about thirty thousand independent London tea dealers finally led to the end of the monopoly of the company in tea trade with China by 1833. Only after this, the company started looking to India for tea supply.

A junior official of the company submitted a memorandum in early 1830s stating that "some better guarantee should be provided for the supply of this article (tea) than that already furnished by the toleration of the Chinese Government" (Banerjee, 1996). On 24th January, 1834, the then Governor General, Lord Bentinck appointed the Tea Committee. The committee recommended the lower hills and valleys of the Himalayas, the eastern frontier, the Nilgiris and the mountains of the Central and South India, as suitable areas for tea cultivation. It also acknowledged the indigenous existence of tea plants.

Its Secretary, Gorden, was sent to China to bring back plants and seeds besides cultivators and know-how. The first despatch of seeds from China sent by Gorden arrived at Kolkata in 1835 and the young plants were distributed to Assam, the Himalayas and the Nilgiris. However, attempts to establish tea plants from China were not broadly successful and hence a beginning was made to exploit the 'indigenous plants'.

By the middle of the nineteenth century, corporate tea companies were organised to operate in Assam and elsewhere. By 1856, major production centres began in Darjeeling and Cachar, in the Terai in 1862 and in the Dooars in 1874. In South India, Dr. Christi was the first to experiment with the cultivation of tea in the Nilgiris in 1832. This was followed by rapid growth in Travancore, Wynaad and the Anamalai. From the modest beginning in 1839, tea today has come to occupy a leading role in the economic life of India (Banerjee, 1996).

Birth of Indian Tea Industry

The birth of Indian tea industry was marked by the discovery of indigenous tea plants in Assam in 1823 by Robert Bruce. This received momentum when the East India Company in 1833 lost the tea trading monopoly in China. In 1835, a scientific deputation was sent to Assam to report on prospects of the tea industry and the team saw tea plants in many parts in the hills between Assam and Burma. In 1836, Bruce was made the Superintendent of Tea Forests.

The first tea plantation was started in 1838 at Jaipur with plants brought from China. In subsequent years, few more plantations were started near Deohall, Chota Tingeri and Hukanpukri. Meanwhile, the hold of East India Company was increasingly at stake. Among others, Bruce formed the Bengal Tea Company at Calcutta with the objective of purchasing the produce from the East India Company's tea plantations in India. A similar Company was also established in the same year in London with the same objectives. The two amalgamated immediately into the Assam Company, signifying the genesis of the modern tea plantations of India.

In 1839, the first consignment of tea from India (eight chests) was shipped to London and it was auctioned at a price ranging from six to thirty four shillings per pound. The company formed with a nominal capital of one million sterlings in 1840 began to bring under cultivation the Assam forests in so wide a scale that the whole experiment turned out to be unproductive in the beginning. With Government transferring the Superintendent Bruce and most of its plantations, the company sanctioned and incurred extravagant expenses. The soil selected was bad, labour insufficient, superintendence lacking and the tea, when manufactured was rejected uniformly as bad in London. The entire profits eaten away in losses, the company was reduced to a state of insolvency and its 20£ shares sold for less than one rupee in Calcutta. In 1840, two thirds of experimental teas were handed over to new company. Bruce, on whose efforts the plants took roots in India, was sacked as a scapegoat in 1846 and following the advice of one Mr. H. De Mornay, the company made a profit for the first time in 1847. And then with the inherent capitalistic instincts, the directors began to genuinely plough back whatever little profits the company made. From then, the industry picked up.

The Great 1851 London Exhibition displayed the Assam Company's tea that received the Prize Exhibition Medal. Tea plantations became an easy and attractive area to invest and during the decades that followed many tea estates were opened in Northeast and South India by individual entrepreneurs or by family concerns. Since China was not interested in world trade, gradually India emerged to be the largest producing and exporting country, displacing China.

In 1852, the first tea company in India paid its final dividends. The second limited company in 1859 was formed in Assam called Jorhat Company. During 1862-67, tea cultivation started in Chittagong and Chotta Nagpur. Ultimately tea cultivation began in many districts in India wherever there was some hope of a success. Within few months, India along with Sri Lanka dominated the world tea trade.

The Ageing of the Industry in India

While the Assam Company was struggling to get out of its financial tangle, the government absolved all its direct responsibilities by disposing its remaining unprofitable tea gardens. The whole gamut of the tea industry came under private entrepreneurs. Tea-making machineries were gradually invented. The British dedication allowed them to master the skills in years that took centuries for the Chinese.

Disturbed by the congestion and expensiveness of living in London, many officials and adventurers turned to Assam hillsides. Gradually, the development of the tea industry, in the later decades of the nineteenth century in India, became under limited liability companies or family concerns. The agency house system came into existence as a link between the London-based owner and the plantations in Assam. For various reasons the system still persists.

Formation of Tea Association

The Tea planters formed an association named Indian Tea Association (ITA) on May 18, 1881, with its headquarters at Calcutta for promoting their common interests and objectives. Subsequently, the Indian-owned tea concerns formed an association named Indian Tea Planters Association. The industrial relations got formalised through state intervention. The sudden expansion of the industry led to disastrous competition in the recruiting areas. As a result, various emigration laws were passed finally in 1915 by which recruitment by private contractors was abolished and the Assam Labour Board was created. In 1917, various planting associations connected with the labour supply were amalgamated under the Tea Districts Labour Association.

Tea Research

The Indian Tea Association started a scientific department in 1900 with laboratory accommodation in Calcutta. Later the research wing expanded and proliferated. For greater interest of the industry, the Tea Research Association was established in 1964 at Tocklai, Assam and was funded jointly by Council of Scientific and Industrial Research [CSIR] and Tea Board of India. Subscriptions of member tea estates and other associate members were called for to carry out the research work. In South India, the development received much fillip only after the world wars. In 1893 the United Planters Association of South India (UPASI) was founded, which henceforth has been looking after the varied interests of the plantations, including research. The first scientific department, the Tea Research Institute of UPASI had its origin in the year 1926 at Coimbatore District, TamilNadu, which also got gradually expanded.

Affiliated to these two associations are the State Planters' Associations and many District Planting Associations. The principal function of these two associations is to represent the interests of the planters in all effective forums at national and international arena. They also undertake commodity research and serve as the nucleus of industrial relations. The UPASI scientific department was founded more than 70 years ago and is supported by the acreage subscription from the member growers. The first tea research centre was started at Peermade in the Idukki district of Kerala. Later in 1926, a tea research station was set up in Devarashola in Nilgiris. In 1965, a new full fledged research station was started in Anamalais with capital grant from the Tea Board. All the Tea Research Institutes (TRI) receive funds from the National Tea Research Foundation. A Krishi Vigyan Kendra (KVK), an affiliated body of UPASI was established in 1982 in order to reach the poorest of poor among the farmers with lab-to-land programmes with regard to tea. Improved agricultural practices were not either reaching the small farmers or they were not getting the proper guidance. KVK was to fill this void. In campus and off-campus training programmes for small farmers, demonstration farms etc. are the other activities of UPASI-KVK. It also has a tea plant nursery where annually over four lakh plants are grown scientifically and are given to small growers free of cost and others at a nominal charge on funding made by the Tea Board. UPASI-KVK has also set up a mini tea factory to give training to tea makers (UPASI, 1997).

Tea Trade

In 1874, the land located in the East of Teesta river was explored with the foreign liability of growing tea plants. By 1876, as many as 13 gardens had started cultivating tea. In 1878, the first two Indian tea gardens by name Megalkat Tea Estate and Indian Tea Company Ltd. were established though the Company actually received a grant of 741 acres on 19 March 1881. As the industry developed, marketing also began to be better organised. The initial trade in the Chinese-controlled Canton was done through transactions between foreign and local traders. But when the East India Company introduced the system of auctions, which persists till this day, the venue shifted to London. The first tea auction started on May 26, 1841 in London under the pioneering leadership of Lyal & Co., Mincing Lane, London. It was the centre of World Tea activities prior to World War II. Public auctions, from early days, were also held in Calcutta. After independence, Calcutta gained momentum as an auction centre. The first tea auction started in Calcutta on December 27, 1861. In March 1947, tea auctions were started in Cochin, later at Coonoor, at Guwahati on September 25, 1970, at Amristar on April 30, 1964, at Siliguri in October, 1976 and at Coimbatore in November, 1980.

International Tea Regulation Scheme

During the second half of the 19th century and first half of the 20th century, four major slumps [1866, 1879, 1896-1904, and 1920] took place. To counteract the situation, India, Sri Lanka, Netherlands and East Indies reached an agreement on voluntary basis to curtail tea production. The world economic depression resulted in decline in tea consumption and stocks continued to pile up till 1932.

International Tea Agreement

Producing countries like India, Indonesia and Sri Lanka entered into an agreement on April 01, 1933 for a period of five years to bring about balance between supply and demand for tea in the world market. A second agreement was signed and came into force for a further period of five years i.e. 01st April, 1938 to 31st March, 1943. The agreement was extended upto 31st March, 1948. Further an interim agreement was signed in April, 1948 and continued till 31st March, 1950.

Tea Control Act and its Amendment

The Indian Tea Control Act 1933 was amended in 1938 in 1943, and subsequently in 1950. The administration of the Act in 1938 was vested with a Committee called 'Tea Licensing Committee' which consisted of a Chairman appointed by the Central Govt. and 14 other members of whom 10 were nominated by the Industry and 04 elected from the constituencies embodied in the Act. The Committee continued upto 31st December 1949.

Tea Board

Both the Central Tea Board Act 1949 and Indian Tea Control Act 1938 were replaced by the Tea Act 1953 which came into effect from 01st April 1954. The functioning of the Central Tea Board and Indian Tea licensing committee were entrusted with the Tea Board, a commodity board under the administrative control of the Ministry of Commerce, Government of India, which is responsible for promoting development of tea industry.

The constitution of the Board represents various interest groups of the tea industry such as owners of tea estate and producers of tea, consumers of tea, government representatives from the tea growing states of India viz. Assam, West Bengal, Tripura, Tamil Nadu, Kerala and Himachal Pradesh, Members of Parliament, exporters and domestic traders of tea, persons employed in tea estates/gardens and persons representing other interests.

The functions of the Board are defined by the provisions of the Tea Act. It is primarily concerned with the development of the tea industry and trade of tea, extension of area under tea cultivation, research activities concerned with improvement in the quality of tea production and cultivation methods, promotion of exports, other licensing activities aimed at containing adulteration and other undesirable activities, interception on behalf of workers for adoption of welfare measures etc.

The Tea Board is headed by its Chairman, which is again sub-constituted into the Standing Committees such as Executive Committee, Development Committee, Labour Welfare Committee and the Export Promotion Committee.

The Tea Act, 1953 stipulates that the Tea Board is to

- Promote the development of the industry
- Regulate production and extent of cultivation of tea
- Foster co-operative efforts among growers and manufacturers
- Assist or encourage scientific, technological and economic research
- Assist in the maintenance of demonstration farms
- Assist in the control of insects and other pests and to protect tea leaves from diseases
- Regulate the sale and export
- Train people in tea tasting
- Increase the consumption in foreign countries and carry on propaganda for that purpose
- Register and license the manufacturers, brokers, tea waste dealers and persons engaged in the business of blending of tea
- Improve the marketing of tea in India and elsewhere
- Collect statistics from growers, manufacturers, dealers and the persons who are connected with tea industry
- Secure better working conditions and incentives for tea industry's workers and
- Undertake various other steps for the increase in production and enlargement of export with a view to earning larger amount of foreign exchange for the country.

PRESENT STATUS OF INDIAN TEA INDUSTRY

The 'Plantation Industry', which was developed over 150 years, has a colonial origin. It is now a valuable asset to the nation. Plantation industry is a branch of agriculture in the broader sense. The organization of modern plantation relates more to the factory than to the farm. Generally, there is a specialization in one crop, which is produced on a large scale for export and for maintenance work. The output is continuous through out the year. The major plantation crops like tea, coffee, rubber and cardamom have now developed to a large extent.

Plantation Industry

In India, plantations account for 0.8 per cent of the total cultivable land. They also contribute five per cent to the national income in agriculture. Besides, they provide more employment per rupee of investment in the country than either agriculture or in industry. Plantation industry employs a large amount of labour force especially women workers which are the highest as compared to any industry. Moreover, this industry helps in the development of other industries.

Among the different plantation crops, tea is considered to be the most important crop in our country. It is the second biggest foreign exchange earner of Rs. 1,794 crore which is exported to about 80 countries. It also contributes a sizeable amount of Rs. 6,795 crore to the national income. Moreover, it provides direct gainful employment to a large number of people (more than 12.6 lakh) and helps in providing indirect employment in various sectors like road construction, transportation, building of warehouses, manufacture of plywood tea chest, aluminium foil, tinplate, metal fittings, paper, card board, fertilizers, insecticides, pesticides, coal, iron, steel, etc. Apart from its contribution to the economy of India, tea today provides to the common man a pleasant and stimulating non-alcoholic beverage.

Tea: Agriculture as well as Industry

Tea can be placed both under agriculture and industry. It is industry in the sense that tea is a processed and manufactured commodity, which is subject to excise duty and cess. It is also an agricultural crop because it is grown on land and thus agricultural income tax is also levied on it. Moreover, tea plantation is governed by both agricultural and industrial rules and regulations. The tea crop involves both agricultural and industrial operations. Agricultural operations like planting, manuring, irrigation, weed control, disease control, pest control, plucking, transportation of green leaf and uprooting are undertaken for growing tea. The final product of tea comes through various processing and manufacturing stages like withering, rolling, fermenting, drying, weighing, sorting and cutting which place tea under industry. Thus the tea plantation, though a big agricultural enterprise, has also some characteristics of industry. The establishments and operations of such industry require massive investment of capital. Modern technical equipment is also necessary for processing the product. An outstanding feature of the plantation economy is that a large portion of tea has been sold in the internal markets from the very inception of this industry. This has, therefore, made it necessary to have well-organised marketing services. The requirement of capital, technical know-how and organized marketing services explain why, the unit of production of tea has taken the shape of a large industrial establishment.

Tea Industry: Earner of Foreign Exchange

A considerable volume of tea is being exported from India and this has given the tea industry a place of importance in the national economy of India as an earner of foreign exchange. Table 2 shows the value of exports of tea as compared to total value of exports of all commodities. The share of export value of tea (Rs. 122 crore) to total export value of all commodities (Rs. 661 crore) accounted for 18.46 per cent in 1961-62 and has registered a declining trend in recent years to an alarming proportion of just 0.39 per cent in 2005-06 (export value of tea Rs. 1,794 crore and export value of all commodities Rs. 4,54,800 crore).

Tea Industry as a Source of Employment

Tea plantation industry not only occupies a very important role in the national economy as an earner of foreign exchange but it also provides gainful employment to a large number of people. This industry, which is largely labour intensive, provides employment to a large number of female workers. The industry accounted for 20 per cent and 15 per cent of the total labour force employed in the private sector in 1961 and in 2002 respectively. The ratio of tea labour to total labour employed in the private sector has registered a declining trend in recent years (Table 3).

Contribution of Tea industry to Total Revenue

Tea is a commodity which is subject to direct taxation in the form of excise duty, export duty, and cess under Tea Act 1951. In addition to these, various state levies are also imposed on the tea industry and these varied from State to State. Revenue earned by way of export duty, excise duty and cess are presented in Table 4.

Tea as a Supporter of Allied Activities

Tea is the mainstay of plywood industry in our country. Tea produced in different regions is mostly packed in plywood chests for sale at the auctions and for exports. However, recently various other alternatives have also been evolved in place of plywood chests. Tea helped the coal industry. Huge amount of coal is required for running the factories. Of course, in recent times, instead of coal, gas is being used. Further, tea industry facilitates the fertilizer industry and forest industry. It supports the industries engaged in the manufacture of pesticides, insecticides and weedicides. It also adds to the development of various industries like iron, steel, cement, aluminium foils, tin plates, metal fittings, paper, card boards, transport and warehousing.

GEOGRAPHY OF INDIAN TEA PLANTATIONS

The discussion about Indian tea industry is facilitated much by classifying it into North-East and South Indian subsystems. The tea growing areas in India and South India are shown in Figures 1 and 2 respectively. The area under tea in North-East India is largely clustered around two great valleys: the Brahmaputra valley, otherwise called the Assam valley and the Surma valley. Practically tea is grown in the plains or lower ranges of these two valleys, the exception being the tea grown in the Darjeeling district. The other major areas are the Dooars and Terai.

The Assam valley, contained between the Himalayas in the North and the Barail range in the South, encloses the major tea growing districts of Lakhimpur, Sibsagar, Nowgong, Darrang, Kamrup and Goalpara districts, all coming under the valley of the Assam State, account for more than 52 per cent of area and production of tea in India. The Assam valley is relatively flat, with alluvial soils thousands of feet deep and with variations in rainfall as one moves towards east along the valley. Though frosts are never reported, the temperature falls sharply in December, gradually rises in March- April and persists till the end of the monsoon periods.

The Surma valley is formed by the Shillong Plateau on the north and the Lushai and Chittagong hills in the east and south-east that fall under Bangladesh. Cachar district, again coming under Assam, is enclosed in this valley, though the valley itself extends into Bangladesh including the tea growing areas of Sylhet and Chittagong. Unlike the Assam valley, the tea areas coming under this valley are uneven, being formed of ranges of low hills. Though this valley too derives its precipitation from the monsoon winds, the rainfall is relatively lower than in Assam valley. Climatically, this valley comes closer to Assam valley, with alluvial soils suited for tea cultivation.

The valleys apart, the tea districts of Dooars and Terai-falling under the state of West Bengal-form a long, narrow strip of land adjacent to the Himalayas. The soils are alluvial, with precipitation better than the two valleys, though the climate remains generally the same. The Darjeeling tea areas, also coming under West Bengal, are unique in that they are situated in altitudes ranging from 1000 to 6500 feet. The tea district is a small rectangular area surrounding the town Darjeeling. From the higher elevations of this district come the world's most priced teas.

In South India, tea is concentrated in two states; Tamil Nadu and Kerala, with small (about 0.5 per cent) area in Karnataka. Unlike the North Indian plains, most of the area in south are along the Western Ghats, concentrated around the Nilgiris and

Anamalais of Tamil Nadu, the Kannan Devan hills and the western slopes of the Western Ghats including the Wynaad areas of Kerala.

Tea cultivation ranges from 2000 to 3000 feet in the Wynaad region along the slopes of the Western Ghats and reaches upto the Nilgiris plateau in the Nilgiri-Wynaad region. Most of the Nilgiri plantations are situated in about 5000 feet above mean sea level. Further south along the Western Ghats, Anamalais are situated where tea cultivation is taken up in elevations of 3000 feet, followed by Kannan Devan hills having plantations at elevations of 5000 feet. Still beyond, some tea growing districts like Quilon, are situated where tea is grown from sea level in the lower elevations of the Western Ghats. The tea plantations of South India along the slopes of the mountains or plateau receive their rainfalls either from the south-west or north-east monsoons. The average rainfall ranges from 100 to 750 mm.

Zone wise Classification of Tea

Tea units and tea growing regions are classified into revenue units and zones. At present there are two zones. Zone I includes Dibrugarh, Lakhimpur, Shibsagar, and Darrang [exluding Barsola circle in North India] districts while Zone II includes all other North Indian districts excluding Barsola circle of Darrang and also South Indian districts.

Geographical Distribution of Area, Production and Yield of Tea

Among all the tea producing countries of the World, India occupies the second position in acreage under the crop. The main regions growing tea in India are Assam, West Bengal and Tripura in North India and Tamil Nadu, Kerala and Karnataka in South India. Besides, it is also grown in a lower acreage in Bihar, Uttar Pradesh, Himachal Pradesh, Sikkim, Manipur, Orissa, Nagaland and Arunachal Pradesh. The details of area under tea in India and in various States are shown in Tables 5.1 and 5.2. Total area under tea stood at 523 thousand hectare of which North India contribute 77.9 per cent and South India 22.1 per cent in 2005. The tea produced in various parts of India caters to the needs of the consumers in a very wide range. Darjeeling in West Bengal produces the 'Darjeeling tea' which is light, aromatic, fine tasting and is considered as the world's most prized tea. The first and second flush of tea produced in Darjeeling commands a very high premium and sold at more than Rs. 1000 per kg in the world market (Rohini, 2001). The later flushes of this tea are sold at around Rs. 200 to Rs. 400 per kg in the auction centres. Thus, this tea accounting for only a little over one per cent in terms of volume of tea output in India, account for 10 per cent of export earnings from tea. In the state of Assam, 35 per cent of the tea area is in the Dibrugarh district while Terai and Darjeeling districts accounts for 63.76 and 15.28 per cent respectively of the area under tea in West Bengal.

In South India, total area under tea stood at 115 thousand hectare of which Tamil Nadu accounts for 65.95 per cent and Kerala 32.21 per cent in 2004. In Tamil Nadu, the tea plantations are located in the Nilgiris, Anamalais, Kanyakumari, Madurai and Tirunelveli districts and 53.85 per cent of the total area is distributed in the Nilgiris district itself. Tea industry is normally considered to be a corporate entry in most of the growing areas, but in the Nilgiris, it has the largest conglomeration of small growers. Of the 62,039 ha. of tea area in the district, the area under small growers accounts for about 43,699 ha. About 61,974 small growers contribute to an annual production of more than 86 m. kg. The preponderance of small growers has led to the existence of a number of bought leaf factories and the government sponsored co-operative factories for processing tea leaves from the small growers. The economy for the small growers revolves around the price fetched for the green leaf which in turn is influenced by the price realisation for the end product.

India is the largest producer of tea in the world and produced 892.97 m. kg. of tea in 2004. In production of tea, North India and South India contribute 74 and 26 per cent respectively. In the regional level, Assam and Tamil Nadu account for 65.79 and 70.64 per cent respectively. The familiarly known 'Nilgiris tea' produced in the Nilgiris district of Tamil Nadu accounts for about 56.23 per cent of tea production in South India and 14.53 per cent at all India output. Nilgiris tea grown in Tamil Nadu caters to the need of Russian market. The details of production of tea in India and in various States are shown in Tables 6.1 and 6.2. The average yield rate is increasing ever since 1951 and the estimated All India average yield in 2005 was 1774 kg / hectare. The yield rate in South India is marginally higher than that in North India of which Karnataka leads with 2527 kg. / hectare (Tables 7.1. and 7.2.). Tea production in India is one of the highest in the world. It has increased from 248 m. kg. in 1950 to 893 m. kg in 2004, approximately three and a half folds of this increase has occurred both due to area expansion and yield. Though, India continues to be the largest producer of tea in the world, it is fast loosing its primacy in the global production.

South India accounts for 25.84 per cent of total production and on the yield front, the increase in yield over years has been rapidly occurring in South India than in North India and the South has registered the highest yields among the countries in the world (Table 8). But, nearly 54 per cent of the plantations in our country are over 30 years old and more than 35 per cent are over 50 years old. They give poor yields due to old age and also due to low yielding planting materials. For boosting the output of tea, there is an urgent need both to expand the area as well as to take up replanting with high yielding variety materials. However, the replanting has long gestation period and is very costly, it is going on at the rate of only one per cent per annum against a desirable rate of minimum two per cent. The area expansion programme is also limited, as no more land is available for expansion under tea in the South and it is very minimal in the North-East.

Size wise Distribution of Tea Estates

The details on distribution of estates are furnished in Table 9. Huge disparity in the size wise distribution of tea estates prevail between the two regions.

Table 9. Size-wise Distribution of Tea Estates in India (2004)

(In numbers)

Classification	Region		All India
	North India	South India	
Up to 10.12 hectare	59368 (97.92)	67998 (99.42)	127366 (98.71)
Above 10.12 to 50 hectare	233 (0.38)	156 (0.23)	389 (0.30)
Above 50 to 100 hectare	146 (0.24)	47(0.07)	193 (0.15)
Above 100 to 200 hectare	234 (0.39)	53 (0.08)	287 (0.22)
Above 200 to 400 hectare	302 (0.50)	104 (0.15)	406 (0.31)
Above 400 hectare	346 (0.57)	40 (0.06)	386 (0.30)
Total	60629 (100.00)	68398 (100.00)	129027 (100.00)

Source: Tea Statistics 2003-04, Tea Board, Kolkata.
Figures in parentheses indicate percentages to respective totals of North India, South India and All India.

About 98 per cent of the total tea estates belong to the size group of upto 10.12 hectare in North India while it is more than 99 per cent in South India. The share of above 400 ha. group was more in North India as compared to South India.

Age wise Geographical Distribution of Tea Plantations

Bushes are the assets of tea estate-owners as they provide green leaves which is the basic raw material for made / green tea. The composition of assets i.e. bushes are classified into four groups viz. tender [below 5 years], progressive [5-10 years], economic [10-50 years] and old [above 50 years]. On an average 40 per cent of the total area under tea contains bushes which have attained the economic age group while 35 per cent are old age bushes and only nine per cent are tender bushes. As more than one-third of the total area is covered by overage bushes, there is a need for rehabilitation programmes in the form of new planting [extension/replanting etc.]. (Table 10). The distribution pattern varies among North and South India in that South India has nearly 45 per cent as old bushes while it was one third in case of North India.

Table 10. Area under Different Age Groups of Bushes in India (2004-05)

(in thousand hectare)

Age Groups	Region		All India
	North India	South India	
Below 5 Years	25216 (7.41)	14759 (14.43)	39975 (9.03)
5 to 10 Years	49743(14.61)	16568 (16.19)	66311 (14.98)
11 to 20 Years	43782 (12.86)	6635 (6.49)	50417 (11.39)
21 to 30 Years	40180 (11.80)	4851 (4.74)	45031 (10.17)
31 to 40 Years	40067 (11.77)	5027 (4.91)	45094 (10.18)
41 to 50 Years	29688 (8.72)	8925 (8.72)	38613 (8.72)
Over 50 Years	111786 (32.83)	45546 (44.52)	157332 (35.53)
Total	340462 (100.00)	102311 (100.00)	442773 (100.00)

Source: Tea Digest 2005-06, Tea Board, Kolkata.
Figures in parentheses indicate percentages to respective totals of North India, South India and All India.

Types of Tea

Tea which is available in the market is in fact 'Made tea'. Green leaves plucked from the tea bushes are manufactured into 'Made tea' or 'tea' in the tea factories through a series of manufacturing processes. Green leaves in the process of manufacturing 'Made tea' generates by-product known as 'tea waste'. Infact, tea waste is unfit for human consumption and has three uses namely, (i) manufacture of caffeine (ii) manufacture of instant tea and (iii) use as manure in the tea field. In order to prevent tea from any possible adulteration, the PFA Act, 1954 has come into existence (Ramamoorthy et al., 1997). Tea therefore shall conform to the following specifications (Table 11) as indicated in the PFA Act.

Table 11. Specification of Tea under PFA Act

Particulars	Percentage content
Total ash determined on tea dried to a constant weight at 100°C	4.0 to 8.0 per cent by weight
Total ash soluble in boiling distilled water	not less than 40.0 per cent of total ash
Ash soluble in HCL	not more than 1.0 per cent by weight on dry basis
Extract obtained boiling dried tea (dried to constant weight at 100°C) with 100 part of distilled water for one hour under reflux	not less than 32 per cent
Alkalinity of soluble ash	not less than 1.0 per cent and not more than 2.2 per cent expressed as K2O on dry basis
Crude fibre determined on tea dried to constant weight at 100°C	not more than 17.0 per cent

Source: Tea Board, Kolkata.

Quality of 'Made Tea' or 'Tea'

Generally, two to three leaves and a bud (85 per cent) is recommended as raw material for tea manufacture, because most of the chemicals which contribute to quality are present only in the tender leaves. If coarse and banji leaves are included, it leads to poor quality of 'made tea'.

The term quality in its broadest sense is used as a description of all the characters of tea by which it is judged on its market value. So, quality means the summation of the desirable attributes comprising of internal and external characters like aroma / flavour, strength, colour, briskness and character of infused leaf. The characteristics of tea is determined by the major components of the leaf that is polyphenols, the peptic substances, the flavouring constituents and caffeine. The caffeine is known for its stimulating effect. The green tea leaves of the plant has its natural 'aroma' and efforts of the tea manufacturer is generally aimed at to maintain the natural aroma in the 'made tea' as far as possible.

The tea quality is primarily determined by the genetic properties of the tea plant and those of the tea bush in particular. Both soil and climate are influencing the quality of tea. Temperature, humidity, duration of sunshine and rainfall are important in determining the quality. Field operations like pruning, fertilizing, shading, plucking round and plucking standard plays an important role in determining the quality of tea (Dwibedi, 1999).

Tea Processing

'Made tea' or tea manufactured from green tea leaves is generally classified into two types namely, black tea and green tea. Green tea is different from Black tea since fermentation of green leaves is arrested in manufacturing green tea. Again black tea is of two types namely orthodox tea and CTC (CTC stands for Crushing, Tearing & Curling) tea. Orthodox teas are manufactured with the help of orthodox roller in the process of rolling (traditional method) while CTC machine/rotervan is used in rolling process in manufacturing of CTC teas.

In the tea manufacturing process, green tea leaves are first subjected to withering, an operation where the concentration of chemicals in the leaf are increased contributing to better quality, in addition to moisture removal. Then, rolling is done to crush, tear and curl the leaf into small size and to form a thin film of juice. It is then coated on the surface of the leaf particle to enhance the chemical changes for CTC tea. For orthodox tea, the tea leaves are twisted and rolled to produce a stylish product which contains a high percentage of leaf. This tea produces lesser cups with high aroma, lighter colour and thin liquor, while CTC tea produces more number of cups with poor aroma, stronger in colour and taste. Fermentation is done to bring about the chemical changes necessary to make tea liquor palatable. It is in fact, an oxidation process by which the rolled leaf looses its green colour and acquires coppery colour. Then, drying is done to arrest fermentation, to remove moisture and to produce tea with good keeping qualities (Ramamoorthy et al, 1997).

Tea processing is done in the bought leaf factories and co-operative factories in India. Of late, there are 22 co-operative factories for tea manufacturing in India spread over the various tea producing areas (Table 12). The bought leaf factories dominate the production of 'made tea' and especially in Tamil Nadu due to the preponderance of small growers, the bought leaf factories existed in large number (185) and there are 455 bought leaf factories in India.

Apart from orthodox, CTC and green tea, powder tea which is known as instant tea is also being manufactured in India and in few other tea producing countries of the world like Kenya and Sri Lanka. The procedure for manufacturing instant tea is different from that of black tea or green tea. The raw materials used for manufacturing instant tea are green tea leaves and/or tea waste. The manufacture of instant tea in India has started since 1960.

The black tea is further processed with the help of tea bagging machine to manufacture 'tea bags'. This is one of the 'convenience tea' generally preferred by the consumers of the western countries. Filter paper is being used as packaging material for manufacture of tea bags. Instant tea and tea bags are generally known as convenience tea, because they are convenient for consumers to get the liquor with less hazards. Moreover, in order to preserve the quality of tea during its different stages of trading activities particularly in retail trading and also to maintain the uniformity of the quality to the extent possible, black tea or green tea are packeted either in original form or in blended form in small consumer packs (Dwibedi, 1999). These are known as packet tea. India is earning considerable foreign exchange through the exports of value-added tea.

It may, therefore, be the strategy of all the developing countries that they should bring in certain structural changes in the product they export. This will help them in improving their share in world trade and in earning more foreign exchange. Besides, this would enable the developing countries to be known not only as exporters of 'primary' products but also as exporters of 'convenient' products or manufactured goods which can directly find place in the display counters of the consumer stores in the developed countries. In other words, a switch over from 'primary' to 'processed' goods might open up new vistas of economic growth for the developing countries through increased exports. India has been trying to maximise exports in the form of processed tea such as packets, tea bags, and instant tea.

Export of Packet tea

In India, tea packets containing loose tea are still the normal form of packaging. India for the first time started the export of packet tea (in consumer pack up to a size of 1 kg) in 1965. Six years later, she ventured into export of tea bags, instant tea, etc. Since then India has been making steady and consistent progress in the export of packet tea. In 1965, with only two firms in the field, she had exported two m. kg. of packet tea and at the end of five years, with entry of few more firms, her tea exports doubled to four m. kg. in 1971-72 and in another four years, exports reached the level of about 11 m. kg. (1975-76). The progress, since then, is noteworthy with the entry of more than 200 firms in the field.

In 1995-96, export of packet tea increased to 84 m. kg. and thereafter declined to 30 m. kg. in 2005-06. Year-wise data further revealed that on many occasions India could not retain the volume of her preceding year's exports. Export of packet tea showed a record increase of 84 m. kg. in 1995-96 followed by 82 m. kg. in 1998-99 and 81 m. kg. in 1996-97 (Table 13). On an average, India exported about 68 m. kg. fetching Rs. 712 crore with average unit price of Rs. 105 per kg. India acquired an important position as the worlds' largest direct exporter of packet tea surpassing the U.K. She is the leading exporter of packet tea and accounts for 60 percent of world trade in packet tea. It is interesting to note that packet tea imports constituted nearly 20 per cent of total world imports and India constitutes for nearly half of it by way of direct export of this item during the year 2005-06.

Region-wise Export of Packet Tea

During the last four decades, major changes have already taken place in the world tea market. Countries like USA, UK, Canada and others have preference for packet tea, tea bags and instant tea in recent years. The countries in the region of West Asia and North Africa place their order mostly for these items. The exports of packet tea in the countries of West Europe (United Kingdom, Irish, Netherlands, Germany, Austria, Finland etc.) are also gradually falling. On an average, about four m. kg. are exported to West Europe, 21 m. kg. to East Europe and 1.5 m. kg. to America (North & Latin America).

Export of Tea Bags

In order to cope up with changing consumer preferences, India started production and export of tea bags from 1971 onwards with three firms. Progress made since then has been considerable and at present there are many firms manufacturing tea bags. Export of tea bag in 1973-74 was 144 thousand kg. which went up to 2524 thousand kg. in 2001-02 showing an increase of 17.6 times. There was an appreciable increase of this item from 1994-95 on wards. Except 1995-96, exports of packet tea boosted up from 1716 thousand kg. in 1996-97 to 2169 thousand kg. in 1997-98. It further improved from 2415 thousand kg. in 1998-99 to 8379 thousand kg. in 2005-06. Average export of packet tea during the last five years was to the level of 5219 thousand kg. fetching Rs. 209 per kg. It is also observed that average unit price stood at Rs. 208 per kg (Table 13).

Region-wise Exports of Tea Bags

Tea bags are exported mainly to countries like United Kingdom, Irish Republic, Germany, France, Belgium and Luxemburg of West Europe. A substantial quantity is also exported to east Europe i.e. CIS countries (Russian Federation, Ukraine, Latvia, Kazakhstan, etc.) and Poland. Meagre quantities are exported to USA, Canada and Brazil as well as Iran, UAE, Kuwait, Bahrain, Muscat, Yemen of West Asia and North Africa. Further less quantity in the level of 20 thousand kg. is exported to Asia other than West (Japan), Africa other than North (Angola, South Africa) and Australia and Oceania (Australia). It is interesting to note that over the last three years, quantities exported to East Europe has increased from 1816 thousand kg. in 1999-00 to 2115 thousand kg. in 2001-02, while it was 16 thousand kg. and 84 thousand kg. during the aforesaid period to America. There was a fall in exports from 207 thousand kg. to 106 thousand kg. to West Asia and North Africa.

It could be seen from Table 13 that the export of instant tea increased from 295 thousand kg. in 1973-74 to 3530 thousand kg. in 2005-06(E) showing twelve fold improvement. Similarly, in value terms it was Rs. 92.17 lakh and Rs. 9113.74 lakh in 1973-74 and 2005-06 respectively.

Value addition in respect of packet tea, tea bags and instant tea stood at 4.77, 133 and 190 per cent respectively in 2005-06. Value addition for packet tea ranged from 2 to 50 per cent during the period from 1966-67 to 2005-06, while it ranged from 55 to 236 per cent and 82 to 338 per cent during the same period in respect of tea bags and instant tea respectively. Value addition was reduced to minimum during 1990-91 and 1991-92 in respect of packet tea and tea bags as compared to bulk tea because of increase in the price per kg of bulk tea. The value addition was even negative during 1977-79 and 1996-97 in respect of packet tea as compared to bulk tea because of increase in the price per kg of bulk tea (Table 14).

Export of value added tea showed a record increase of 94 m. kg. in 1997 followed by 86 m.kg. in 1998 and 83 m. kg. in 1995 (Table 15). After 1997, the export of value added tea has shown a declining trend and recorded both in volume and value terms as low as 31 m. kg. and Rs. 447 crore respectively in 2006. The share of export of value added tea to the total export of tea from India showed a record increase of 51.39 per cent in quantity and 52.54 per cent in value during the year 1995-96 (Table 16). Thereafter, the quantity exported declined to 21.58 per cent (nearly 30 per cent lower than in 1995-96) and the value declined to 30.69 per cent (nearly 22 per cent lower than in 1995-96).

Potential and Scope for Instant Teas

Tea is probably one of the most widely consumed beverage in the world and is accepted and acclaimed everywhere. The worldwide acceptance of tea is because of its zero alcohol content, stimulating effect, aroma etc. Many types like black, green, orange, flavoured, golden, pekoe, etc. are available in the market (Table 17). These types are mainly classified according to their manufacturing process, blended with spices and other flavour rendering substances. Brewing of instant tea is a common and old practice. Black and green teas are only products obtained on a large scale from the tea bush and at present none of the other products mentioned above are being exploited on a commercial scale. Efforts have to be made for developing and standardising suitable and effective technologies for tea industry to keep pace with other tea producing countries like China, Sri Lanka and Kenya who has already made their mark in the world export market for tea.

Tea Powder

Although commercial production of instant tea began in the 1940s, little information is available as to what sort of process is suitable, as these techniques have been kept secret by patent rights over the manufactured products. Generally, tea powder, the basic material is derived from the fermented leaf. The usual steps adopted in the preparation of powder are extraction of tea solids followed by concentration of extracts and finally drying of these concentrates, to convert them into powder. Extraction is generally carried out by recovering the solids in water. Concentration of extracts is effected by evaporation of the water at low temperature and under reduced pressure. The final step of drying the concentrated leaf is achieved by subjecting the concentrate to either low temperature, spray, fridge or foam drying. The solid thus obtained is brown in colour and amorphous in nature but on breeding it turns into brown powder.

One such study was conducted in the tea research laboratory in Himachal Pradesh Krishi Vishwa Vidhyalaya, Palampur. The yield of powder from the fermented tea was generally better than that of made tea. At present, a number of laboratories are set up which have invented the technologies for preparation of tea powder.

Problems of Value Added Instant Tea

In expansion of exports of value added items of Tea, India is facing various problems. These are: (i) dearth of indigenous know how in international market, (ii) inadequate production capacity of tea bags, (iii) lack of investment for establishment of firm's brand name and entry into the super markets in foreign countries and (iv) imposition of various tariff as well as non-tariff barriers created by developed countries against the entry of Indian tea in consumer packs.

Development of Instant Tea

As regards instant tea, India is still on the threshold of product development. With the gradual acceptance of instant tea by the consumer, its demand is bound to rise gradually in the near future. Instant tea is processed in two forms, the cold water solubles (CWS) and hot water solubles (HWS). These are manufactured both from the green leaf and from the black tea or from a combination of both types. HWS has limited market in the UK, Australia, etc. While CWS has markets in USA, Tata Finlay, is specialising in CWS and food specialities in HWS. Both the products are manufactured in South India.

TEA MARKETING

Marketing of Tea

Tea being a perishable product, it should be disposed of as quickly as possible. The economic viability of tea industry depends crucially on profitable disposal of its products. The marketing system of India tea deals with marketing channels and Govt. regulations on tea disposal. It refers to the complex system of institutions and operations, which intervene the producer of tea on one hand and ultimate consumer who drinks his cup of tea, on the other hand. Among the alternative means of disposal, the producer chooses the channel, which brings the best price to him within the purview of Govt. regulations. The marketing channel in tea is the pathway of movement of tea through intermediaries from production in the garden to the hands of the ultimate consumers within or outside the country.

Modes of Disposal

Tea is marketed and made available to the consumers in two different forms viz. loose and packaged. There are mainly three modes of disposal of tea.

- Sale through auctions
- Ex-factory or ex-garden sale
- Sale as direct export by the producer to the importer of importing countries through forward contract.

There are 13 auction centers in the world at present out of which seven are in India. Most of the tea produced in India is sold through the seven auction centers situated in different parts of the country. Tea is sold to the buyers through brokers, a middleman, who sells tea on behalf of the growers. The tea is sold to the highest bidder under the usual rules of sale governing such auction. The seven auction centers of the country are Guwahati, Kolkata, Siliguri, Cochin, Coonoor, Coimbatore, and Amritsar. Table 18 shows the dates of establishment of the tea auction centers of India.

Table 18. Tea Auction Centers of India

SI. No.	Name of the auction center	Date of establishment
1	Amritsar	30th April, 1964
2	Calcutta	27th December, 1861
3	Cochin	4th July, 1947
4	Coimbatore	22nd November, 1980
5	Coonoor	23rd March, 1963
6	Guwahati	25th September, 1970
7	Siliguri	26th October, 1976

Source: Tea Board, Kolkata.

Public auctions have been the most popular channel of marketing for more than 165 years. Direct export by the producer is only minimal, while an ex-factory sale is gaining momentum during recent years. Details of Primary Marketing of Indian Tea are given in Table 19. The marketing channel of tea in India is best explained by the flow chart in Fig. 3.

Guwahati, Kolkata and Siliguri are the most important auction centres in North India and they account for about 53.32 per cent of total sales in this region. Amritsar auction centre is of minimal importance and handles less than one per cent of the sales. Ex-factory sales and direct exports by producers account for about 40.69 and six per cent respectively. In South India, Coonoor and Cochin auction markets are the most important ones and 44.9 per cent sales has occurred in these two auction markets. Coimbatore auction market is of less importance, handling only 8.74 per cent of the South Indian sales. Ex-factory and direct exports account for 35.47 and 4.4 per cent of total sales respectively.

Auctions are organised under the auspices of Tea Trade Associations formed at each centre which has its members; the Sellers (producers), Brokers (auctioners) and Buyers (traders). There are elaborate rules for conducting the auctions. Tea prices have shown a fluctuating trend as seen in Table 20.

Government Controls

Under the Tea Act, 1953, the Union Government has taken under its control the development of tea industry. The Tea Board was formed under the Act for executing the functions envisaged as discussed earlier. Chairman and 30 other members representing producers, labourers, traders, consumers, state governments and parliament constitute the Board.

Under the Tea Act,

- no one can plant tea on an area earlier not planted with tea without prior permission of the Tea Board,
- although there is no provision under the Tea Act requiring registration of tea estate owner with the Tea Board, it is advisable to register as and when

there is change in ownership, since the benefit of Board's development schemes are available only for the registered owners,

- the central government has power under the Act to take over the management of sick tea plantations.

Tea (Distribution and Export) Control Order, 1957

The order requires every exporter of tea to obtain a licence from the Tea Board which should be renewed once in three years. However, established exporters can obtain a permanent licence.

Tea Waste (Control) Order, 1959

Under this order, any producer intending to stock or sell tea waste has to obtain an annual license from the Tea Board, which should be renewed periodically. Such lincence is not required if the tea waste is destroyed by approved methods and used as compost in estate itself. Producers selling tea waste under licence should ensure that the buyer also has the licence from the Board. Licences are not issued to merchants for the purpose of buying and selling tea waste. Only producers can get the licence and sell them to end users like caffeine manufactures or instant tea manufacturers, who must also have licence for purchase. Tea waste is presently not allowed to be exported. Here 'Tea waste' means tea sweepings, tea fluff, tea fibre or tea stalks or any article purpoting to be tea which does not confirm to the specifications for tea laid down under the PFA Act, but does not include green tea or green tea stalks (Ramadurai, 2001).

WORLD TEA SCENARIO

Beginning of Tea in Other Countries

The idea of planting tea originally mooted for India gradually found its way to other parts of Asia and Africa, though in Indonesia tea cultivation was a little older than India. Planting in Sri Lanka began in 1880 and in the next 15 years vigorous expansion was met with and by the First World War, most of the corporate sector became established. In Indonesia, more precisely in Java, tea planting was started in 1824, using seeds from China, though commercial planting using Assam plants was taken up from 1878. Japan and Taiwan were also major producing countries with China emerging as an important producer in the world tea trade. Although tea existed as a local plantation in Durban in South Africa, the foundation of commercial plantation of tea in Africa was laid in Malawi during 1878. At the turn of the century, tea was planted in Kenya, Uganda and Tanzania though commercial exploitation in these countries started only during 1920 to 1930. Tea is also being produced in varying quantities in countries like Burma, Thailand, Mauritius, Congo, St. Helena, Cameron, Peru, Paraguay, Colombia, Bolivia, Mexico, Australia and Corsica for domestic consumption (Banerjee, 1996).

Area under Tea - India and the World

The number of tea producing countries in the world has been increasing since 1950 and at present there are more than 80 such countries. Among the principal tea producing countries in the world, China occupies the first place in terms of area with a share of 45.73 per cent, followed by India, Sri Lanka, Indonesia and Kenya with the share of 17.69, 6.38, 4.83 and 4.78 per cent respectively (Table 21).

India’s area under tea presents appreciable increase during the period 1961 to 2005 and the world’s tea area exhibited a significant rise. While the world tea area increased by 182.16 per cent, India’s rose by just 58 per cent only. India’s tea area as percentage to world tea area has declined over the years from 34.34 per cent in 1961 to 17.69 per cent in 2005. In absolute terms, India’s total area in 1961 was 331 thousand ha., which increased to 523 thousand ha. in 2005. Similarly, the world’s area under tea was 964 thousand ha. in 1961 and 2956 thousand ha. in 2005. Comparative picture is shown in Table 22.

Production of Tea - India and World

Tea is one of the worlds' most important crop. It is consumed as a beverage throughout the world and grown widely in countries of Asia, Africa and to a small extent in Europe, South America and Australia. It has widespread implications for the earnings and food security of farm communities, particularly for small holders in these countries. Historically, it has competed effectively in an increasingly crowded beverages market but indications are that, it has lost ground, particularly in the early to mid-nineties. Demand has become sluggish and even declined in some of its traditional markets. Consequently, prices have fallen in real terms as the imbalance between production and consumption has grown. During the last one and a half decades, the tea industry has witnessed an increase in production world-wide, exceeding the increase in demand during that period. This disproportionate increase in demand and supply has lowered the prices. The production to consumption ratio needs to be rationalized in order to attain remunerative prices and ensure the viability of the global tea economy (Chang, 2000). Among the countries growing tea, a few could be regarded as major producers. The details on production of tea in the major producing countries are furnished in Table 23.

World production has been dominated by India where output peaked to nearly 893 m. kg. during 2004, followed by China with 835 m. kg.; the highest output achieved by that country in the past decades, Kenya follows at a distant third with 324 m. kg., Sri Lanka with 308 m. kg., Turkey with 165 and Indonesia with 164.8 m. kg. World tea production in the last decade has grown at an yearly rate of 1.81 per cent until 1999. India lost its leadership position in the production of tea to China in the year 2005 where China overtook by producing 935 m. kg. against India's 928 m. kg. China further rallied to produce 1020 m. kg. with a share of almost 29 per cent of the total world production against India’s production of 956 m. kg. with a share of just above 27 per cent during 2006.

Among the major tea varieties produced in the world, the output of black tea accounts for more than 70 per cent. The green and other types of tea produced are mostly consumed in the producing countries themselves. More than 80 per cent of green and other tea produced are consumed in the home countries and the rest are exported. It is therefore, black tea that is of prime importance as far as international tea trade is concerned. Again in black tea, the two manufacturing processes lead to CTC and orthodox tea. Sri Lanka, Indonesia, Turkey, Argentina and Iran produce orthodox tea while Kenya, Bangladesh, Malawi, Tanzania, Uganda, Zimbabwe and South Africa manufacture CTC tea. India manufactures both the varieties. China, Japan and Taiwan produce mainly green tea.

World production increased by 300 per cent during the period, while India's production enhanced by 162 per cent. India's production to world production has substantially reduced from 41.21 per cent in 1961 to 27.01 per cent in 2005. Average annual rate of growth of tea production in India stood at 3.70 per cent while it was 7.34 per cent for the World. India's share in the world tea production is given in Table 24.

Consumption – India and World

As seen from Table 25, out of the total production of 3435.65 m. kg. in 2005, the producing countries retained as much as 1868.37 m. kg. (54.38 per cent) for their own consumption and exported 1567.28 m. kg. (45.62 per cent). Also rate of growth in tea consumption is faster in producing countries than in importing countries. In terms of total quantity consumed, India tops the list among global tea consumers followed by China, Russia / CIS, Japan, Turkey, U.K., Pakistan, and Iran in that order (Table 26). The consuming countries could be classified into three groups.

- Consuming their own production.
- Importing for consumption and
- Consuming their production and also importing for consumption.

Russia / C.I.S, Iran, Japan and South Africa are deficit producing countries coming in the third category. Although India's total consumption is substantial, the per capita consumption is very small at 650 g during 2004. Among the producing countries, Turkey, Japan, Iran and Sri Lanka have a per capita consumption of more than one kg. Among the major importing countries, U.K., Pakistan, Russia, U.S.A., Egypt, Morocco, Poland, Syria and Iran are prominent. The global per capita consumption between 1981 and 2005 has annually increased at the rate of about three per cent as compared to about two per cent growth in population indicating that, globally, per capita tea consumption is increasing.

World imports grew yearly at 1.2 per cent over the last decade. The United Kingdom was the largest importer until 1997 when the C.I.S., surpassed its imports. Pakistan is the third largest importing country followed by the United States, Egypt, Iraq and Japan in that order. Together, these countries accounted for 52.56 per cent of total imports. Import requirements at 2005 are projected at 1.55 million tonnes, an average annual increase of 3.6 per cent from the base period average. Import requirements by developing countries would increase more rapidly to reach 850 m. kg., while the import demand in developed countries is projected to increase to 700 m. kg. (Chang, 2000).

Domestic consumption

India's per capita consumption of tea is among the lowest. Yet in volume terms, India is the largest consumer. With the population having exceeded 100 crore even if an Indian were to drink one extra cup a year, the additional requirement of tea for domestic consumption would be 2.55 m. kg. If ten cups extra were to be drunk every day by every Indian, then the requirement would be 25.5 m. kg. Taken into account one cup extra to be drunk every day by every Indian, the additional requirement works out to 931 m. kg. per annum. India is indeed a very powerful market. Another important factor to note is that the Indians drink the very best of CTCs and are prepared to pay a premium for quality. Because of the strong domestic base, Indian tea prices are generally higher than the world prices. The superior quality of Indian tea and its vast variety have also helped in maintaining higher price levels.

In 1947, Indian consumption was only 39 per cent of production and in 1999 this figure reached 76 per cent. In the past, the equation was "Indian consumption equals production minus exports". In the eighties, this equation was reversed and on several occasions, the government restricted export to conserve tea for the domestic market. The details of Indian consumption of tea are presented in Table 27.

The break-up of the Soviet Union has therefore had a strong impact on the Indian tea market. However, it gained momentum over the years. Russia and other CIS members did not cross 45 m. kg. Total Indian exports thus touched 205 m. kg. Indian domestic market continues to grow at around two per cent per annum. In 1999, domestic consumption was about 633 m. kg. By 2004 this figure was 735 m. kg. If export of 205 m. kg. is added, production in 2004 was about 940 m. kg. (Table 28). The CTC element of Indian consumption is over 94 per cent. It is estimated that in 2010 the Indian requirement for CTC teas would be 1034 m. kg., which would go up to 1050 m. kg. in 2012. The domestic market is further expanding, necessitating the accelerated growth in tea production. However the per capita consumption of tea in India is still very low and there is a great scope for raising it (Ramadurai, 2001).

The rise in domestic consumption is the industry's greatest strength. It is this demand which is fuelling the industry and compelling it to grow as fast as possible. With the increasing population, improved economic conditions and living standards, demand for domestic consumption continues to grow steadily from 1951 to 1998. The domestic consumption on an average registered a compound growth rate of 4.74 per cent per annum, whereas the production growth rate was only 2.4 per cent. This gap needs to be bridged in order to retain India's pre-eminent position as the largest producer of tea.

Exports – India and World

World tea exports have grown by almost two per cent over the last decade. Sri Lanka is the largest exporter followed by Kenya, China and India in that order (Table 29). Indian tea’s popular slogan since Independence has been “world’s largest producer, consumer and exporter of Tea”. Due to absence of any domestic base and comparatively small range of exportable items, Sri Lanka and Kenya have an edge over India to offload tea in the international market at any price and favourable credit terms. India exports only 21.33 per cent of its production and a larger share was utilised for domestic consumption. The overall situation in India is quite different from that of other major producing countries and only India and China have got substantial internal market. The other tea producing countries have no option than to pump their tea into the world market.

In 1986, Sri Lanka exported 207.5 m. kg. exceeding Indian export of 203 m. kg. After that there is an increasing trend in the Sri Lankan exports reaching new heights. In 2006, however, Sri Lanka forged ahead of Kenya snatching the first place in exports by exporting 315 m. kg. against 314 m. kg. of exports by Kenya and Indian exports of 204 m. kg. Ever since 1986, Sri Lanka exported more than India. Sri Lankan exports for these years were ranging between 208 m. kg. in1986 and 315 m. kg. in 2006 against Indian exports of 203 m. kg. and 204 m. kg. during the period under question respectively. For a very long time, Indian exports is hovering around 200 m. kg. mark.

India’s share in world export expressed in terms of percentage has declined between 1961 and 2005, but there is only marginal decline in absolute quantum of exports. Tea export has remained, on an average, at 200 m. kg. during the period. The main reason for fall of India’s share for the last 40 years is that a large quantum of tea has been retained for domestic consumption. While World exports increased by 187 per cent, India’s exports reduced by 3.40 per cent during the period from 1961 to 2005. India’s share in the world exports declined from 37.73 to 12.70 per cent during the same period (Table 30).

Indian tea reaches the consumers of around 80 countries in the world. U.K. was the largest importer of Indian tea till the end of sixties. Another feature of Indian exports has been the sea change in its profile between 1947 and 2004. In 1947 U.K’s share of Indian exports was 66 per cent and in 2004 it has declined to 12 per cent. Erstwhile U.S.S.R. became the largest importer of Indian tea replacing U.K. After the disintegration of U.S.S.R., the demand for the Indian tea reduced because of the political climate in that country. The former Soviet Union, which bought no Indian teas till the 60’s, became the major importer of Indian tea, it accounted for 44.9 per cent of Indian tea exports in 2004 (Table 31).

Countries like Poland, Yugoslavia, Afghanistan, Japan, Tunisia and even Germany bought no teas from India in 1947 but today they are strong supporters of the Indian produce. Iraq, Iran, Gulf, ARE have been buying more but Canada, USA, Australia, New Zealand and the UK, have reduced their purchases from India substantially. In the 57 years period since 1947, African Countries, particularly Kenya, have been giving stiff competition to Indian CTC teas and have gained popularity in the hard currency areas. Sri Lanka, on the other hand, a major producer of orthodox, has been stepping into the Indian orthodox exports and took credit for catering to the entire expansion and demand in the orthodox segment. The only exception has been the former USSR who has supported Indian orthodox varieties strongly. Sri Lanka has been catering to the growing markets of Arab Rep. of Egypt (ARE), Iran, USA, and Pakistan (Table 32).

An encouraging feature of Indian tea exports has been a rise in value added goods and instant Tea. Packet tea exports in a 25 years span between 1981 and 2005 had seen many ups and downs. It went up from 32 m. kg. to 89 m. kg. in 1997, thus showing an increase of less than 300 per cent and afterwards declined to 37 m. kg. in 2005. The reasons for this sort of decline in packet tea exports were already discussed in this chapter (Through tables 13, 14, 15 and 16). The instant tea exports in the same 25 years period has shown a rise by more than three and a half times from 1.14 m. kg. to 3.8 m. kg. Exports of value added teas have gone down by almost fifty per cent in nine years from 93.83 m. kg. in 1997 to 49.5 m. kg. in 2005. In value terms, the earnings from Packets increased from Rs. 69.98 crore in 1980-81 to Rs. 353.65 crore in 2004-05; in the case of tea bags, the earnings raised from Rs. 3.26 crore to Rs. 142.9 crore and in the case of instant tea, the earnings raised from Rs. 3.66 crore to Rs. 115.3 crore during the same period. The total value of Indian exports including instant tea in 2005 was Rs. 1831.00 crore as against Rs. 55.38 crore in 1947.

New strategies have to be evolved for the Russian Federation, CIS and Pakistan. Above all, exports have to be given a clear priority over domestic need. While future supply and demand, on the overall, appears ‘hand to-mouth’, the future of specialty varieties, such as Darjeelings and Assam orthodox, would depend upon aggressive marketing.

Import of tea was totally banned in India. In 1996, the Union government for the first time allowed the import of tea by 100 per cent export oriented units for blending and re-export in the form of packet tea, tea bags and instant tea. This tea was not allowed to be sold in the domestic market. In 1998, the government allowed the sales of up to 25 per cent of this tea and or five per cent of its reject in the domestic market for a period of six months to ease the price situation. But, due to the World Trade Organisation agreement, tea imports were allowed from various countries as the quantitative restrictions were removed for many items, including tea.

The prices of black tea declined and was highly volatile in all auction markets from 1999 onwards (Table 33), due to higher production in major producing countries, weaker demand in the importing nations. The decline and volatility in prices are also caused by the slow but steady appreciation of Indian rupee in case of Indian Auction markets and other world auction markets; the causes were the appreciation of US dollar and the devaluation of the local currencies of the respective countries. The price expectations for the future period remain uncertain because of the current financial difficulties in traditional and major importing countries like Russian federation. Although import demand has increased in the Near Eastern Markets such as Saudi Arabia, Iraq and United Arab Emirates, continued expansion will most likely depend on continued firmness of oil prices. The prospect of downward pressure on prices call for new and market-oriented approaches for tea in the next decade (Chang, 2000).

The trading of 85 per cent of the total world tea production is through auctions, which are spot markets, is the peculiarity of tea industry. Development of forward and future markets will lead to stability in tea prices. Traditionally, tea faces stiff competition from coffee and of late from carbonated drinks. Manufactures of carbonated drinks have been able to reach every nook and corner of the globe by their sheer financial might, backed up by effective marketing strategy. The entire tea fraternity must go for generic promotional effects as an effective marketing strategy. A market trend in the recent years has been the shift in demand towards the import of quality tea, not only in mature markets such as United Kingdom and Russian Federation but also in the rest of Europe and North America. The discovery of anticarcinogenic properties and the rediscovery of extra-ordinary revival and relaxing properties of tea are bound to give an added strength to the generic promotion programmes (Maran, 2000).

MAJOR WORLD TEA AUCTION MARKETS

There are several black tea auction markets around the world. They are primarily located in major cities of tea growing countries. They are India (Kolkata, Guwahati, Siliguri, Cochin, Coonoor and Coimbatore), Sri Lanka (Colombo), Indonesia (Jakarta), Kenya (Mombasa) and Malawi (Limbe). Among these, the major black tea auction markets in Asia, South Eastern Asia and East Africa are shown in Figures 4.1 and 4.2.

Indian Tea Auctions

There are three distinctly different varieties of tea grown in three different tea growing areas in India. They are Darjeeling tea, Assam tea and Nilgiri tea. All these are named after the area grown. Each type has special quality characteristics unique to the area grown. The Indian export markets of tea are CIS, Europe, North America and Middle East countries. In India, there are seven tea auction markets and in six markets only the black tea is auctioned in significant volumes. They are Kolkata, Coimbatore, Cochin, Guwahati, Coonoor and Siliguri. Established in 1861, Kolkata is the world's oldest tea auction centre. It handled about 141 million kilograms of tea annually (2005). The Tea Trade Association of Coimbatore controls the tea auction in Coimbatore. Its turn over was about 20 million kilograms in 2005. Coonoor Tea Trade Association (CTTA) is the principle entity that has control over the Coonoor tea auction. It is the biggest auction center in South India. The market capitalisation was 42 million kilograms of tea in 2005. Guwahati Tea Auction Center (GTAC) had about 143 million kilograms market sales in the year 2005. It is the second largest tea auction centre, only second to the Colombo tea auction.

Sri Lankan Tea Industry and Colombo Tea Auction

Sri Lankan tea is sold through different marketing channels. They are the Colombo tea auction, private sales, forward contracts and direct sales. But almost 95 per cent of tea is sold through the Colombo tea auction. Other channels are used in special circumstances, such as to accommodate any quick requests from buyers. The Colombo tea auction dates back to 1883 when the first tea auction was held in the island. Today the Colombo tea auction is the world's largest tea auction center with almost 200 companies vying with each other on behalf of principals from all over the world. Auctions are held weekly (two days per week, Tuesday and Wednesday). Weekly quantity offered varie from 3-7 million kilograms.

The Colombo Tea Traders Association conducts auctions under the guidance of the chamber of commerce. According to Sri Lankan Tea Board, government has no influence in the price discovery in the auction center. The Sri Lankan government does not restrict the amount of tea entering the auction center. There is a tax called cess charged by the SLTB for every kilogram of tea exported. It is 2.50 Sri Lankan rupees per kilogram (US$ 0.025 per kilogram of tea).

Indonesian Tea Industry and Jakarta Tea Auction

In the Indonesian tea industry, the main product is black tea and about 80 per cent is exported (Tea Auction Ltd, 2005). Java and Sumatra, two of the largest islands, are the main growing areas. Tea had been a way of life with the Indonesian people, but after World War II, the Indonesian tea industry was neglected leading to a very poor state. After the rejuvenation of the industry, by 1984, Indonesia started exporting tea. In 1994, Indonesia exported about 102 million kg. of tea, accounting for less than seven per cent of world exports (The Tea Council Ltd, 2005). Major importers of Indonesian tea are Russia, Pakistan, Mediterranean Europe (M.E.) and UK / Europe. The Joint Marketing Office or Kantor Pemasaran Bersama conducts Indonesian tea auctions.

Kenyan Tea Industry and Mombassa Tea Auction

Tea is a major foreign exchange earner in Kenya. In 1995, the tea industry brought US $342 million into the country and Kenya became the largest exporter of black tea in Africa and the second largest in the world (Tea Auction Ltd, 2006). The majority of the Kenyan tea production is sold through the Mombassa auction. The biggest importers are Pakistan, the UK and Egypt. Tea production in Kenya is almost exclusively CTC manufactured. This type of manufacturing produces strong-liquoring teas, which yield a high number of cups per kilo when brewed both loose and in teabags. The share of production is about 8.82 per cent globally and the share of exports was about 19.87 per cent in 2006. Africa Tea Brokers (ATB) monitors the sales in the Mombasa tea auction. The Kenyan government does not interfere with the price discovery process in the Mombasa auction. However, there are taxes on tea planted acreage and manufacturing. There is no export duty for tea exports. According to the tea board of Kenya, producers have the choice of selling the produce through either the auction center or through private treaty agreements.

Malawi Tea Industry and Limbe Tea Auction

Malawi started growing tea commercially in the 1880s. Now exporting 42.5 million kg. annually, Malawi has a 2.69 per cent share of world exports. The export earning from tea is about 19 per cent of its total export value (NSOM, 2004). Tea trading is done through the auction market in Limbe and the annual capitalization is about 42 million kilograms.

The Present Crisis

The tea industry in India is stirring a rather bitter brew minus any sweeteners to cheer the planters at the start of the new millennium. While the declining price trend is being digested, increase in labour wages, additional burden of excise duty, almost static shipments to Russia and free imports of tea are the major factors that have pushed the industry into a quagmire. Besides all these factors, the global supplies are more than the demand in the recent years which is sending shivers down the planters' spines. Against this background, the general perception is that the Indian tea industry could be heading for difficult days, perhaps the worst in recent years.

The tea prices in the auction centres slipped down to the bottom in the year 1998 and onwards. In reciprocation of fall in tea prices, the price level of green tea leaves also went down to below Rs. 5 per kg. This affected the small grower section dominating the tea production in recent years in India. To help the small growers, the Tea Board announced a subsidy scheme of Rs. 8 per kg. The government also abolished the excise duty of Rs. 2 per kg. All these measures though helped the growers, would not be a long-term solution. As cost of production is escalating, heavy competition is sensed and the government policy of importing tea into India is gearing up, the tea industry sector has to come out with a concrete plan. No amount of government subsides and concessions can bale out the producers from this grave situation.

Unlike alcohols or even coffee, tea does not have any negative health effects. It effectively shields skin from cancer causing ultra violet rays. Discovery of the anti-oxidants namely flavonoids in both black and green tea, help neutralise 'free radicals' produced in the body as part of the normal functioning and thereby decreasing incidence of heart attack caused by blocked arteries. The antioxidants present in tea deter this process and also help in fighting ageing. Studies conducted by UPASI in Coonoor, reveals that tea seems to help in control of diabetes and hyper cholesterol in humans. Tea brings down the severity of inflammation due to smoking. Tea also reduces headache and depression and strengthens the human immune system, and is a rich source of flavonoids, which improve blood circulation and skin health. It is these new roles of tea, which is going to be of extreme value to the world community, particularly as medical treatment is progressively becoming more and more expensive (Jhawar, 2000).

More than monetary input, it is the innovative approach that would help in achieving major break through in tea research, which often demands collaborative and interdisciplinary efforts even at one single problem of topical importance. Research has always been an integral part of the tea industry and tea is one of the few organised core sectors to have a sustained and long term interest in research and development activities. With the current emphasis on increasing productivity and quality, relevant areas of priorities in research have to be sorted out. To meet the challenges of the productivity barriers and to make a significant break-through in quality development, stress is being laid on applications of biotechnology, tissue culture technique, integrated energy management etc., in overcoming the hurdles in increasing productivity.

The challenge is to increase production, improve quality and ensure that tea is available at a price remunerative to the producer and affordable by the domestic consumers. Yet the industry should have sufficient tea to meet the export requirement in order to retain India's share in the world market. It has been estimated that India will require about 1000 million kg. of tea by the end of the Tenth plan, to meet the growing internal consumption plus the demand for export, calculated on the basis of retaining India's share of the world tea market.

Projections by the FAO suggest that there will be an imbalance in the international black tea demand and supply at current prices. That is, the FAO projects a surplus of exports at current prices. This will result in downward pressure on price that all bulk tea exporters have to face, as there is little product differentiation that exists among exporters' products.

To overcome all these problems efficient planning coupled with adopting intensive modern technology in production and innovative effective marketing strategies with sufficient product differentiation are to be carried out in order to regain the pride and supremacy once enjoyed by India in the world tea economy.

CHAPTER V

RESULTS AND DISCUSSION

The data and information collected from secondary sources were analysed keeping in view the stated objectives of the present study. The results of the analysis are presented and discussed under three major sections. The focus of the first section is on the past trends of the industry and the discussion mainly draws on time series analyses of the relevant data. To some extent, the behavioural relationships based on the OLS estimations of the regression equations specified earlier are also discussed. The second part is organised around the results of the structural model and some venture is made to assess the likely trends of the industry in the near future, utilising the results of all relevant analyses. The third part is organized around the results of the market integration model.

Area Under Tea Cultivation

Of the two contiguous tea growing regions, the North India had been consistently contributing the major area under tea for several decades. Assam and West Bengal States of the North had been accounting for about 74 per cent area, while Tamil Nadu and Kerala of the south for another 21 per cent. The fact that these four states accounted for most of the area under tea without much changes over time symbolised the overall structural stability of the industry over the decades (Table 34).

The compound growth rate of area at all India level, as seen from Table 35, was 1.22 per cent per annum. Though the larger issues of geo-environmental limitations coupled with socio-economic forces might have contributed for this trend, for the moment the significant observation was that the growth rate of Tamil Nadu in South India (2.80) far exceeded that of the North, other states and even the southern region. In south, the compound growth rate in Kerala state was almost static. In fact, with its size, north India had been singly contributing for the total area expansion in India by inducting more area under tea in non-traditional states grouped under others showing higher growth rate than that of northern region and even all India (1.25). In absolute terms, as evident from the linear trends in the table, north added about 7443 ha. annually while the south added about 3139 hectare which is less than half of the addition by north.

The issue of land distribution inevitably crops up in any discussion of cultivation and ownership and yet remains largely unsettled. Without entertaining any welfare propositions, it could still be asserted that the distribution of area under tea was heavily skewed first between the two regions, conditioned perhaps by the geo-environmental factors, and second, more significantly, within the regions.

At the regional level, the average holding size of a tea estate in north India ($NIAHS_t$) was steadily increasing to reach around 125 ha. in 1984 and there after it started declining steadily to reach 107 ha. in 1994. In contrast, the average holding size of a south Indian estate ($SIAHS_t$) was static around seven ha. upto 1994 and afterwards started shrinking to reach 1.68 ha. in 2005. Whereas, the north Indian average holding size of tea estates shrunk more rapidly and was around 6.7 ha. in 2005.

The ownership position within the regions is summarised in Table 36. While about 29 per cent estates till 1990-91 accounted for about 59 per cent area (> 400 ha.) in the northern region, the distribution within the southern region was still poorer. About 2.50 per cent of the estates-except first size group all the other size groups were grouped together- owned about a substantial 82 per cent area. A quantum jump in the number of estates under the first size group had been observed ever since 1995-96 due to the intensive efforts took by the Tea Board in area expansion both in traditional and non-traditional areas and at the same time the figures in tea statistics included the small growers from the year 1998 onwards. Because of the increase in area under the first size group accounted for almost 17 per cent area, thus reducing the distribution by the last size group to just above 51 per cent in the northern region. In the southern region the increase was 45 per cent in the case of first size group and the reduction was substantial to less than 55 per cent. And no significant temporal variations were apparent in the ownership pattern. Welfare implications apart, studies providing definite insights about the implications of such a wide skewness on productivity were not available.

For management decisions, vintage of tea stocks were more important since it internalised research and development efforts in productivity. But the major criticism about the Indian tea industry was precisely about its inability to modernise the tea stocks. Rigorous statistical scrutiny of the actual position, was somewhat hampered by the inadequacy of the relevant data.

Tea stocks would begin yielding by fifth year and would peak around tenth year. Thereafter it would remain more or less stable for few decades. However, it was generally considered that half a century was the economically optimum life of tea stocks. In the southern tea areas of India, nearly 45 per cent had stocks aged 50 years and above while the proportion was slightly lower to 33 per cent for north and 36 per cent for all India (Table 37). Over the decade, the position had not improved much just registering only a marginal improvement of 35.53 per cent from 38.89 per cent.

Even assuming that the all India tea area remained constant and allowing that a fifty year replacement cycle was sufficient under the present circumstances, every year atleast two per cent of the area under tea would have to be replaced by new stocks. This amounted to replacing about 10428 ha. of the total 5.21 lakh ha. as on 2004. But there was hardly any evidence that this would become possible in the near future. The actual achievements during the period 1996-2004 of the Tea Board are presented in Table 38 for comparison.

Table 38. Percentage of Area under Extensions, Replacements and Replantings (1996 - 2004)

Year 1	Extensions 2	Replacement 3	Replanting 4	Total 5	Tea Area (ha.) 6	Percentage to Area	Percentage of Col.3+Col.4 to Col.6
1996	4879.63	1409.66	1775.96	8065.25	431204	1.87	0.74
1997	2639.45	1006.57	1421.17	5067.19	434294	1.17	0.56
1998	4019.37	1109.21	1495.89	6624.47	474027	1.40	0.55
1999	3029.33	913.56	1320.21	5263.10	490200	1.07	0.46
2000	2844.94	796.00	1197.35	4838.29	504366	0.96	0.40
2001	2606.02	632.00	959.68	4197.70	509806	0.82	0.31
2002	2870.00	760.00	1160.00	4790.00	515832	0.93	0.37
2003	3033.34	827.00	1292.21	5152.55	519598	0.99	0.41
2004(E)	1470.10	248.00	485.42	2203.52	521403	0.42	0.14

Source: Tea Statistics (various issues), Tea Board, Kolkata.

Note: Replanting is defined as uprooting old tea bushes and planting new bushes in the same ground, whereas, replacement refers to tea planted on fresh ground for which an equal area of old tea is uprooted.

The average replacement and replanting combination of about 733 ha. worked out to only about seven per cent of the approximately required 10428 ha. Further these replacements were only 17 per cent of the extensions in area. Thus, should the same trends continue, the industry would never be able to modernise itself.

The discussion so far, had abstracted of the random fluctuations and relied mainly upon the secular trends. The results of Fourier analysis of the area under tea would provide some evidence on the existence of cyclical fluctuations.

The Schuster's 'k' values of Table 39 indicated that no significant cyclical fluctuations existed in the tea bearing area at the national level as well as the northern region and southern region. Some erratic fluctuations occurred in both the regions as well as at the national level and the pattern were not consistent and stable. The reason might be the inclusion of small growers in the statistics from the year 1998 onwards by the Tea Board. Combining the discussion of the secular trend with these observations, it would be evident that the area under tea in India had been more or less stagnant predicting no structural changes and response to market forces. The classical postulates of causal relationships seem to be perceptibly very weak.

To explore the above hypothesis, OLS estimates of different specifications of the behavioural relationship discussed earlier were attempted and the most promising among them are presented below.

$$NIA_t = \underset{(1.0553)}{5089.71} + \underset{(0.9423)}{213.2914}\, DP_t - \underset{(0.6607)}{113.084}\, IP_t - \underset{(1.0501)}{48.8250}\, CED_t + \underset{(1.8536)}{2090.19^{**}}\, NIAHS_t + \underset{(21.9303)}{0.9140^{*}}\, NIA_{t-1}$$

$$R^2 = 0.9912 \qquad DW = 3.1659$$

$$SIA_t = \underset{(4.9464)}{32748.67^{*}} + \underset{(0.8182)}{106.907}\, DP_t + \underset{(0.8440)}{86.5827}\, IP_t - \underset{(1.3621)}{27.2410}\, CED_t + \underset{(1.0659)}{88.8251}\, SIAHS_t + 0.7251^{*}\, SIA_{t-1}$$

(13.9214)

$R^2 = 0.6732$ DW = 2.0234

Broadly, the signs of the coefficients confirmed with a priori expectations, except with respect to the impact of international prices on the north Indian area where the sign was negative. However, it was not significant. The explanatory power of the independent variables was comparatively low in the southern case, implying that the fluctuations in the south distorted the specified casual relationships, atleast in the models tried.

In both cases, the duties levied by the government (CED_t) appeared to have had a negative impact on the area, though the available evidence was not sufficient to make a definite observation. Prices, both domestic (DP_t) and international (IP_t) had positive impacts. However, in the short run the responsiveness of area could only be marginal in plantation crops and it was not surprising that the coefficients did not pass the confidence tests.

Though size of holding (AHS_t), positively influenced the area in both the regions, its impact was more pronounced only in the north, where the average size was large concurring with the earlier discussions. In both the regions, the area under tea had significantly responded to market forces in the long run as indicated by the significance of lagged dependent variable, but the marginal contribution seemed to be small. Technically, if the results were to be interpreted in the Nerlovian partial adjustment framework, the short run price variables should be lagged by the gestation period of tea plants. However, the removals lacked any such gestation which were also induced indirectly by the prices, both current and lagged and hence the above specification.

Consistent with its objectives, the Tea Board had been engaging itself in area promotion and stock improvement activities to some extent. Principally, its operation was through loan schemes for area development as part of its overall development strategy.

To summarise, if the past trends were of any indication, the industry would not be able to fare any better areawise and in terms of stock vintage. The market forces did not seem to appreciably influence the tea areas and stocks in the short run and so also the role of the Tea Board. At best, the Board's efforts appeared to be adhoc in nature with respect to area development.

Productivity

Productivity is the vehicle through which improvements in the science and art of cultivation are transformed into improved production of any crop. The improvements accumulate over years and subsume both the short and long run effects. Over the past two decades, much of the increases in world tea production came about by improvements in productivity rather than through area expansion (refer Tables 8 and 29). In India, productivity increased from 901 kg. / ha. in 1951 to 1774 kg. / ha. in 2005, an improvement of about 97 per cent. The growth rates in productivity are presented below.

Linear		Compound
$NIY_t = 1341.90^* + 12.2182^*\, t$	$R^2 = 0.7995$	CGR = 0.81 per cent
(37.3121) (12.3926)		
$SIY_t = 1627.52^* + 16.8125^*\, t$	$R^2 = 0.732$	CGR = 0.96 per cent
(24.9008) (9.3650)		
$AIY_t = 1393.80^* + 13.3272^*\, t$	R2 = 0.9035	CGR = 0.85 per cent
(41.2155) (13.8987)		

The growth rate in productivity was significant both in absolute and compound terms and in both the regions. Though, the productivity in the southern region was marginally higher, it could not have much impact on all India average since proportionally the industry was small in the south. The productivity growth rate of 0.85 per cent at the national level was far lesser than that of area growth (1.22 per cent) and was the most important component of the two in determining the production levels.

While productivity by itself is determined by technological improvements and management internalised in the production process, their adoption, to a greater extent, is conditioned by the socio-economic backgrounds of the planters. Economically, while larger plantations were able to better utilise most of the management and capital based resources, the small holders were traditionally supposed to better utilise the labour resources. Though southern region was dominated by small holdings, a higher growth rate comparing north shows that even these small holders have followed better management and cultivation practices. Details are furnished in Table 40.

The implied productivity as computed by dividing the contribution to production by the area share of respective size groups provided some indication of the relative efficiency of different size groups. In the absence of scale effects, one would expect the share of contribution to production to match the share of area. This, however, was not the case as the figures in the table indicate. Consistently greater had been the productivity, greater the size group. Though the productivity of the estates of southern states of size less than 50 ha. was very low upto 1995-96, it started increasing and remained on par with estates of above 400 ha. size. This confirms the earlier discussion. On an average, southern productivity was on the higher side due to the relatively small share of area of the small holdings coupled with the relatively high productivity of the larger estates. Obviously, in these circumstances, a casual reading of the variables at the macro-level was misleading. Evidently, Halayya justified in his claim that "the yield per hectare of the small units is dismally low as compared with that of estates above 50 ha."

These differences among size groups apart, there were considerable variations in productivity among different producing states as evident from Table 7.2. From the fifties onwards, southern regions had overtaken the north in productivity. It might perhaps be due to the relatively younger nature of the southern industry. If the yield differentials were narrowed, and the productivity of the north was raised to that of the south, by its size, then north would be able to add substantially to total production.

Input management is an important component of efforts to improve productivity. The predominant input in tea production is labour, the cost on which is alleged to affect the international competitiveness of Indian tea. The employment of labour and their productivity positions are summarized in Table 41. Generally, the labour productivity was decreasing implying that all other inputs were not complementing labour. However, labour productivity increased at the cost of employment in the north, whereas, in the south, employment increased at the cost of productivity quite seriously. These observations were further supported by the following trend results, though the level of confidence of the coefficient with respect to the southern case estates was not satisfactory.

While some substitution of labour seemed to occur to some extent in the north characterised by large holdings, in the south labour acted as a complementary resource. Perhaps additional information would be required to make a confident assertion. Apart from labour, information about other inputs utilised in the tea industry were generally lacking, except some pertaining to the expenditure on research and development.

The trends apart, not much cyclical fluctuation were discernible as evident from the Fourier results (Table 42). Fluctuations in productivity occurred in the south, which lost its identity when aggregated with the northern counterpart. The fluctuations might be due to the erratic behaviour of rainfall since in South almost the entire tea gardens are rainfed and a seven to eight year rainfall cycle in Tamil Nadu has been identified.

Attempts had been made to capture the fluctuations in productivity through behavioural equations were not generally successful on statistical grounds. As an example, the result obtained by regressing north India; productivity (NIY_t) on domestic (DP_t) and international (IP_t) prices, changes in tea area (ΔNIA_t), average north Indian estate size ($NIAHS_t$) and average labour employed per hectare ($NIAL_t$) is presented below.

$$NIY_t = \underset{(0.5204)}{878.0865} + \underset{(1.0899)}{3.1728}\, DP_t + \underset{(0.4601)}{8.3418}\, IP_t - \underset{(1.1175)}{0.000215}\, \Delta NIA_t - \underset{(0.5435)}{0.02742}\, NRF_t$$

$$+ \underset{(1.4210)}{2.3570}\, NIAHS_t - \underset{(1.1271)}{147.6982}\, NIAL_t$$

$R^2 = 0.9094$ $\quad$ $DW = 1.2152$

All the coefficients had expected signs with the exception of changes in bearing area. Both domestic and external prices had a positive impact on productivity as also the average holding size. Replantings, by definition involved uprooting old tea and replanting with new stocks and as such had a negative impact in the short run, as specified in the model. As discussed elsewhere, productivity, in north improved at the cost of employment and that seemed to be properly accounted by the coefficient of the variable $NIAL_t$. Unfortunately, none of the coefficients were significant but overall the regression had a satisfactory explanatory power.

$$SIY_t = 800.8031 + 9.1419\ DP_t + 24.1506\ IP_t - 0.0193\ \Delta\ SIA_t - 0.0869\ SRF_t$$
$$(1.4708) \quad (0.7766) \quad (0.9112) \quad (1.1290) \quad (0.2572)$$
$$+ 142.5788\ SIAHS_t - 0.00197\ SIAL_t$$
$$(1.3052) \quad (1.2181)$$
$$R^2 = 0.6848 \qquad DW = 1.0919$$

As regards to south, all the coefficients also had expected signs except that of changes in bearing area. As discussed elsewhere, productivity, in south decreased at the cost of employment and that seemed to be properly accounted by the coefficient of the variable $SIAL_t$. Weak explanatory power was exhibited by the regression coupled with the insignificance of all the coefficients. When trend variable was introduced into the above specification also, none of the coefficients turned out to be significant except that of the trend variable which was highly significant.

In the absence of reliable data on the extent and nature of adoption of improved practices, new plantings and removals altering the age-yield profile and consequently productivity, it might naturally pose difficulties to relate improvements in productivity to market forces without some qualification. In any case, trend variable by itself seemed to capture most of the variations that these variables could explain.

The efforts of the Tea Board to improve productivity fall under three broad categories; grants to various agencies associated with tea to facilitate research and development, plantation development scheme and loans to planters to adopt improved practices. Under the first category Tea Research Association (TRA), UPASI Tea Scientific Department and the Tea Board were the three major agencies engaged in implementing. During the Ninth Plan period, together they disbursed, on an average, Rs.60 crore annually. The projects were financed in an adhoc manner, to be implemented by agricultural universities, UPASI Scientific Department and Darjeeling Tea Research

Centre. Most of the projects involved the improvement of the chemistry of tea processing, stock and culture improvement, and improving package of practices, besides short training courses and the undergraduate courses organised in collaboration with TRA and Assam Agricultural University, respectively.

The second category of the Board's efforts included schemes such as Tea Machinery and Irrigation Equipment Hire Purchase Scheme and other development schemes oriented towards small growers. And the Board coordinated with various other government agencies to procure, move and distribute inputs like fertilizers, coal, iron and steel, imported packaging machinery and chemicals. The amount disbursed towards this category was Rs.215 crore. Towards the plantation development scheme, the Board disbursed Rs.1033 crore through the implementing agencies.

Production

The mechanics of production, being determined by area and productivity, follows them closely. The growth rates and fluctuations confirm to those of its determinants as the trend and Fourier results (Table 43) would indicate.

Linear		Compound
$NIQ_t = 372.1441^* + 9.8396^*\, t$	$R^2 = 0.9688$	CGR = 1.92 per cent
(61.0616) (30.5262)		
$SIQ_t = 99.4206^* + 4.0044^*\, t$	$R^2 = 0.9342$	CGR = 2.54 per cent
(27.1136) (20.6485)		
$AIQ_t = 473.3054^* + 13.7757^*\, t$	$R^2 = 0.9746$	CGR = 2.07 percent
(61.6775) (33.9420)		

Productivity wise, southern region (0.96 per cent) was performing better and hence the contribution to output growth was high by the south (2.54 per cent). Of these two components, the contribution of productivity to production had been low (0.81 per cent) by less than one per cent than that of the area growth (1.11 per cent) by the north. For the past two decades, therefore, emphasis seemed to have been on productivity and area expansion to increase total production in south and land resources had almost been exploited and further expansion possibilities were limited. Already the size of the industry and the area expansion were higher in north.

Only the southern production showed evidence of a seven year cycle for reasons discussed earlier, which lost its significance when viewed from national level. In Tamil Nadu, a seven year rainfall cycle has been observed and this augments with the production cycle. However, fluctuations did occur within a year, largely influenced by monsoons and climate. Thus the peak production coincided with the monsoon periods associated with rainfall. The wide variations in the production pattern could be seen from seasonal indices of the following table.

Table 44. Seasonal Indices of Production

Month	North India	South India	All India
January	5.25	78.77	21.91
February	2.81	69.68	18.00
March	24.36	90.98	39.62
April	69.64	106.59	78.17
May	95.82	145.28	106.89
June	137.92	121.41	134.10
July	176.01	85.03	155.45
August	185.51	75.05	160.51
September	187.30	95.41	166.67
October	163.68	129.88	156.01
November	111.25	107.69	110.48
December	43.23	96.91	55.31

Note**:** Data relates to the calendar years 1996 to 2005.

The results implied that tea production was sensitive to environmental factors, and it would be worthy to explore whether these were abnormalities and would adversely affect production. Inspite of such variations, the geographical distribution of production remained almost stable (Table 45) with marginal increase in contribution by south and closely followed the area distribution over decades.

Though production by itself reflects the behaviour of its components, the post harvest processing is independent of them and as such undergoes its own changes over time. As evident from Table 46, the manual orthodox method of tea processing had increasingly given way for technically advanced CTC (Crush, Tear, Curl) processing. The proportion of green tea, however, was very low but stable.

The shift towards the CTC processing was more pronounced in the north which accounted for about 94 per cent of total production, while in the south, it accounted for about 83 per cent. This was consistent with the earlier observations that while in the north, the labour employed per hectare was on a declining trend, it marginally increased in the south. The average size of holding in the north being larger, it appeared to have facilitated substitution of capital for labour at a relatively faster rate. As such, the all India pattern mainly reflected that of the north.

These preliminary processing apart, there was increasing concern to produce tea in more value added form, especially from the export point of view. While bulk tea was the predominant form of production and export, there was increasing awareness of the need to convert it into value added forms like packet tea, tea bags and Instant tea.

However, during 2004-05 the quantity exported in terms of these forms were only 35.73, 7.10 and 3.96 m. kg. respectively, together accounting for 5.16 per cent of total production. Inspite of various tax reliefs and promotional activities, both within and outside the country, the production and export in the value added form remained low. For example, there had been cash compensatory support on export of packet tea, tea bags and instant tea, besides export rebates. The Tea Board had also been advancing loans for importing bagging machines through its Tea Bag Machinery Finance Scheme.

The major constraints, according to a report submitted to the FAO Intergovernmental group on 16th July 1985, were infrastructural, besides inadequate promotional activities of the producing countries in the consuming countries. It was also said that the companies in the producing countries engaged in exporting value added teas would not be able to match the resources and compete with their counterparts in the developed consuming countries as already discussed in Chapter IV. However, the threshold of product development is still on India and the thrust is still continued by the Export Promotion Committee of the Tea Board through delegations, participation in fairs and exhibitions and through unilateral and collective promotional activities in collaboration with other major traditional producers and the industry is slowly progressing towards it.

Domestic Consumption

Though the increases in domestic consumption of tea started relatively late in India, the growth in consumption had been relatively fast. The growth rate had been as high as 3.43 per cent per annum, more than that of the population growth rate of 2.21 per cent over the past two and a half decades, indicating that the tea drinking habit had spread both deep and wide.

Linear		Compound
$DC_t = 219.22^* + 15.5307^*\ t$	$R^2 = 0.996$	CGR = 3.43 per cent
(24.9008) (9.3650)		

The absolute marginal increase of 15.53 m. kg. in consumption exceeded that of production increase by little less than two million kilograms per year and the rate of growth was more than one time that of production (2.07 per cent). To have a comparative picture, the apparent per capita consumption of major consuming countries is presented in Table 47.

Evidently, consumption per capita was increasing at the rate of 10 grams per year in India and for the past four triennial average years, the consumption was static. Though the per capita consumption of around 0.650 kg. per year in India was comparably lower than that in almost all major producers and most of the major importers, India was one among the few countries in which the consumption rate per capita was growing. In fact while all the major producers and major importers among the developed block were showing a declining trend in per capita consumption, only the countries with which India was having bilateral trade agreements i.e., the Russian Block countries and some Arab countries, showed a marginally increasing trend in consumption.

The explanatory power of the trend variable (about 99 per cent) was crucial in that, changes in the tastes and preferences of the population that determined consumption levels were by and large qualitative and needed to be proxied for empirical scrutiny. Though income per capita, prices of the commodity and its substitutes did provide some predictable relationships, the role of subjective factors that too in a time span of about three decades could not be underestimated. And trend variable often came out to be the simple effective proxy to represent them. Keeping in view the above factors, OLS estimates of different specifications of the consumption relationship were attempted and the most promising among them is presented below.

$$DC_t = 282.5045^* + 2.1644\ DP_t + 1.21645\ IP_t + 0.8065^*\ PCI_t$$

$$(4.6237) \quad (0.9679) \quad (0.7160) \quad (3.9685)$$

$R^2 = 0.9408$ DW = 2.4612

The explanatory power of the above specification was high, with a positive sign of the domestic price coefficient. The lack of confidence of the price coefficients would go to indicate that the effect of prices on consumption was obscured. However, growing per capita income definitely and positively contributed to the domestic consumption. The income elasticity of 0.40 indicated that every one per cent addition to net per capita income raised domestic consumption by atleast 0.40 per cent i.e. irrespective of the increase in domestic price the consumption increased if per capita income increased.

Though, from the consumer point of view, the impact of causal factors appeared to be little, one could note plausibly that the producers could have a strong reason to turn to domestic market. In terms of prices, they received for their produce; domestic market offered them an irresistible outlet.

Over the last decade, the domestic consumer prices were higher than the unit value realised, on exports. Since most of the established estates had their own distributional networks, the retail prices or atleast the wholesale prices turned out to be close to producer prices, domestic market offered them better profits with lesser risk. In contrast, exports involved severe international competition, strict quality control enforcement atleast by the importing countries and associated formalities; the captive domestic market, with its vastness coupled with the lack of consumer awareness, proved a strong disincentive for the producers to export tea.

The indications were that, consumption would grow unchecked; government also seemed to aid the domestic consumers as it occasionally placed restrictions on exports through duties, minimum price and export ceilings and producers had all the advantages by turning to the domestic market. In these circumstances, it would be hard for India to regain or maintain her share in the world trade. The trend was inward looking.

Prices and Stocks

As the Indian economy is growing steadily over the years as discussed elsewhere, this generally exerts an upward pressure on prices. For the study, the Kolkata auction prices, that proxied the domestic price, had been steadily growing over the decades.

Linear		Compound
$DP_t = 1.3108 + 2.5810^* \, t$	$R^2 = 0.8950$	CGR = 7.60 per cent
(1.4102) (9.2942)		

It is to be expected that, in a predominantly outward looking industry, increases in domestic prices, by suppressing consumption, would lead to increased exports. But the reverse had happened in the present case, inspite of the fact that even export duties were abolished for a very long time. The increase in domestic consumption, irrespective of prices, seemed to have exerted an upward pressure on prices, which consequently made the domestic market more profitable. Alternatively, the inbuilt inflationary pressures of the economy could have caused the economy to be a high cost one, thereby placing the Indian tea exports at a disadvantageous position and, at the same time, raising the domestic prices.

The OLS regression results of consumption discussed in the previous section seemed to support these observations, where the price variable entered consistently with a positive coefficient, though not significantly.

The Fourier results indicated the existence of cycle in the prices. The length of the cycle was found to be seven years which was confirmed by the harmonic analysis. The harmonic analysis results are shown in Table 48. The results showed that once in seven years period, the tea prices will be attaining the maximum. The producers would obtain maximum profit in the peak years than in other years. During 1999, the annual prices went upto a maximum of Rs. 88.60 / kg. and declined to Rs. 70 / kg. in 2005.

While the prices exhibited cyclical fluctuations, seasonally they were quite stabilised. This was in contrast with the other major facets of the industry like the bearing area, productivity and production, which were exhibiting quite significant seasonal fluctuations, but no cycles. While the latter facets growing steadily had been temporally stabilised with fluctuations due to only environmental factors, prices (Table 49) fluctuated according to the underlying market adjustments, though seasonally stabilised due to the organised nature of its markets.

As noted earlier, the Kolkata auction prices were considered proxies for domestic price, the correlation between the former and prices at various centres were quite high. The correlation between Kolkata prices and wholesale and retail prices at different centres are presented in Table 50.

Table 50. Correlation between Kolkata Auction Prices and Wholesale and Retail Prices at Different Centres

Consumption Centre	Wholesale prices	Retail prices
Kolkata	0.9426	0.9454
Delhi	0.9563	0.9647
Chennai	0.9812	0.9538
Trivandrum	0.9784	0.9721
Lucknow	0.9432	0.9619
Mumbai	0.9368	0.9655

The close association among prices indicated that the industry, within the country was well integrated. The OLS results, of the basic version of the domestic prices specification depict the perspective of the price formation process, are presented below**:**

$$DP_t = 4.3435 - 23.1977^* \; S_t / DC_t + 21.9559^{**} \; S_t / Q_t + 0.7930^* \; IP_t + 0.7508 \; DP_{t-1}$$

$$(1.3672) \quad (1.7838) \qquad (2.1088) \qquad (5.4949) \qquad (0.4237)$$

$R^2 = 0.9792$ DW = 1.0183

The stock-flow adjustment process had a determined role in the price formation process, as also the international market forces as proxied by the international prices. Stocks, which had grown significantly in the recent years, apparently had a decisive role in price formation. Rising stocks relative to consumption, by excess accumulation had a price-suppressing effect, whereas when moved upward relative to production, the prices tended to rise due to limited release for consumption. Similarly, the international market, through its competition transmitted an upward pressure on domestic prices. The futures market in India is in primitive stage as tea is included in the commodities market quite recently and expectations, in a commodity that involved commitments over decades, seemed to be very conservative. While domestic prices were positively influenced by the international prices, the later too had been growing over time.

International Prices

Linear		Compound
$IP_t = 4.1179 + 3.2304^* \; t$	$R^2 = 0.9150$	CGR = 8.14 per cent
(1.19378)(18.2475)		

The growth rate of international prices (8.14 per cent) came closer to that of domestic prices (7.60 per cent) implying that the domestic market was closely responding to international conditions. Though London auction market was closed in 1998, a different but closer representation of the same in the nature of an index was provided by International Tea Committee as unit value realised on exports by the principal exporting countries, which takes into account the spatial distribution of exports, prices and exchange rate fluctuations.

The level of stockholding which was only 155 m. kg. in 1973 increased to 469 m. kg. in 2005, which was greater than the total exports in 2005 by 27 per cent. It increased three times in three decades with a growth rate of 4.40 per cent.

Stocks

Linear | Compound

S_t = 117.2350* + 14.8166* t R^2 = 0.8510   CGR = 4.40 per cent

(5.3933)   (13.2815)

Though stocks had grown at an absolute marginal rate of 14.8166 m. kg. per annum, the better fit of compound trend indicated that the growth was faster in recent times. However, except the consolidated figures of stocks held, no further details and break up of stocks held by different categories were available. The market forces did impart cyclical changes in the stocks held, the frequency of which corresponded to those of prices but with different amplitudes, as evident from Table 51.

The significant growth in stocks might imply that there had been a perpetuating gap between supply and demand, the former outstripping the latter and the existence of cycles would imply that the gap was to some extent market influenced.

Table 51. Fourier Results for Tea Stocks held in India

Cycle Length	Fourier coefficient		R^2P	R^2M	K
	A_p	B_p			
5	-1.07	0.43	1.33	41.19	0.03
6	-2.06	-4.15	21.5	"	0.52
7	8.16	3.77	80.84	"	1.96
8	-11.13	-5.81	157.53	"	3.82
9	-2.31	-0.56	5.65	"	0.14
10	-9.49	-1.72	93.08	"	2.26

Since the supply side had been stable and growing, the fluctuations appeared to have originated from the demand side. The stable growth of supply in India, as well as the traditionally established producers, had occasionally resulted in price slumps over the history of the industry which had been attributed to the excess world supply. While in the long run supply management was also important, demand management was clearly the deserving parameter in the short run. No tangible efforts had been undertaken so far in domestic demand management. Though some efforts had been made by the Board, to stimulate international demand through encouraging studies on the medicinal value of tea and transmitting the same to create awareness among the people in India and outside, the results were yet to be assessed.

Regarding supply management, though the efforts of the Board had been quite visible in the domestic front, with partial success as discussed earlier, no apparent breakthrough occurred in the international scene.

Exports

Indian tea, once commanded as the single largest share in international market, had gradually lost its hold. The share of Indian exports was about 45 per cent in 1951, declined to about 28 per cent in the early eighties and further declined to about 12.70 per cent in 2005 (Table 30). The exports virtually hovering around 200 m. kg. mark in physical terms, widely fluctuating with no apparent trend pattern (see trend results below) and the Indian Share (IS), declined sharply at almost three per cent per annum even as the total world tea trade was expanding at about 2.31 per cent per year. As discussed elsewhere, the growth rate of world imports for consumption (2.22 per cent) was less than the world exports with an absolute marginal rate of decline of 22.38 m. kg. per annum. These substantiate the earlier discussion of recent imbalances in supply and demand which eventually slashes the prices of tea both in domestic and international.

Linear		Compound
Quantity Exported		
$E_t = 216.07^* - 0.9633\ t$	$R^2 = 0.1980$	CGR = 0.48 per cent
(31.8497) (1.1629)		
Indian Share of World Exports		
$IS_t = 29.1681^* - 0.5426^*\ t$	$R^2 = 0.9070$	CGR = -2.72 per cent
(48.0154) (17.4053)		
Total World Exports		

$WE_t = 647.8720^* + 24.2051^* \, t$ $R^2 = 0.9360$ CGR = 2.31 per cent

(29.1409) (21.2139)

World Imports for Consumption

$WI_t = 650.5130^* + 22.3826^* \, t$ $R^2 = 0.964$ CGR = 2.22 per cent

(43.0753) (28.8792)

The value realised on exports on the other hand, had been significantly growing on account of increased prices. For instance, the value realised on exports rose from Rs.93.94 crore in 1951-52 to Rs.1830.98 crore in 2004-05, mostly due to the increase in unit value realised which increased from Rs.4.83 / kg. to Rs.91.99 / kg. in the same periods. Quite amazingly, while the unit value increased by 19 times, the total value realised also increased at the same proportion, leaving very little as the contribution by increased quantity of exports. Trend results indicated that both the value realised on exports and unit value realized grew at the same rate of 6.85 per cent.

Over the decades, though the quantum of exports remained stagnant, there were significant changes in their spatial distribution. In this process, part of the traditionally established markets were lost to the competitors and some new markets gained. The spatio-temporal evolution of the export destinations are presented in Table 31, 52 and 53. It could be seen that India lost much grounds in countries among the developed block. Most obvious was the reduction in the export share to U.K. which declined from 68 per cent in 1957 to 12.11 per cent in 2004. Though the per capita consumption rate in the developed countries had been falling, this alone did not account for the drastic decline in Indian exports to these countries. The new entrants into the export market such as the African producers, and the desire of China to re-emerge as a power in the international market, had made heavy inroads into the export share of India, as well as Sri Lanka, the traditional major exporters.

The spatial-temporal distribution of the value realised on exports broadly confirmed to that of the quantity exported. Though the unit value realised from different importers consistently exhibited a growing trend, the distribution had been widely different. In general, where the percentage of exports tended to concentrate, the unit value realised tended to be low. Especially the unit value realised with respect to CIS/Russia, which had emerged to be the largest importer of Indian tea, was one of the lowest. Perhaps, though the economies of scale might be in operation, to some extent, it is imperative to explore why the prices vastly differ among destinations and to rectify them. The bilateral agreements and commitments apparently exerted a downward pressure on the unit value realised.

The imports for consumption by few major consumers' are presented in Table 53 and their major sources in Table 54. Evidently, the major consumers in the developed block, like U.K., U.S.A., Canada and Australia had either stabilised their total consumption or reduced it. This was mainly due to the generally declining per capita consumption of tea in these countries. Increasingly tea was becoming to be identified as poor man's beverage whereas the affluent sections of the society seemed to move towards other hot and carbonated soft drinks including cold coffee and alcoholic drinks. It was thus gradually relegated to the position of being an inferior good, which perhaps explained the declining per capita consumption in relatively affluent countries like U.K., U.S.A., Canada, and its increasing trend in general, in the West Asian, East European and former Soviet block countries falling under the developing nation category.

Among the major exporters, Sri Lanka, the other major traditional exporter and most serious Indian competitor, also suffered spatio-temporal distribution pattern of exports similar to that of India. Her export share in the world trade also declined considerably from a peak 35.40 per cent in 1961 to 19.94 per cent in 2006 (refer Table 29), and she had also lost significantly her traditional markets to Kenya, while gaining the Asian and European developing countries.

Among the relative emerging entrants into the market, the East African exporters and Indonesia penetrated deep into the developed world markets, gradually replacing Indian and Sri Lankan teas. Similarly, China from where tea originated, and which had hitherto been mainly inward looking, started increasing its exports to these established markets. Her export share which was just 2.80 per cent in 1951 sharply rose to 18.50 per cent in 2006.

Perhaps, the traditional exporters faced considerable cost disadvantages due to their old stocks and establishments, while the new entrants inherited the vintage benefits right from the beginning. With their cost advantages, they found it relatively easy to route their produce through the established channels, where upon the traditional exporters slowly lost their hold and faced the arduous task of exploring new markets with considerable disadvantages.

Apart from the declining per capita consumption in major consuming countries and the cost disadvantages, the supply pressure created, by the new entrants and in general increasing production also added to the stagnancy of traditional exporters. In Indian case, to all these, the domestic demand pressure was also added. Both the internal and external factors combined together presented a highly unfavourable environment for exports. Hence the major producers were unable to agree among themselves for supply management.

There had been a strong tendency among both the major producers and consumers to diversify their destinations and sources. The consumers in developed countries had achieved consistently a high degree of diversification in the sources of their imports. In case of the West Asian and, East European countries and the former Soviet Block, though there had been a tendency to diversify their sources, there were mixed results on account of bilateral agreements, to which most of them were parties.

Similarly, the exporters diversified their destinations. Almost all had the advantage of larger market base in the initial stage, while India was serving predominantly her colonial master. It meant that the diversification might have costed India dearly in the later stages, thus adding to the causes of stagnating exports. Consequently, the contingencies of bilateral agreements were resorted to, even at the risk of depressed unit value realisations. Among the smaller producers and exporters, there had been a mixed diversification pattern, perhaps, since with their smaller volumes of produce they could not cater to a larger market.

Sri Lanka had been maintaining a very high degree of market diversification right from the fifties. In the formative year of the industry in India i.e. in the first half of the twentieth century, tea was relatively unknown in Sri Lanka and tea was popularised in India for the sole benefit of the British. Naturally, Britain used to be the major destination for the Indian exports. When Sri Lanka switched over to tea from coffee by the fifties, already British market was served by India and this could have necessitated and brought about a high degree of diversification for Sri Lankan tea as well as that of other new entrants in the fifties. Since the developed countries stabilised their imports decades back, their import diversification implied that part of such markets had been eroded for Indian exports.

Just as spatial diversification and temporal variations count for the country's ability to export, its success in value terms depends largely upon quality evolutions. It was a paradox that the largest producer and exporter of tea could not, over decades, evolve technology with competitive edge to export tea in the made form. It was pointed out in the section and an FAO study had observed the failure of traditional tea exporters to export them in value added form. The progress made in India is presented in Tables 13 through 16 and discussed in Chapter IV.

Packet tea, tea bags and instant tea were the major value added forms of production and exports. India was hardly able to convert 21.58 per cent of her exports into value added forms in 2005-06. Of the three forms, packet tea alone had been the predominant one, accounting for almost the entire value added form of exports, and the other two forms hardly accounted for two fourths percentage. While the latter two had higher unit value realisations, the unit value realisation of the former slided close to that realised on bulk exports. Further, the unit value realisations in all the cases were highly fluctuating with a significant downward trend in recent times. Whether it was due to the inability of the Indian exporters to compete with the processors in the developed nations as the FAO study alleged or because of the high cost of Indian production is a question to be explored further.

The trend results at the beginning of the section indicated that while the world tea exports grew over time, Indian export share significantly declined over time with stagnant exports. Apart from stagnation, there had also been cyclical fluctuations as the Fourier results indicated. Though the fluctuations appeared to be little violent, an eight-year cycle was visible and similar fluctuations were visible in the value realised on exports and unit value realised (Table 55).

As in the other cases, the OLS regression corresponding to the specification in the model was attempted with some modifications and the results are presented below**:**

$$E_t = 142.5709 + 1.6588\ DP_t - 0.2532\ IP_t + 0.4997^{**}\ RWS_t + 0.2439^{**}\ DE_t - 1.1891\ t$$

$$(0.7140) \quad (0.4390) \quad (0.5856) \quad (2.1484) \quad (2.1342) \quad (0.8313)$$

$R^2 = 0.5429$ DW = 1.9105

The trend variable was included to capture the expectation formation hypothesis. According to Hallam (1990), in the model of expectations formation, expectations are assumed to be based upon the simple extrapolation of a variable's past behaviour and this is found to be a negative non-significant coefficient. Direct exports through private sales and forward contracts was included to capture the effects of future trading, if any. The results indicated that prices had no significant impact on exports. The variable export duties realised was omitted, since they were discontinued very long time ago. Both the rest of the world supply and direct exports had positive significant effects on exports, indicating that the overall international market conditions were atleast partially responsible for the stagnancy condition of Indian exports. The international market was treated exogenously in the present model, with the inclination to treat the equation as an export demand equation, under which assumption the signs of the price variables were as expected. When the overall demand for tea improved, the demand for Indian tea also improved but only partly, as indicated by the coefficient of the rest of the world supply. The fact that the equation explained only about 50 per cent of the variations in exports implied that there were additional factors not accounted for in this study. Perhaps quality differences in exports, external competitiveness, future trading and other factors could have improved the results when added, but their inclusion was not possible for want of data.

The Model

Based on theory, an empirical model for the Indian Tea Industry was specified in Chapter III that consisted a set of seven equations with two identities. The behavioural relationships were constituted with a set of 31 variables, of which nine were endogenous, six were lagged endogenous and the rest 16 were exogenous.

Based on experimentation and the results of estimations discussed in previous sections, certain changes were effected in the empirical implementation of the model. Few variables were redefined, certain data discrepancies were corrected, and certain behavioural assumptions were reformulated. Hence, the data were checked to confirm the identities. The bearing area (A_t), production (Q_t) and yield (Y_t) figures were collected and using the identity, the data were crosschecked for its consistency and corrections were carried out whenever discrepancies did occur.

$Q_t = (NIY_t * NIA_t) + (SIY_t * SIA_t)$

where N and S were prefixes referring to the regions. Similarly, data on stocks held (S_t), domestic consumption (DC_t) and exports (E_t) were collected and using the identity, verified for their consistency and corrected when discrepancies did occur.

$C_t = (Q_t + S_t) - (E_t + S_t)$

In the previous section, the domestic price, in nominal terms always entered the relationship with a positive coefficient probably because of the inflationary pressure of the fast growing economy. The price of substitute, coffee when introduced into the specification had a very dominant positive effect which was quite pervasive. Though it had the relevant sign, its effect was indistinguishable with that of the trend variable. To overcome these difficulties, in the final estimated version, the lagged dependent variable and coffee price were deleted; the domestic price variable was deflated by the All India Consumer Price Index (CPI_t).

Yield equations were modified by dropping some of the variables. The variable like rainfall ($SIRF_t$, $NIRF_t$), average holding size of the tea plantations ($NIAHS_t$, $SIAHS_t$) which exhibited extreme skewness in the trend results and the difference in bearing area (Δ NIA_t, Δ SIA_t) as the data available on extensions, replacements and replantings were not be able to equate to the bearing area published by Tea Board. The trend variable was included as a proxy for the long run productivity improvements by internalising improved technology. Besides, it was possible in the short run to manage the output within limits by input management or altering the picking decision by coarse picking or fine picking depending upon the market conditions and these were accounted by the price variables.

Bearing area relationship was more or less adopted in the original form discussed earlier in its reduced form, bypassing new planting and replacement equations. A minor modification pertained to the lag structure of the relationship specified. Normally, the bearing area in year t, with respect to perennials, was expected to be influenced by the prices prevailing in year t-k, where k was the gestation period. Since in the present case, the new planting and replacement components were abstracted and the current removals were affected by current prices as well, the lag scheme was so specified as to have their impact without gestation lags.

The prices within the period t-k to t too had short run profitability impacts and hence influenced the bearing area. Strictly speaking, the average size of holding (AHS_t), should have been incorporated as a composite variable, like that of the deflated domestic price variable of the consumption equation (discussed subsequently) as NIA_t/NNE_t and SIA_t/NSE_t where NIA_t and SIA_t were the endogenous bearing area with its counterpart exogenous variable, the number of tea plantations (NNE_t and NSE_t). The variable was not quite consistent as already discussed elsewhere and the inclusion of small farmers from 1998 reduced the average holding size of tea plantations in the form of composite variable as above. This analytical contingency was hoped not to have substantially modified the results. The lagged endogenous variables were retained to assess the long term area adjustments.

The explicit price formation specification was retained with the stock flow adjustment process devoid of adjustments based on expectation formation. Stocks in relation to consumption and production signified the stock flow adjustment process of price formation.

The final export equation estimated also followed largely the original specification. The stagnancy of exports necessitated the dropping of the lagged dependent variable. Since London auction market was closed in 1998, direct export through private sales and forward contract were expected to have significant influence on the sellers and buyers and hence was introduced as a variable in the export equation though on the face of it, it appeared to enter the dependent variable definitionally.

The final estimated version of the system of equations specified and the identities are given below**:**

1) $NIA_t = a_0 + a_1\ DP_t + a_2\ IP_t + a_3\ NIAHS_t + a_4\ NIA_{t-1} + u_t$

2) $SIA_t = b_0 + b_1\ DP_t + b_2\ IP_t + b_3\ SIAHS_t + b_4\ SIA_{t-1} + u_t$

3) $NIY_t = c_0 + c_1\ DP_t + c_2\ IP_t + c_3\ T + u_t$

4) $SIY_t = d_0 + d_1\ DP_t + d_2\ IP_t + d_3\ T + u_t$

5) $DC_t = e_0 + e_1\ DP_t/CPI_t + e_2\ IP_t + e_3\ GNP_t + u_t$

6) $DP_t = f_0 + f_1\ S_t/DC_t + f_2\ S_t/Q_t + f_3\ IP_t + u_t$

7) $E_t = g_0 + g_1\ DP_t + g_2\ IP_t + g_3\ RWS_t + g_4\ DE_t + u_t$

Identities

1) $Q_t = (NIA_t*NIY_t) + (SIA_t*SIY_t)$

2) $S_t = (Q_t + S_{t-1}) – (DC_t + E_t)$

While finalising the model, different specifications of the basic version of the commodity model were tried through both OLS and 2SLS and the most promising among them are presented and discussed below, some of which were presented earlier under respective sections. Generally, the estimates of the coefficients were found to be robust both in magnitude and direction, probably because the system as a whole was very simple, without involving any complex lag variables and other theoretical sophistications.

Partly it was purposeful, so that the basic trends of the industry could be distilled without running the risk of sensitising the results.

The above system consisted of seven equations determined altogether by a set of 24 variables with ten exogenous, three lagged endogenous variables and the remaining as endogenous variables. All the behavioural relationships were over identified. Hence 2SLS estimation technique was applied to the above system and the results are presented below and discussed one after the other**:**

Bearing Area

The bearing area specification fitted extremely well in the northern region, wherein the R^2 was very high (0.9874) relegating the explanatory power of the system. Except the intercept and the coefficient of international prices, all other variables had significant coefficients with expected signs. The exceptions were not statistically significant. The average holding size of the north, which was rising positively, contributed to the area while the state intervention in the form of central excise duties had a suppressing effect. The latter however, was significant only at ten per cent level. The lagged variable was highly significant, implying that the northern area was responding to long term expectations. Though marginal, the long term response to domestic prices was more than that of short run response.

Some structural differences were observed with respect to the southern area response. The specification was able to capture only 76 per cent of the variations, which was markedly lower as compared to that of the north. While all the coefficients had the expected signs, only the adjustment process was found to be pronounced in effect. The size of holding also contributed to the area but the significance was only at 10 per cent level. The coefficients of domestic price and central excise duties turned out to be statistically non-significant. Hence, though the short run and long run response were higher as compared to those of the north, their behaviour had been more erratic, with sharp fluctuations in the southern bearing area.

$$NIA_t = 36.7448 + 0.7213^{**}\ DP_t - 0.01057\ IP_t + 1.1536^{**}\ NIAHS_t + 0.8588^{*}\ NIA_{t-1}$$

$$(0.6750)\quad (1.8512)\qquad (1.0338)\qquad (2.2484)\qquad (3.2561)$$

$– 0.0048^{***}\ CED_t$

(1.6512)

$R^2 = 0.9874$ DW = 1.9614

$SIA_t = 33.5637^* + 0.0298\ DP_t + 0.0032\ IP_t + 0.2131^{***}\ SIAHS_t + 0.5416^*\ SIA_{t-1}$

(2.7382) (0.2919) (0.8642) (1.5730) (3.7492)

$– 0.0029\ CED_t$

(0.3749)

$R^2 = 0.7623$ DW = 1.9962

Yield

In the yield equations, the trend variable was quite dominant in its influence in both the regions. The price variables had mixed signs in the estimated equations, one half confirming the a priori expectations, but were consistently statistically non-significant. This implied that long term technical improvements have played a major role in the improvements of productivity, wherein the profitability considerations of the short run played only a marginal role.

The overall explanatory power was generally high in the regions, 77 per cent for north and 80 per cent for south. Yet, the productivity changes underwent sharp short run fluctuations, largely due to the numerous environmental factors, not accounted for in the above specifications. The specification thus, captured the major technological and market effects accounting for a substantial part of the variations in productivity. Structurally both regions seemed to have responded in a similar fashion, though in absolute terms, the Southern States fared better overall.

$NIY_t = 1356.6003^* – 1.5287\ DP_t + 4.0574\ IP_t + 13.0565^*\ T$

(25.4463) (0.4961) (1.0704) (3.0835)

$R^2 = 0.7716$ DW = 1.7447

$SIY_t = 1590.5806^* + 8.5450\ DP_t – 1.1690\ IP_t + 32.5234^*\ T$

(28.3243) (0.7682) (1.0731) (2.7425)

$R^2 = 0.8053$ DW = 1.5465

Consumption

The coefficients of the consumption equation had the expected signs and its overall explanatory power was high (86 per cent). The price coefficients were not statistically significant, implying probably that evolving social customs and habit formation were more important in determining consumption rather than prices themselves. These changes were to some extent proxied by the GNP which by its own right also significantly served to spread the domestic consumption deep and wide over the decades.

$DC_t = 280.0844^* - 24.3364\ DP_t/CPI_t + 0.6273\ IP_t + 0.1058^*\ GNP_t$

(4.1771) (1.1902) (0.3923) (4.5746)

$R^2 = 0.8679$ DW = 1.3029

Prices

The price formation relationship results confirmed to the OLS results discussed earlier. The explanatory power was quite high (0.97 per cent. The stock-flow adjustment process had a determined role in the price formation process, as also the international market forces as proxied by the international prices. Stocks, which had grown significantly in the recent years, apparently had a decisive role in price formation. Rising stocks relative to consumption, by excess accumulation had a price-suppressing effect, whereas when moved upward relative to production, the prices tended to rise due to limited release for consumption. The international prices exerted a significant upward pressure on domestic prices, probably through competition arising out of close integration of the domestic market with international markets.

$DP_t = 5.2116 - 7.9729^{**}\ S_t/DC_t + 4.8245^*\ S_t/Q_t + 0.8035^*\ IP_t$

(1.2521) (1.9754) (3.1976) (14.0068)

$R^2 = 0.9755$ DW = 2.4952

Exports

Except the coefficient attached to international prices, all the other coefficients had the expected signs, which however, along with domestic prices was non significant and the results of the export equation was satisfactory. The expansion in world trade exerted a small but significant upward pressure on Indian exports. Interestingly, for every one m. kg. expansions in world trade of the rest of the exporters, the Indian exports marginally increased by about 0.15 m. kg. which was close to the Indian share of world exports. Direct exports through forward contracts and private sales to some extent, exerted a significant upward influence on total exports. Considering the fact that, the specification as estimated accounted for about 57 per cent of the export variations only, it was possible that other factors like the small scale futures trading with respect to New york and London markets, would have indeed played some positive role in the determination of export volume. However such considerations could not be taken into account in the present study.

Though the coefficient of direct exports was positive and significant its magnitude which was close to two (1.9882) led to some conclusion that it entered exports definitionally, in which case the impact of future trading and private sales would indeed have significant role. This would suggest that India stands to gain her exports marginally on direct exports through private sales and forward contracts. These observations, however, could not be confirmed by the evidence generated by this study.

$$E_t = 68.9488 - 0.9325\ DP_t - 0.02678\ IP_t + 0.1497^{**}\ RWS_t + 1.9882^{*}\ DE_t$$

$$(1.1612) \quad (0.2778) \qquad (0.8593) \qquad (2.5932) \qquad\qquad (3.2864)$$

$R^2 = 0.5739$ DW = 2.0712

Overall

Overall, the model appeared to have captured the essentials of the industry, though in an aggregative manner. The individual equations of the system had satisfactory explanatory power, with R^2 on the upwards around 76 per cent and above barring the export equation. Similarly except the price equation and the north Indian bearing area response equation, the other equations did not exhibit much autocorrelation problems. For reasons discussed below, the somewhat high Durbin-Watson 'D' values of the former two equations did not pose much practical problems.

A major inference arising out of the careful scrutiny of the estimated system was that none of the price variables, both domestic and international, entered any of the structural equations with statistically significant coefficients, with just two exceptions. Firstly the domestic variable had a coefficient attached to it at five per cent level in the northern bearing area response equation and secondly the international prices significantly entered the domestic price equation. Moreover, only these price variables occasionally had coefficients with signs not confirming to a priori expectations. It indicated clearly that there was no short run simultaneous determination of the levels of the major structural components of the industry, except the domestic price formation process.

In all the structural equations, except the domestic price equation, only the exogenous variables were having significant influences. While, the yield levels, bearing area, domestic consumption, exports and stocks were largely determined by relevant exogenous variables, the domestic price alone appeared to adjust to the balancing of the system. This major result seems to explain all the aspects of the industry discussed so far.

Certain broad generalization of the industry could be drawn from these regression results and earlier discussions. The industry, as such is divided into south and north subsystems, with important structural differences. The industry had become aged with consequent old age symptoms. The area, productivity and growth seemed to have reached their peaks and had begun to stagnate. The plant stocks were growing in age well beyond their biologically active production periods and their rejuvenation and replanting rates were lagging far behind. While the domestic demand for made tea was increasing, exports both in total quantum and value added form was decreasing rapidly rather than stagnating.

The industry appeared to have lost its sensitivity to market forces, as the prices did not seem to influence the evolution of major industry variables. Prices in turn were closely related to the stock adjustment and external market forces. The mounting stocks and the stagnating exports seemed to exhibit a downward pressure on prices continuously and since the inertia of the industry did not allow for instant adjustments, the producers, rather than the consumers, especially the small holders (of the south) were largely affected. There seemed to be relevance in the argument that supply management was more relevant coupled with external demand management in the short run.

Though exports were not much affected by domestic prices, other international market conditions did affect them, yet the sources were not properly accounted in the present model. Probably consideration of comparative cost structures of international suppliers, the quality and service methods would improve the understanding. As such, exports, though relatively stagnant, were fluctuating with consequent adjustments, in the domestic stocks held, which through the stock adjustment mechanism determined the domestic prices. The latter however proved to be passive and the industry lacked simultaneity in the relationship among its variables.

Allowing the trends to continue, probably in another decade or more, domestic demand would grow enough to claim the surplus production, thereby the industry becoming entirely inward looking. Export prospects did not seem to be bright. The loss of London Auction market from 1998 was also a set back for the Indian tea industry as major exports were directed to it. This might also be a reason for loosing some of our traditional importers like the U.K., U.S.A., and other EU countries. The stiff competition from Sri Lanka, Indonesia, Myanmar and Kenya snatched the considerable market share from India with their cost advantage, dumping at low prices and long term credits. After the collapse of former Soviet Union which was the major importer of Indian tea, if serious exploration to open up new avenues had done earlier, India could have solved so many problems like mounting stocks, stagnant exports and sharp decline in quantum and value of exports both in bulk and value added forms. With the limited replacement of old stocks, productivity may not continue its past growth rates and by the end of another decade or two, domestic consumption might outstrip production. When the industry is protected, the producers might gain but the export would vanish and the industry would become progressively high cost in nature.

Thus, while surplus supply might be a problem, it would still be essential in the long run to change the vintage composition of the tea stocks to meet the domestic demand and also to stay in the international market. This needs to be done through conscious planning and effective implementation since the market forces had proved to be of little assistance. Similarly, export promotion, in the value added form might have to be consciously undertaken since increased production has no say in increased exports.

Though physical stocks were found to have important roles in the price formation process, the Tea Board did not seem to consider it adequately in its analysis. Nor the particulars of how it was managed made available. Thus the Boards services appear to be all the more relevant in the near future in a systematic and intensive manner, to dynamise the industry.

Market Integration

Market integration implies that the price changes that occur in one market would immediately be transmitted to the other market. Integration of markets is a good indicator of efficiency in the marketing system. Co-integration analysis was used to test the integration of black tea prices. Testing was done for monthly prices of six regional auction markets in India namely, Kolkata, Guwahati, Siliguri, Cochin, Coonoor and Coimbatore and four international markets namely Colombo (Sri Lanka), Jakarta (Indonesia), Mombassa (Kenya) and Limbe (Malawi) for the period 1990-2005.

Co-integration test starts with the pre-condition that if two time series variables could be integrated, they should be of the same order of integration. To have the same order of integration, these variables should be stationary when they are differenced the same number of times. Hence, the test of co-integration starts with a test of stationarity at different differenced levels. To verify whether the level and first differenced price series were indeed stationary, Augmented Dickey-Fuller (ADF) unit root test was used. The equations were estimated with an intercept and no time trend for each price series. The ADF test results for the current research are presented in Table 56.

The null hypothesis of non stationarity was tested based on the critical values reported by MacKinnon (1990). Some of the price series appeared non stationary in the levels, but all the series were stationary in first differences. The price series of Kolkata, Guwahati, Siliguri and Jakarta (Indonesia) were stationary in the levels itself and hence omitted for further analysis. The remaining markets Cochin, Coonoor, Coimbatore, Colombo (Sri Lanka), Mombassa (Kenya) and Limbe (Malawi) were taken for further analysis.

Having confirmed that the price series were stationary in their first differences, cointegration between the markets was tested using Johansen's maximum likelihood procedure for the presence of short run and long run relationship between the domestic and international black tea auction markets and associated price transmission and resultant price volatility in the domestic markets for black tea.

Integration of global markets with the domestic markets for black tea were studied in Johansen's multiple cointegration frame work. The world black tea auction markets price transmission to the domestic markets was analyzed through estimates of the VECM frame work. The econometric analyses were carried out using the software E-Views 3.1.

Results of Johansen's multiple cointegration tests revealed that the domestic black tea auction markets of Cochin, Coonoor and Coimbatore were integrated with international black tea auction markets each with four cointegrating equation proving the spatial market integration of black tea auction markets. The results are presented in Table 57 proving the long run association between domestic black tea auction markets with international black tea auction markets.

Table 57. Results of Multiple Cointegration Tests for Different Black Tea Auction Markets

Auction Markets	Eigen Value	Likelihood Ratio (LR)	5 per cent Critical Value	1 per cent Critical Value	Hypothesized No. of CE (S)	Cointegrating Equations
Cochin	0.26764	164.5205	94.15	103.18	None*	4
Coonoor	0.21629	105.6492	68.52	76.07	At most 1*	
Coimbatore	0.13868	59.58536	47.21	54.46	At most 2*	
Colombo	0.08165	31.36936	29.68	35.65	At most 3**	
Mombassa	0.04744	15.27098	15.41	20.04	At most 4	
Limbe	0.03168	6.084987	03.76	06.65	At most 5**	

Note**:** Critical values based on MacKinnon (1991).

LR test indicated number of cointegrating equations are significant at 1(*) and 5(**) percent level

As discussed in the previous chapters, before proceeding to vector error correction mechanism, lag order of variables to be included in the model had to be ascertained. The optimal lag length was identified as one for all the variables under research investigation.

For the present study, the vector error correction mechanism (VECM) was adhered for the domestic black tea auction markets which were having long run association with global black tea auction markets. Accordingly, VECM results are presented in Table 58 and discussed in the subsequent sections.

The estimates of error correction coefficients for all the black tea auction markets indicated that all the South Indian markets were significant and their signs were negative indicating the short run price movements along the long run equilibrium path was stable. It authenticated a strong association between these markets. About 65 per cent of disequilibrium corrected for each month in Cochin auction market by changes in its own prices and the remaining was influenced by other internal and external market forces. Similarly, 49 and 28 per cent of disequilibrium corrected for each month in the Coonoor and Coimbatore auction markets respectively by changes in its own prices and the remaining was influenced by other internal and external market forces respectively. The coefficients of the error correction term indicated the speed of convergence to the long run growth path as a result of shock of their own prices. About 30.4, 24 and 32 per cent disequilibrium corrected with one month lag in the Cochin auction market prices with relation to Coonoor, Coimbatore and Colombo auction market prices respectively.

The coefficients of own lagged price of Cochin auction market price was found significant and revealed that the impact of its own price took place with two months lag period indicating the short run price movements along the long run equilibrium path was stable. Whereas, the coefficient of own lagged price of Coimbatore auction market price was found to be significant and revealed that the impact of its own price took place with one month lag period and the speed of convergence was marginal at 27 per cent with short run price movements along the long run equilibrium path.

In the long run, the coefficients of own lagged price of Coonoor, Coimbatore, Colombo and Mombassa auction market prices were found significant and the impact of Cochin price took place with one month lag period, while in Limbe auction market, the impact took place with two months lag period as a result of shock of both Cochin and Coimbatore auction market prices. The shock in Colombo and Mombassa auction market prices revealed that the impact in prices of Coimbatore auction market took place with one month lag period. The coefficient of own lagged price of Limbe auction market was found significant and revealed that the impact of its own price took place with one month lag period marginally.

Further the error correction estimates for Limbe auction market indicated that it was not affected by the international black tea auction market prices and it was found to be a separate market, might be because of relatively low volume of transactions and the quality of tea traded there.

The results of the study confirms that both the domestic and international tea markets are integrated.

SUMMARY AND CONCLUSIONS…

CHAPTER VI

SUMMARY AND CONCLUSIONS

The stabilization of the Indian tea industry took place around the middle of the twentieth century, while it took roots in India by the middle of eighteenth century through British efforts. And from 1953 onwards, the industry was brought under State regulation through the Tea Act and Tea Board came into being to implement its provisions. Indian share of world tea trade has been declining over the decades with its significance far reaching and indirect effect on her trade balance. Tea industry lost its importance in the national economy of India as an earner of foreign exchange, registered a declining trend in the share of export value to total export value of all commodities with 0.51 per cent in 2004-05 as against 18.46 per cent in 1961. Various reasons, both domestic and external were adduced to this trend.

Inspite of planned efforts, many problem areas persisted, some due to the inadequate understanding of the structural components of the industry. This study was undertaken to analyse the evolution of the industry and its overall performance in an integrated manner. To understand the structure, an econometric modeling, in the commodity model framework, was attempted in the study. To assess the evolutionary trends of the industry, time series tools, mainly linear and compound trends, seasonal indices and Fourier analysis were extensively used.

With a slow but significant expansion rate of 1.11 per cent per annum which was lower than the all India level of 1.22 per cent, north had been accounting for about 75 per cent of the total tea area in India over several decades. On the contrary, with a significant expansion rate of 1.64 per cent per annum which was higher than the all India level, the south had been accounting for about 21 per cent of the total tea area in India over several decades. The distribution of area had thus been skewed between the regions, probably due to geo-environmental factors.

Once, the average size of holding in the north was 125 ha. and it decreased over years to register 6.7 ha. On the other hand, in south the average size of holding was static around 7 ha. for a long time and rapidly declined to 1.68 ha. Though in both regions the distribution of ownership was skewed, the position was much poorer in the south with about 98 per cent of estates owning about 45 per cent area while in north about 0.57 per cent estates owned about 51 per cent area. The tea industry, while considered to be a corporate entry in north, it has the largest conglomeration of small growers in south especially in the Nilgiris. This led to the existence of a number of bought leaf factories and the government sponsored co-operative factories for processing tea leaves of the small growers.

More than 44 per cent area had tea plants aged 50 years and above in the south while the proportion was 32 and 35 per cent for north and all India respectively. While a fifty year replacement cycle of the existing area by 2004 would require replacing an area of about 10428 ha. per annum, the actual achievements during the period was only 733 ha., i.e., seven per cent of the requirement. Infact, this replacement was even less than the annual expansion in area and was around 17 per cent of the extensions in area, determining the industry to become progressively obsolete as far as tea plant stock was concerned. This would in turn irrevocably limit the productivity improvements on which the tea industry heavily relied for the future. The data availability on the removals and new plantings was not consistent and adequate to incorporate them as components into the model and further probe into their behaviour.

The north, characterised by larger sized estates and its behaviour dominated over the industry the area seemed to have been almost stabilised. Since the south had relatively greater number of small estates, the area seemed to have fluctuated in the margin as the results of Fourier analysis indicated. This small fluctuation in the south notwithstanding, the regression results did not indicate any influence of the domestic and international prices on the bearing area in both the regions. In both regions, the area seemed to have been significantly influenced only by long run forces as their lagged variables were found to have significant coefficients.

The efforts made by the tea industry to expand the tea area and to rejuvenate the stocks of old vintage were with little success. The area expansion programmes or schemes were found to be biased towards the north, though there was already a tendency for expansion whereas it was lacking in the south.

The productivity was growing in both regions, the rate at south being marginally higher and the overall growth rate worked out to 0.85 per cent. This was lower than the area expansion rate (1.22 per cent) but was the most important component in increasing production of the past. Though south exhibited a higher productivity on an average, when the size groups of the estates were taken into consideration, in both the regions productivity was not found to be positively associated with the size group of the estates. It was thus difficult to judge the exact relationship between size group and productivity.

Tea plantation industry, which was largely labour intensive, provided gainful employment to a large number of people and the ratio of tea labour to total labour employed in the private sector had registered a declining trend in recent years.

In both regions, the productivity per labour employed was decreasing except in states like West Bengal in the north and Karnataka in the south but with an important distinction. In the north, labour productivity increased at the cost of employment, whereas in the south, employment increased at the cost of productivity quite seriously. As in the case of area, marginal fluctuations were visible in the southern productivity which were masked at the national level by the stability of the northern productivity. The attempts to capture the yield responses through regression analysis was generally unsuccessful and only trend evolution was found significant. Probably age groupwise details, if available, could have helped the analysis.

Besides inheriting the behaviour of its determinants namely area and yield, production exhibited its own peculiarities. The production pattern was found to be significantly seasonal and closely followed the geographical area distribution. There has been a notable shift towards CTC production. Yet the production in terms of value added form did not make much headway till today. All value added forms put together accounted for only 5.16 per cent of total production. It was stated that the companies producing value added form could not match the resources of their counterparts in the developed countries.

The rate of growth in tea consumption was faster in producing countries than in importing countries. Domestic consumption which started relatively late as compared to the European countries, was however growing at a fast rate of 3.43 per cent per annum outstripping growth rates of area, production and population. In terms of total quantity consumed, India tops the list among global tea consumers. But India's per capita consumption of tea is among the lowest. The per capita consumption of 650 gm. was less than that of all major producers and most of the importers. However, while in majority of them the consumption rate was declining, it was increasing in India.

The regression results indicated that the prices did not seem to have significant influence over the levels of consumption over the years, whereas the per capita income growth positively influenced the consumption levels. Though domestic prices were found to have insignificant influence on consumption per se they were higher than the unit value realised on export over the past decade except in few years and thus offering better marketing for the producers internally. This coupled with the international market prices and the autonomously growing domestic consumption turned the industry somewhat inward looking.

In nominal terms, domestic prices were growing at a rate (7.6 per cent) higher than that of all other industry variables with the exception of international prices (8.14 per cent). This rate of growth was found to be closely correlated with the international prices. Domestically, the Kolkata auction prices which proxied the overall prices was found to be closely associated with prices prevailing at various regions. The market, thus, was found to be spatially well linked in terms of prices.

Regression results indicated that stock-flow adjustment process was instrumental in the price formation process, besides the international prices. The domestic stock holding in relation to domestic consumption and production determined domestic prices to which the influence of external prices was added. However, the nature of the former was one of self-balancing and thus even fluctuations of very high order in the stocks held, given the steady states of consumption and production did not correspondingly affect prices. Yet domestic prices fluctuated with a notable seven year cycle which was associated with the fluctuations in exports, external prices and domestic stocks held.

The fluctuating levels of stocks which had a significant relationship with domestic prices were nevertheless growing at a rate of 4.40 per cent. However, with consumption growth outstripping the growth in domestic production and continuing efforts to promote exports, it might decline in future. Though stock holding was having vital influences, many details were not available as to who held them and whether speculative activities were involved. Unfortunately, the stocks were to be treated only as a residual activity. The growing stocks of the past suggested that excess supply was a problem and neither supply management nor total demand management was effectively implemented to bridge the gaps.

The Indian tea exports was stagnating with the quantum of exports hovering around 200 m. kg. over the past three or four decades with the result that her share in the world exports was declining at a significant rate of 2.27 per cent per annum. This was happening even while the total trade was growing at a rate of 2.31 per cent progressively compounding the decline of Indian exports. The value realised on exports was however increasing over years due to the appreciating international prices. Thus between the period 1951-52 and 2004-05, the value realised increased by 19 times associated with an increase of same proportion in unit value realised and little was contributed by the increased quantum exported to total value realised on exports.

Over decades, there had been significant changes in the spatial distribution of Indian tea exports. India had lost much of her market among the developed block countries to the relatively new entrants like the African producers and gained to some extent among the West Asian and East European former Soviet block countries. Her exports were mainly flowing through bilateral trade agreements in recent times with a significant downward pressure on the unit value realised. Thus the unit value realised from Russia under bilateral agreement was the lowest even though it had emerged to be the largest importer of Indian tea.

The developed consumers consistently diversified their sources of imports and similarly major exporters also diversified their destinations. While the importers diversified on choice, most of the traditional exporters were somewhat forced to do so on account of supply pressure. Yet the producers were unable to agree among themselves to regulate their exports.

Though exports in value added form was much desirable and talked about, India was hardly able to convert 21.58 per cent of her exports into value added forms. Among the value added forms too, only packet tea was found to be dominating (11 per cent of total exports) whose price was only marginally higher than the unit value realized of bulk tea. The other two forms viz., tea bags and instant tea constituted only less than five per cent of total exports and their price differential as compared to unit value realised had also been drastically declining overtime. An FAO study concluded that Indian companies lacked resources and technology to match their counterparts in the developed world in a cost effective manner. Apart from stagnancy, an eight-year cyclical fluctuation was visible in the quantum of Indian tea exports and also visible in the value realised on exports and unit value realised. These in turn influenced the domestic prices.

The regression results of the study indicated that exports were significantly influenced by international market conditions and domestic policies, though not influenced by price factors directly. The rest of the world exports and direct Indian exports through private sales and forward contracts were found to influence the levels of exports. The explanatory power of the export equation, though satisfactory (R^2 around 0.54) was not quite high as compared to the other components of the industry. Probably the quality differences in exports and their geographical distribution, forward contracts and sales and bilateral agreements not accounted for adequately in the study could have been the limiting factors. But details on these aspects were generally found wanting.

Having, thus assessed the behaviour of individual elements of the industry, a seven equation econometric model was fitted to the industry data. The equations explained respectively the north and south bearing area responses, north and south yield responses, domestic consumption, the domestic price formation process and the level of Indian exports. Stocks and total production were determined by the system through identities.

Except the price formation equation, all other equations contained both domestic and international prices as explanatory variables but were consistently associated with non significant coefficients. In the consumption equation, the endogenous variable GNP alone was significant. In both south and north bearing area equations, their lagged variables and the average estate size were found to have significant coefficients, all with positive impacts. Additionally in the northern case, excise duty levied had a significant negative influence. Exports was significantly influenced only by endogenous variables, rest of the world supply and direct exports through private sales and forward contracts.

The price formation equation was significant in the entire model in the sense that the endogenous variables viz., stocks, consumption and production combined significantly influenced the 'stock flow' adjustment mechanism to determine the domestic prices. They were significantly aided by the international prices.

Though the model was highly aggregative in nature, nevertheless it helped to assess the structure of the industry explicitly. Thus most of the components of the industry were behaving independently and were out of the controlling hands of market prices. The stocks and prices were mainly bearing the responsibilities of clearing the market. The market in general was plagued by excess supply. The industry as a whole was ageing and need conscious revitalisation efforts.

The plantation industry’s undue emphasis on short-run productivity, without adequate emphasis on stock vintage improvement appeared to be shortsighted. Similarly concrete steps to regulate domestic consumption, export promotion especially in value added form and more importantly steps to regulate the supply through organised stock operations were generally overlooked. These were bound to perpetuate the problems of the industry.

Integration of markets is a good indicator of efficiency in the marketing system. Co-integration analysis was used to test the integration of black tea prices. Testing was done for monthly prices of six regional auction markets in India namely, Kolkata, Guwahati, Siliguri, Cochin, Coonoor and Coimbatore and four international markets namely Colombo (Sri Lanka), Jakarta (Indonesia), Mombassa (Kenya) and Limbe (Malawi) for the period 1990-2005.

The price series of Kolkata, Guwahati, Siliguri and Jakarta (Indonesia) were stationary in the levels itself, whereas Cochin, Coonoor, Coimbatore, Colombo (Sri Lanka), Mombassa (Kenya) and Limbe (Malawi) markets price series were nonstationary and taken for further analysis.

Integration of global markets with the domestic markets for black tea were studied in Johansen's multiple cointegration frame work for the presence of short run and long run relationship between the domestic and international black tea auction markets and associated price transmission in the domestic markets. The international black tea auction markets price transmission to the domestic markets was analyzed through estimates of the VECM frame work.

Results of Johansen's multiple cointegration tests revealed that the domestic black tea auction markets of Cochin, Coonoor and Coimbatore were integrated with international black tea auction markets each with four cointegrating equations proving the spatial market integration of black tea auction markets.

The estimates of error correction coefficients were significant for the black tea auction markets of South India and their signs were negative indicating the short run price movements along the long run equilibrium path stable.

About 30, 24 and 32 per cent disequilibrium werecorrected with one month lag in the Cochin auction market prices with relation to Coonoor, Coimbatore and Colombo auction market prices respectively.

The coefficients of own lagged price of Cochin auction market was found significant and revealed that the impact of its own price took place with two months lag period indicating the short run price movements along the long run equilibrium path was stable. Whereas, the coefficient of own lagged price of Coimbatore auction market price was found significant and revealed that the impact of its own price took place with one month lag period and the speed of convergence was marginal at 27 per cent with short run price movements along the long run equilibrium path.

In the long run, the coefficients of own lagged price of Coonoor, Coimbatore, Colombo and Mombassa auction market prices were found significant and the impact of Cochin price took place with one month lag period, while in Limbe auction market the impact took place with two months lag period as a result of shock of both Cochin and Coimbatore auction market prices. The shock in Colombo and Mombassa auction market prices revealed that the impact in prices of Coimbatore auction market took place with one month lag period. The coefficient of own lagged price of Limbe auction market was found significant and revealed that the impact of its own price took place with one month lag period marginally.

Further the error correction estimates for Limbe auction market indicated that it was not affected by the international black tea auction market prices and it was found to be a separate market segment, might be due to its relatively low volume of transactions and the quality of tea traded there.

This study on market integration confirms the earlier discussions regarding the price formation process, as the international prices exerted a significant upward pressure on domestic prices, probably through competition arising out of close integration of the domestic market with international markets.

Policy Implications

The results of the study had brought out certain invariant basic trends of the industry. These results might serve as first approximations and might serve as hypotheses, rigorously testable with expanded models as additional data are made available in future.

The immediate modification might relate to further disaggregation of the model employed in the study. New plantings and removals and the resulting age-yield profile might be profitably incorporated into the model. These additions, if proved to be price response, could provide valuable information to regulate the industry through market intervention policies.

Considering the importance in the price formation process, the stock holding might be explained through causal relationship rather than allowing it to operate as a residual activity. Similarly consumption equation could further be disaggregated between regions and possibly among consumer categories so that ways and means of regulating it could be devised. As such, the present study suggested no possible way to regulate domestic consumption. Though not a problem at present, it may need regulation in the future.

Similarly, the international prices and exports of tea might be probed in an expanded framework. Specifically, direct exports through private sales and forward contracts along with the quality distribution of exports need to be properly integrated into the basic framework. Bilateral trade agreements also need to be endogenised to explore their impact on exports and domestic industry. All these expansion might well be integrated into the commodity framework which seemed to be capable of withstanding such expansions.

One important lacuna is the non-consideration of cost elements in the present analysis. This too might, when integrated provide additional information on the wisdom of expanding tea area viz., other plantation crops, besides enhancing the understanding of cost effectiveness in the international markets.

The tea industry might reconsider its emphasis on short run yield improvements since such an approach is inherently limited by the vintage of stocks. Strategies might be devised that prove more productive per unit of investment both on infrastructural developments and scientific research. The strategies should be based on the profitability of tea in comparison with other plantation crops and unilateral promotion measures might be avoided.

Transparent authoritative control over the operation of the stock holding activity is needed to have some say on the level of prices. This might help the smaller producers who are invariably the worst hit by price slumps that have been consistently repeating.

The efforts of the major producers to manage their export to ensure a stable external market had generally been unsuccessful in the past. Breakthrough from this impasse and the creation of an international buffer-stock is an acknowledged improvement, to which the industry might pledge its efforts. In its absence, the regulation of domestic stock holding might to some extent insulate the domestic prices from externally imposed fluctuations. When domestic consumption begins to approximately match the domestic production, which may happen if the present tendencies continue, the industry might explore the possibilities of creating a buffer stock of its own to serve the larger interests of the industry.

In the export sphere, the strategies of the industry need to be more specific and target oriented. Instead of thinly spreading its resources it might concentrate in few potential markets and become market leader. Of course that needs to be correspondingly matched by cost effective strategies in domestic production. The industry might begin with strategies to increase the exports in value added form in few specific categories in which it could introduce all possible cost effective methods and follow it with gradual extension to cover other categories of exports in a phased manner.

The relatively higher cost of production and poor quality of our output has affected the competitiveness of our tea industry. High cost of labour coupled with low productivity has been the primary reason for the high cost of production. The productivity and quality of tea produced in the country is also affected due to existence of ageing plantations in the country. A significant portion of our tea plantations is aged beyond economic life of tea bushes. The tea gardens of Sri Lanka and Kenya are of relatively younger origin. It is therefore felt that the Indian tea industry would need to take drastic measures to improve productivity and also take up replantation/rejuvenation on a war footing to improve competitiveness and long-term viability.

On the export front, diversification of export market portfolio, targeting value addition and niche segment opportunities in specific markets, etc are warranted at once. Indian tea in the domestic and the international markets requires new initiatives from the tea industry for meeting the emerging challenges. In keeping with the requirements of the export and domestic markets, there is a focus on quality control. Implementation of ISO 3720 Standards and HACCP (Hazard Analysis & Critical Control Points) has therefore acquired growing importance. Efforts might also be continued to persuade producers to increase production of exportable quality teas and good teas of orthodox variety.

There are two agencies in India which produce tea. One is the export orientated firms and the other is the proprietary agencies. The export oriented agencies have taken up several steps to maintain the Minimum Residue Level (MRL). The regulatory authorities like Tea Board India and Pesticide Board of India should formulate strict measures so that tea having high pesticide residue should not be exported.

As far as marketing is concerned, an effective integrated marketing plan should be evolved for getting the biggest profits through research, setting objectives, strategy and measurement.

The importance of tea industry cannot be undermined. Hence its performance will have far reaching consequences on the domestic economy as a whole. Keeping in view all these aspects, in a nutshell, the industry is required to take a pause to look into its own activities, study the behaviour of the industry dispassionately, organise its priorities, discontinue schemes and strategies that are inherently limited in scope, and implement specific result oriented strategies. A little introspection on the part of all concerned, might cater the interests of the industry in a better way.

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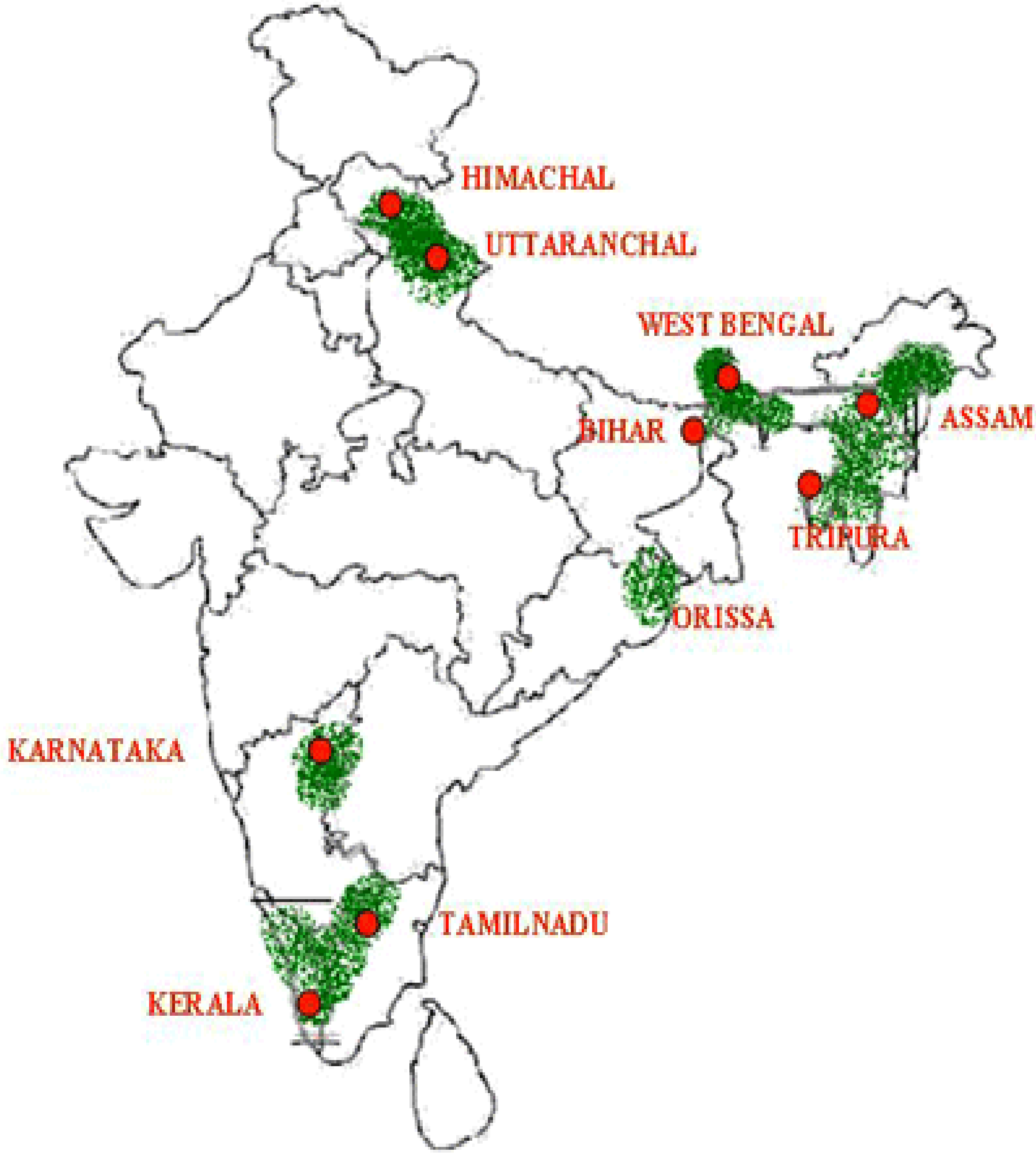
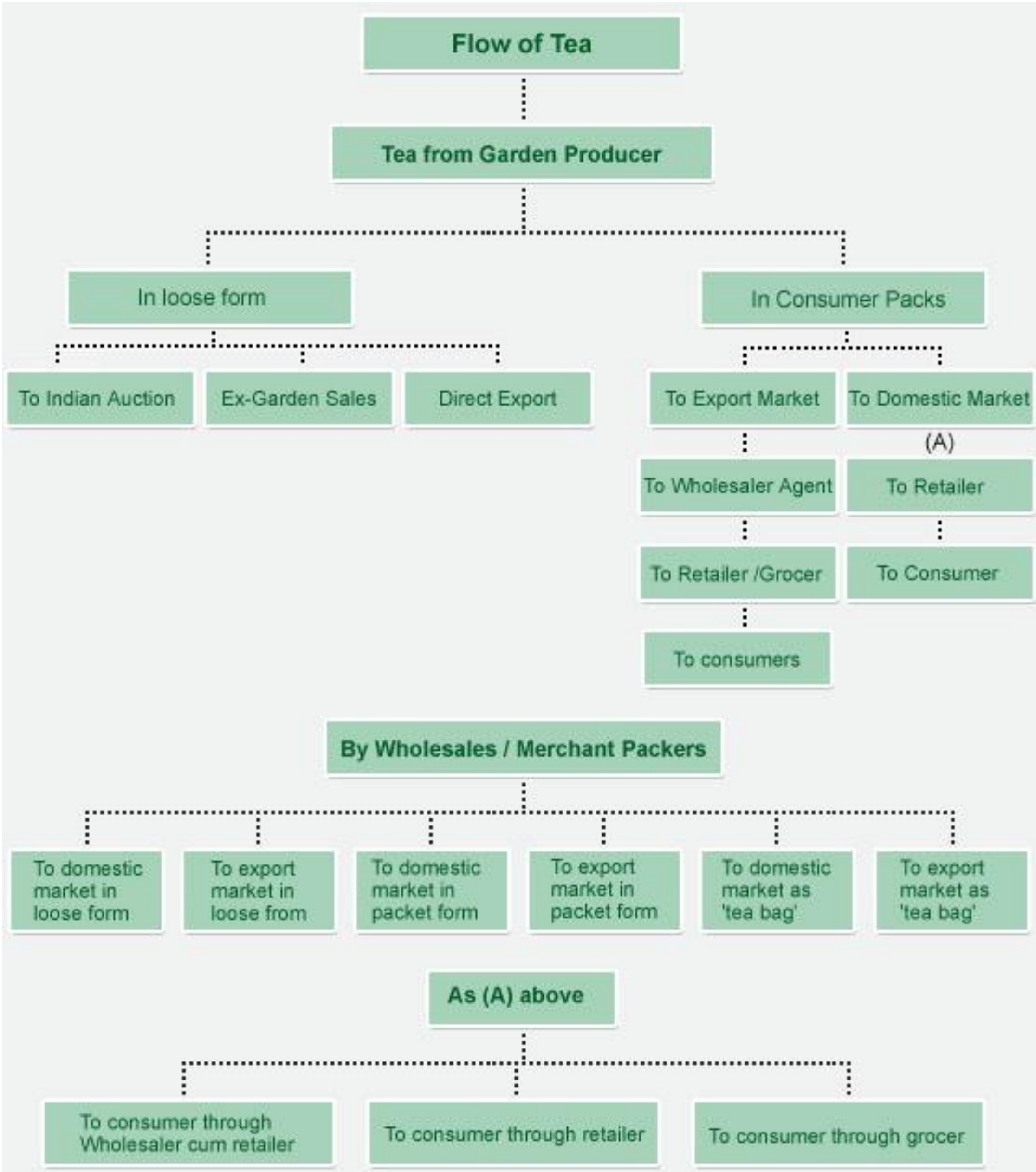
Figure 1. Tea Growing Areas in India


HIMACHAL
UTTARANCHAL
WEST BENGAL
BIHAR
ASSAM
TRIPURA
ORISSA
KARNATAKA
TAMILNADU
KERALA

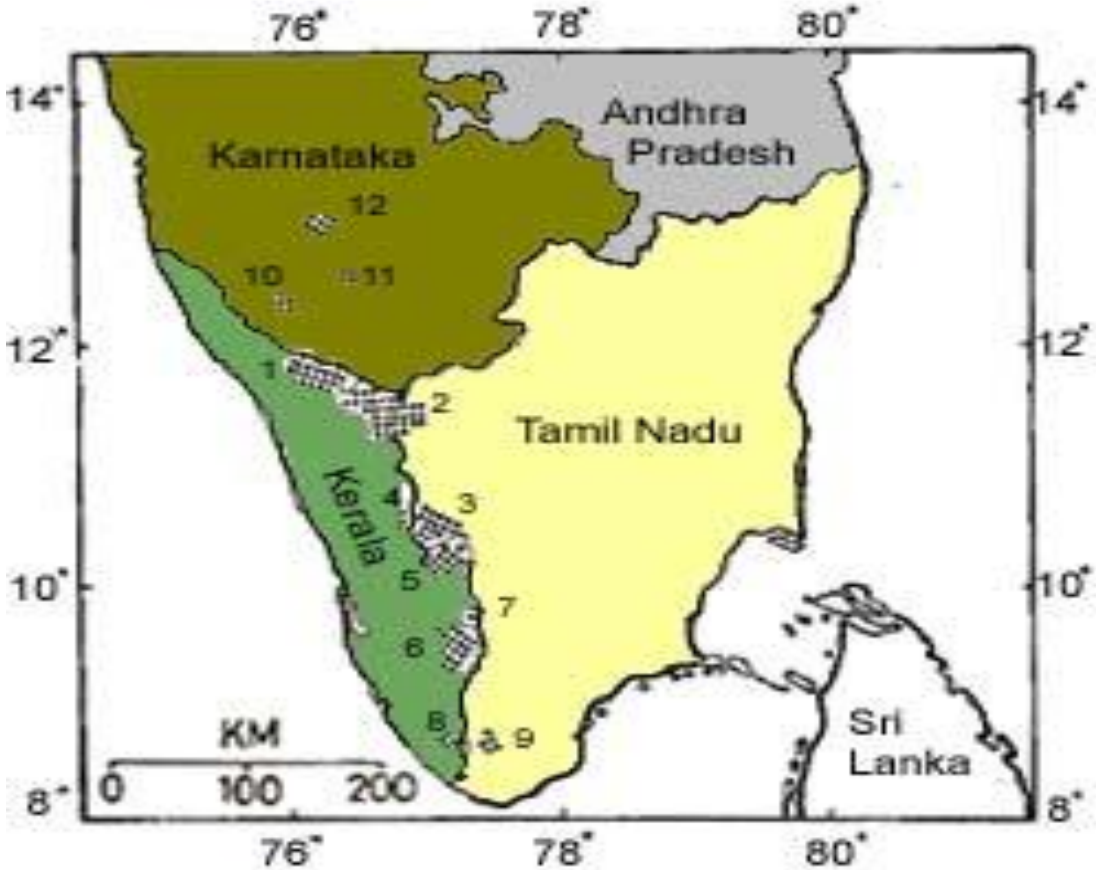
Source: Tea Board, Kolkata.

Figure 3. Marketing Channel of Tea in India


Flow of Tea
Tea from Garden Producer
In loose form
In Consumer Packs
To Indian Auction
Ex-Garden Sales
Direct Export
To Export Market
To Domestic Market
(A)
To Wholesaler Agent
To Retailer
To Retailer /Grocer
To Consumer
To consumers
By Wholesales / Merchant Packers
To domestic market in loose form
To export market in loose from
To domestic market in packet form
To export market in packet form
To domestic market as 'tea bag'
To export market as 'tea bag'
As (A) above
To consumer through Wholesaler cum retailer
To consumer through retailer
To consumer through grocer

Source: Tea Board, Kolkata.

Figure 2. Tea Growing Areas in South India

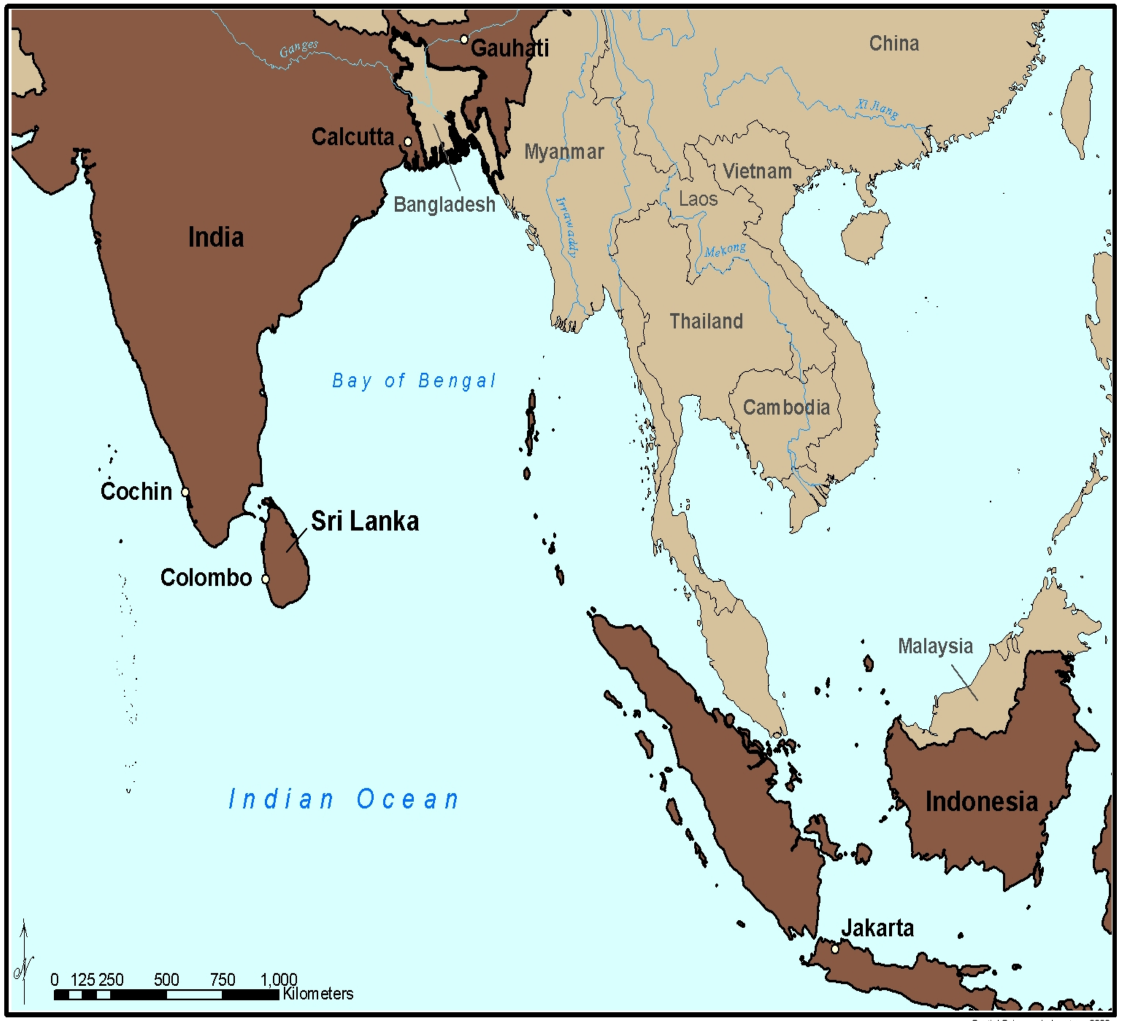


1	Wayanad	7	High Wavys (Madurai)
2	The Nilgiris	8	Trivandrum

3	Anamallais (Coimbatore)	9	Singampatty (Tirunelveli)
4	Nelliampathy (Palghat)	10	Coorg
5	High Range (Iddukki)	11	Hassan
6	Vandiperiyar and Peermade (Iddukki)	12	Chikmagalur

Source: United Planters' Association of South India (UPASI), Valparai.

Figure 4.1. Tea Auction Markets in Asia and South East Asia



Spatial Sciences Laboratory, 2003.

Source: Annual Bulletin of Statistics, International Tea Committee (ITC), London.

Figure 4.2. Tea Auction Markets in East Africa

Spatial Sciences Laboratory, 2003.

Source: Annual Bulletin of Statistics, International Tea Committee (ITC), London.

Table 1. Value and Share of Agricultural, Horticultural, Tea Exports and Imports and Net Exports

(Value in Rs. 000' crore and share in percentage)

Year	EXPORTS										IMPORTS				
	Agrl. and allied products	Hortl. Products	Tea Exports	Total exports	Share of agrl. Exports in Primary Products	Share of Agrl. Exports in Total Exports	Share of Hortl. Products Exports in Agrl. Exports	Share of Hortl. Products Exports in Total Exports	Share of Tea Exports in Agrl. Exports	Share of Tea Exports in Agrl. Exports	Agrl. Products	Total Imports	Share of Agrl. Imports in Total Imports	Net Exports (Exports-Imports)	
														Agriculture	Total
1987-88	3320	1817	601	15674	81.02	21.18	54.72	11.59	18.11	3.84	1479	22244	6.65	1841	-6570
1988-89	3501	1801	609	20232	74.55	17.30	51.46	8.90	17.41	3.01	1888	28235	6.69	1612	-8004
1989-90	4750	2321	917	27658	73.46	17.17	48.87	8.39	19.30	3.31	926	35328	2.62	3824	-7670
1990-91	6019	2429	1070	32558	77.58	18.49	40.36	7.46	17.78	3.29	999	43193	2.31	5020	-10635
1991-92	7895	3131	1212	44042	77.50	17.93	39.66	7.11	15.35	2.75	677	47851	1.42	7218	-3809
1992-93	9082	3036	977	53688	80.95	16.92	33.42	5.65	10.75	1.82	1468	63375	2.32	7615	-9686
1993-94	12633	3920	1059	69751	81.93	18.11	31.03	5.62	8.38	1.52	1025	73101	1.40	11608	-3350
1994-95	13269	4686	975	82674	81.05	16.05	35.31	5.67	7.35	1.18	3592	89971	3.99	9677	-7297
1995-96	20344	6120	1171	106353	83.81	19.13	30.08	5.75	5.76	1.10	3244	122678	2.64	17101	-16325
1996-97	24363	6623	1037	118817	85.41	20.50	27.19	5.57	4.26	0.87	4310	138920	3.10	20053	-20103
1997-98	24626	7624	1876	130101	86.20	18.93	30.96	5.86	7.62	1.44	5513	154176	3.58	19113	-24076
1998-99	25387	8511	2265	139753	87.10	18.17	33.52	6.09	8.92	1.62	10619	178332	5.95	14768	-38579
1999-00	24301	8944	1785	159561	85.96	15.23	36.80	5.61	7.34	1.12	10473	215237	4.87	13828	-55675
2000-01	27288	8806	1789	203571	83.82	13.40	32.27	4.33	6.55	0.88	6593	230873	2.86	20695	-27302
2001-02	28144	8396	1719	209018	82.38	13.46	29.83	4.02	6.11	0.82	9745	245200	3.97	18399	-36182
2002-03	32473	9035	1652	255137	77.07	12.73	27.82	3.54	5.09	0.65	11668	297206	3.93	20805	-42069
2003-04	34616	9166	1637	293367	76.08	11.80	26.48	3.12	4.73	0.56	14120	359108	3.93	20496	-65741

2004-05	38078	10350	1840	375340	62.53	10.14	27.18	2.76	4.83	0.49	13950	501065	2.78	24129	-125725
2005-06P	45154	11678	1632	454800	62.23	9.93	25.86	2.57	3.61	0.36	11870	630527	1.88	33285	-175727

Source: Economic Survey (various issues), Government of India.

Table 2. Share of Export Value of Tea to Total Export Value of all Commodities

(Qty. in m. kg. and value in Rs. in crore)

Year	Value of exports of all commodities @	Absolute change	Quantity of Tea Exports	Value of exports of tea @@	Absolute change	Share of tea to value of exports of all commodities
1961-62	661	—	205	122	—	**18.46**
1971-72	1608	(+) 947	214	184	(+) 62	11.46
1981-82	7806	(+) 6198	224	407	(+) 223	5.21
1991-92	44042	(+) 36236	216	1212	(+) 805	2.75
1997-98	130101	(+) 86059	211	2003	(+) 791	1.54
1998-99	139753	(+) 9653	206	2192	(+) 189	1.57
1999-2000	159561	(+) 19808	192	1933	(-) 259	1.21
2000-01	203571	(+) 44010	204	1890	(-) 43	0.93
2001-02	209018	(+) 5447	190	1696	(-) 194	0.81
2002-03	255137	(+) 46119	184	1665	(-) 31	0.65
2003-04	293367	(+) 38229	183	1637	(-) 28	0.56
2004-05*	375340	(+) 81973	206	1925	(+) 288	0.51
2005-06*	454800	(+) 79460	197	1794	(-) 131	**0.39**

Source: @ Economic Survey (various issues), Government of India.
@@ Tea Statistics (various issues), Tea Board, Kolkata.
* Provisional and subject to revision.

Table 3. Ratio of Tea Labour to Total Labour Employed

(Number in lakh)

Year	Total number of labour employed in private sector @	Number of labour employed in tea @@	Per cent Share
1961	50.50	10.04	**19.88**
1971	67.30	8.10	12.04
1981	74.00	8.49	11.47
1991	76.80	9.96	12.97
1997	86.90	10.32	11.88
1998	87.50	10.45	11.94
1999	87.00	11.88	13.66
2000	86.50	12.10	13.99
2001	86.50	12.32	14.24
2002	84.30	12.55	14.89
2003	84.20	12.56	14.92
2004	82.50	12.57	15.24
2005*	83.80	12.58	**15.01**

Source: @ Economic Survey (various issues), Government of India.
@@ Tea Statistics (various issues), Tea Board, Kolkata.
* Provisional and subject to revision.

Table 4. Share of Tea Revenue to Total Revenue

(Rs. in crore)

Year	Total revenue @	Revenue earned through tea @@				Tea revenue in percentage to total revenue
		Export duty	Central excise duty	Cess	Total	
1961-62	1037	9.83	10.78	—	20.61	1.98
1971-72	4027	—	34.35	—	34.35	0.85
1981-82	11573	—	63.51	4.45	67.96	0.50
1991-92	35960	—	70.56	10.88	81.44	0.19
1997-98	40857	—	—	—	—	0.06
1998-99	42015	—	115.98	26.07	142.04	0.33
1999-2000	43765	—	128.84	25.17	154.01	0.35
2000-01	44978	—	141.27	25.06	166.33	0.36
2001-02	46123	—	162.52	25.34	187.86	0.40

Source: @ Economic Survey (various issues), Government of India.
@@ Tea Statistics (various issues), Tea Board, Kolkata.

Table 5.1. Area under Tea in North India

(Area in hectare)

Districts/State	1961	1981	2001	2003	2004	2005(E)	
						Area	Percentage to All India Total
Darrang	26509	35198	41367	41158	41300	41350	7.91
Goalpara	1603	2576	3471	3635	3643	3643	0.70
Kamrup	2074	3159	3436	3466	3460	3460	0.66
Lakhimpur	50243	3680	4763	4839	4873	4875	0.93
Dibrugarh	@	60273	93484	95118	95118	95200	18.20
Nowgong	5577	6822	8004	8114	8135	8135	1.56
Sibsagar (a)	46433	58962	76113	77135	77135	77230	14.77
Cachar	29928	32368	32703	32137	32149	32149	6.15
North Cachar	—	—	4065	1923	4032	1923	0.37
Karbi Anlong	—	—	1748	4064	1923	4035	0.77
Assam	**162367**	**203038**	**269154**	**271589**	**271768**	**272000**	**52.01**
Darjeeling	18605	19239	17453	17580	17522	17500	3.35
Dooars ©	54756	63418	72109	22971	72883	24000	4.59
Terai (b)	9344	11314	21258	72800	23598	73000	13.96
West Bengal	**82705**	**93971**	**110820**	**113351**	**114003**	**114500**	**21.89**

(Contd…)

Table 5.1. (Contd…)

Districts/State	1961	1981	2001	2003	2004	2005(E)	
						Area	Percentage to All India Total
Tripura	5055	5333	7200	8268	8268	(+)	—
Bihar	534	460	1445	2000	2000		—
Uttaranchal	2084	1804	1068	1471	1446		—
Himachal Pradesh	4183	4183	2312	2348	2348		—
Manipur	—	80	450	1319	1319		—
Sikkim	—	192	300	195	195		—
Arunachal Pradesh	—	5	1067	1229	1729		—
Nagaland	—	—	580	1898	1898		—
Orissa	—	—	214	252	214		—
Meghalaya	—	—	103	750	252		—
Mizoram	—	—	400	214	750		—
Others	**11856**	**12057**	**15139**	**19944**	**20419**	**21000**	**4.02**
North India	**256928**	**309066**	**395113**	**404884**	**406190**	**407500**	**77.92**

Source: Tea Statistics (various Issues), Tea Board, Kolkata.
(a) Including Karbi Anlong & North Cachar up to 1989.
(b) Including West Dinajpur.
(c) Including Cooch Behar.
\+ Break up by district/state are not available.
@ Figures prior to 1981 included with Lakhimpur.
(E) Estimated and subject to revision.
Note: Since 1998 figures are inclusive of Small Growers operating in different tea producing District/States.

Table 5.2. Area under Tea in South India

(Area in hectare)

Districts/State	1961	1981	2001	2003	2004	2005(E)	Percentage to 2004 All India Total
Kanyakumari	451	443	434	433	433	@	0.08
Tirunelveli	449	800	800	800	800		0.15
Madurai	734	964	973	973	972		0.19
Coimbatore	10249	10017	11784	11734	11734		2.25
Nilgiris	20840	24849	61634	61679	62039		11.90
Tamil Nadu	**32723**	**37073**	**75625**	**75619**	**75978**	**76252**	**14.57**
Cannanore	1448	—	—	—	—	@	—
Palghat	574	665	850	852	852		0.16
Kozhikode	4014	—	—	—	—		—
Malapuram (d)	—	174	174	174	174		0.03
Trichur	401	447	530	529	529		0.10
Trivandrum	1082	1071	965	965	965		0.19
Quilon	3006	1653	1348	1348	1348		0.26
Ernakulam	161	30	2	2	2		0.00

(Contd…)

Table 5.2. (Contd…)

Districts/State	1961	1981	2001	2003	2004	2005(E)	Percentage to 2004 All India Total
Kottayam	29098	2232	840	840	840	@	0.16
Idukki (e)	—	23930	26748	26753	26893		5.16
Wynaad (@)	—	5387	5483	5504	5504		1.06
Kerala	**39784**	**35589**	**36940**	**36967**	**37107**	**37120**	**7.12**
Chikmagalur	1168	1317	1434	1434	1434	@	0.28
Coorg	178	188	299	299	299		0.06
Hassan	448	396	395	395	395		0.08
Karnataka	**1794**	**1901**	**2128**	**2128**	**2128**	**2128**	**0.41**
South India	**74301**	**74563**	**114693**	**114714**	**115213**	**115500**	**22.10**
All India	**331229**	**383629**	**509806**	**519598**	**521403**	**523000**	**100.00**

Source: Tea Statistics (various Issues), Tea Board, Kolkata.
(d) New District formed since 1969 out of Kozhikode District.
(e) New District formed since 1972 out of Kottayam & Ernakulam District.
@ Break up by district/state are not available.
Note: Since 1998 figures are inclusive of Small Growers operating in different tea producing District/States.

Table 6.1. Production of Tea in North India

(Production in 000' kg.)

Districts/State	1961	1981	2001	2003	2004	2005(E)	Percentage to 2004 All India Total
Darrang	31194	58260	78224	80291	80474	82995	9.01
Goalpara	1717	3569	6338	6137	5665	5740	0.63
Kamrup	1668	3486	4588	4333	4304	4015	0.48
Lakhimpur	73339	6994	9075	8502	8280	8387	0.93
Dibrugarh	@	123466	167047	175339	178352	206000	19.97
Nowgong	5643	8602	11836	11587	10981	11560	1.23
Sibsagar (a)	48569	71476	119626	100693	102192	104000	11.44
Cachar	20181	29277	49793	41411	38757	45110	4.34
North Cachar	—	—	5115	4438	4632	4420	0.52
Karbi Anlong	—	—	1945	2028	2012	1910	0.23
Assam	**182311**	**305130**	**453587**	**434759**	**435649**	**474137**	**48.79**
Darjeeling	10107	12226	9841	9582	10065	11366	1.13
Dooars ©	66898	100251	127611	131267	135237	133054	15.14
Terai (b)	9253	15782	49388	59786	69239	70240	7.75
West Bengal	**86258**	**128259**	**186840**	**200635**	**214541**	**214660**	**24.03**

(Contd…)

Table 6.1. (Contd…)

Districts/State	1961	1981	2001	2003	2004	2005	2004 Percentage to All India Total
Tripura	2689	3219	6506	8577	7168	@	0.80
Bihar	55	1	1005	1130	1023		0.11
Uttaranchal	804	542	327	141	246		0.03
Himachal Pradesh	1188	607	1022	605	616		0.07
Manipur	—	32	101	119	110		0.01
Sikkim	—	—	110	107	150		0.02
Arunachal Pradesh	—	—	1047	1745	2219		0.25
Nagaland	—	—	75	195	190		0.02
Orissa	—	—	105	105	101		0.01
Meghalaya	—	—	41	81	99		0.01
Mizoram	—	—	41	78	72		0.01
Others	**4736**	**4401**	**10380**	**12883**	**11994**	**12178**	**1.34**
North India	**273305**	**437790**	**650807**	**648277**	**662184**	**700975**	**74.16**

Source: Tea Statistics, Tea Digest (various issues), Tea Board, Kolkata.
(a) Including Karbi Anlong & North Cachar upto 1989.
(b) Including West Dinajpur.
(c) Including Cooch Behar.
@ Break up by district/state are not available.
Note: Since 1998 figures are inclusive of Small Growers operating in different tea producing District/States.

Table 6.2. Production of Tea in South India

(Production in 000' kg.)

Districts/State	1961	1981	2001	2002	2003	2004	
						Qty.	Percentage to All India Total
Kanyakumari	267	131	117	141	101	81	0.01
Tirunelveli	444	1528	1779	1692	1658	1454	0.16
Madurai	1062	1974	3152	1318	2036	2306	0.26
Coimbatore	13913	23475	31261	27124	29208	29417	3.29
Nilgiris	24082	44489	96092	112846	133569	129757	14.53
Tamil Nadu	**39768**	**71597**	**132401**	**143121**	**166572**	**163015**	**18.26**
Cannanore	1175	—	—	—	—	—	—
Palghat	720	1214	1898	2915	2444	2206	0.25
Kozhikode	4827	—	—	—	—	—	—
Malapuram (d)	—	80	—	—	—	—	—
Trichur	669	1001	1668	1467	1002	1769	0.20
Trivandrum	1058	760	124	320	298	441	0.05
Quilon	1878	872	364	349	322	237	0.03
Ernakulam	46	—	—	—	—	—	—

(Contd…)

Table 6.2. (Contd…)

Districts/State	1961	1981	2001	2002	2003	2004	
						Qty.	Percentage to All India Total
Kottayam	29172	181	245	257	645	557	0.06
Idukki (e)	—'	36087	46439	40207	41848	44861	5.02
Wynaad (+)	—	7436	14413	12257	11453	12075	1.35
Kerala	**39545**	**47631**	**65151**	**57772**	**58012**	**62146**	**6.96**
Chikmagalur	1157	2369	3606	3825	3563	3755	0.42
Coorg	192	391	797	794	756	823	0.09
Hassan	430	649	1161	1214	949	1042	0.12
Karnataka	**1779**	**3409**	**5564**	**5833**	**5268**	**5620**	**0.63**
South India	**81092**	**122637**	**203116**	**206726**	**229852**	**230781**	**25.84**
All India	**354397**	**560427**	**853923**	**838474**	**878129**	**892965**	**100.00**

Source: Tea Statistics, Tea Digest (various issues), Tea Board, Kolkata.
(a) Including Karbi Anlong & North Cachar upto 1989.
(b) Including West Dinajpur.
(c) Including Cooch Behar.
+ Break up by district/state are not available.
Note: Since 1998 figures are inclusive of Small Growers operating in different tea producing District/States.

Table 7.1. Average Yield of Tea in North India

(Yield in kg. / hectare)

Districts/State	1951 (+)	1961	1971	1981	1991	2001	2003	2004	2005(E)
Darrang	1063	1177	1336	1655	2016	1891	1952	1949	2007
Goalpara	1102	1071	1157	1385	1697	1826	1688	1555	1576
Kamrup	615	804	942	1104	1304	1335	1250	1244	1160
Lakhimpur	1193	1460	1605	1901	1962	1905	1757	1699	1720
Dibrugarh	@	@	@	2048	2135	1787	1843	1875	2164
Nowgong	729	1012	1165	1261	1516	1479	1428	1350	1421
Sibsagar (a)	924	1046	1065	1212	1476	1572	1505	1325	1347
Cachar	651	674	733	905	1150	1523	1289	1206	1403
North Cachar	—	—	—	—	1281	1258	1092	1149	1095
Karbi Anlong	—	—	—	—	1004	1113	1055	1046	993
Assam	**966**	**1123**	**1227**	**1503**	**1717**	**1685**	**1601**	**1603**	**1743**
Darjeeling	473	543	564	635	694	564	545	574	650
Dooars ©	1171	1222	1359	1581	1697	1770	1803	1856	2927
Terai (b)	759	990	1203	1395	1732	2323	2603	2934	1823
West Bengal	**982**	**1043**	**1176**	**1365**	**1523**	**1686**	**1770**	**1882**	**1875**
Tripura	392	532	544	604	874	904	1037	867	NA
Bihar	668	103	89	-	545	696	565	512	
Uttar Pradesh	346	386	380	300	576	306	96	170	
Himachal Pradesh	261	284	212	145	574	442	258	262	
Manipur	—	—	—	400	174	224	90	83	
Sikkim	—	—	—	—	556	367	549	769	
Arunachal Pradesh	—	—	—	—	125	981	1420	1283	
Nagaland	—	—	—	—	57	129	103	100	
Orissa	—	—	—	—	47	491	491	472	
Meghalaya	—	—	—	—	—	398	321	393	
Mizoram	—	—	—	—	—	103	104	96	
North India	**939**	**1064**	**1175**	**1416**	**1631**	**1647**	**1601**	**1630**	**1720**

Source: Tea Statistics (various Issues), Tea Board, Kolkata.
(a) Including Karbi Anlong & North Cachar up to 1989.
(b) Including West Dinajpur.
(c) Including Cooch Behar.
\+ Break up by district/state are not available.
@ Figures prior to 1981 included with Lakhimpur.
(E) Estimated and subject to revision.
Note: Since 1998 figures are inclusive of Small Growers operating in different tea producing District/States.

Table 7.2. Average Yield of Tea in South India

(Yield in kg. / hectare)

Districts/State	1951+	1961	1971	1981	1991	2001	2003	2004	2005(E)
Kanyakumari	+	592	510	296	410	270	233	187	249
Tirunelveli		989	1686	1910	2974	2224	2073	1818	1950
Madurai		1447	1841	2048	3259	3239	2092	2372	3186
Coimbatore		1357	1833	2344	2906	2653	2489	2507	2269
Nilgiris		1156	1601	1790	3225	1559	2166	2092	1977
Tamil Nadu	**756**	**1215**	**1661**	**1931**	**3104**	**1751**	**2203**	**2146**	**2027**
Cannanore	+	811	957	—	—	—	—	—	—
Palghat		1254	1535	1826	2538	2233	2869	2589	2408
Kozhikode		1203	1585	—	—	—	—	—	—
Malapuram (d)		—	793	460	557	—	—	—	—
Trichur		1668	1468	2239	3464	3147	1894	3344	3524
Trivandrum		978	889	710	697	128	309	457	456
Quilon		625	617	528	345	270	239	176	172
Ernakulam		286	456	—	—	—	768	—	457
Kottayam		1003	1148	81	226	292	—	663	—
Idukki (e)		—	—	1508	2185	1736	1564	1668	1872
Wynaad (+)		—	—	1380	1900	2629	2081	2194	2123
Kerala	**776**	**994**	**1146**	**1338**	**1926**	**1764**	**1569**	**1675**	**1806**
Chikmagalur	+	991	1655	1799	2285	2515	2485	2619	2526
Coorg		1079	1332	2080	1847	2666	2528	2753	2595
Hassan		960	1314	1639	2603	2939	2403	2638	2481
Karnataka	**524**	**992**	**1539**	**1793**	**2290**	**2615**	**2476**	**2641**	**2527**
South India	**760**	**1091**	**1398**	**1645**	**2540**	**1771**	**2004**	**2003**	**1965**
All India	**901**	**1070**	**1221**	**1461**	**1794**	**1675**	**1690**	**1713**	**1774**

Source: Tea Statistics (various Issues), Tea Board, Kolkata.
(d) New District formed since 1969 out of Kozhikode District.
(e) New District formed since 1972 out of Kottayam & Ernakulam District.
\+ Break up by district/state are not available.
Note: Since 1998 figures are inclusive of Small Growers operating in different tea producing District/States.

Table 9. Size-wise Distribution of Tea Estates in India - 2004

(Estates in number)

Classification	Region		All India
	North India	South India	
Up to 10.12 hectare	59368 (97.92)	67998 (99.42)	127366 (98.71)
Above 10.12 to 50 hectare	233 (0.38)	156 (0.23)	389 (0.30)
Above 50 to 100 hectare	146 (0.24)	47(0.07)	193 (0.15)
Above 100 to 200 hectare	234 (0.39)	53 (0.08)	287 (0.22)
Above 200 to 400 hectare	302 (0.50)	104 (0.15)	406 (0.31)
Above 400 hectare	346 (0.57)	40 (0.06)	386 (0.30)
Total	60629 (100.00)	68398 (100.00)	129027 (100.00)

Source: Tea Statistics 2003-04, Tea Board, Kolkata.
Figures in parentheses indicate percentages to respective totals of North India, South India and All India.

Table 10. Area under Different Age Groups of Bushes in India (2003-04)

Age Groups	Region		All India
	North India	South India	
Below 5 Years	25216 (7.41)	14759 (14.43)	39975 (9.03)
5 to 10 Years	49743(14.61)	16568 (16.19)	66311 (14.98)
11 to 20 Years	43782 (12.86)	6635 (6.49)	50417 (11.39)
21 to 30 Years	40180 (11.80)	4851 (4.74)	45031 (10.17)
31 to 40 Years	40067 (11.77)	5027 (4.91)	45094 (10.18)
41 to 50 Years	29688 (8.72)	8925 (8.72)	38613 (8.72)
Over 50 Years	111786 (32.83)	45546 (44.52)	157332 (35.53)
Total	340462 (100.00)	102311 (100.00)	442773 (100.00)

Source: Tea Statistics 2003-04, Tea Board, Kolkata.
Figures in parentheses indicate percentages to respective totals of North India, South India and All India.

Table 11. Specification of Tea under PFA Act

Particulars	Percentage content
Total ash determined on tea dried to a constant weight at 100°C	4.0 to 8.0 per cent by weight
Total ash soluble in boiling distilled water	not less than 40.0 per cent of total ash
Ash soluble in HCL	not more than 1.0 per cent by weight on dry basis
Extract obtained boiling dried tea (dried to constant weight at 100°C) with 100 part of distilled water for one hour under reflux	not less than 32 per cent
Alkalinity of soluble ash	not less than 1.0 per cent and not more than 2.2 per cent expressed as K2O on dry basis
Crude fibre determined on tea dried to constant weight at 100°C	not more than 17.0 per cent

Table 12. Estimated Production of Co-Operatives and Bought Leaf Factories in India

(Production in m. kg.)

State / Districts	Co-op / Bought Leaf Factories	2002		2003		2004 (P)	
		No.	Prdn.	No.	Prdn.	No.	Prdn.
Assam							
Assam Valley	Bought Leaf Factory	137	53.27	150	65.24	160	77.53
	Co-op	—	—	1	0.08	1	0.05
Cachar	Bought Leaf Factory	2	0.02	1	0.04	2	0.07
West Bengal							
Dooars	Bought Leaf Factory	20	11.3	26	11.46	33	16.1
Terai	Bought Leaf Factory	36	22.14	43	26.28	46	33.49
Bihar							
Kishangunj	Bought Leaf Factory	1	0.07	1	0.22	1	0.25
Uttaranchal	Bought Leaf Factory	1	0.02	1	0.02	1	0.02
Tripura	Bought Leaf Factory	2	1.58	2	1.51	2	1.47
Arunachal Pradesh	Bought Leaf Factory	—	—	4	1.03	5	1.3
Himachal Pradesh	Co-op	4	0.44	4	0.41	4	0.43
North India							
	Bought Leaf Factory	**199**	**88.4**	**228**	**105.8**	**250**	**130.23**
	Co-op	**4**	**0.44**	**5**	**0.49**	**5**	**0.48**
Tamil Nadu							
Coimbatore	Bought Leaf Factory	2	2.12	2	1.99	2	2.2
Kanyakumari	Bought Leaf Factory	—	—	1	0	1	0
Madurai	Bought Leaf Factory	—	—	1	0	1	0
Nilgiris	Bought Leaf Factory	157	65.31	178	73.81	181	78.52
	Co-op	16	11.19	15	14.06	15	14.12
Kerala							
Iddukki	Bought Leaf Factory	7	0.94	7	1	8	1.57
	Co-op	1	0.55	1	0.71	1	0.59
Wynad	Bought Leaf Factory	3	0	4	0.3	5	0.87
Palghat	Bought Leaf Factory	—	—	1	0.18	1	0.17
Kottayam	Bought Leaf Factory	2	0	4	0.84	4	0.34
	Co-op	1	0.26	1	0.12	1	0.26
Karnataka	Bought Leaf Factory	1	0.23	2	0.07	2	0.12
South India	**Bought Leaf Factory**	**172**	**68.6**	**200**	**78.19**	**205**	**83.79**
	Co-op	18	12	17	14.89	17	14.97
All India	**Bought Leaf Factory**	**371**	**157**	**428**	**183.99**	**455**	**214.02**
	Co-op	**22**	**12.44**	**22**	**15.38**	**22**	**15.45**
Grand Total		**393**	**169.44**	**450**	**199.37**	**477**	**229.47**

Source: Tea Digest – 2005, Tea Board, Kolkata. P- Provisional.

Table 13. Year-wise Export of Value Added Tea from India

(Qty. in 000' kg., value in 000' Rs. and unit value in Rs. / kg.)

Year	Packet tea			Tea bags			Instant tea		
	Quantity	value	Unit value	Quantity	value	Unit value	Quantity	Value	Unit Value
1973-74	4744	50216	10.59	144	3571	24.80	295	9217	31.24
1974-75	6095	83051	13.63	108	2752	25.48	255	563	33.58
1975-76	10787	172457	15.99	157	5914	37.67	478	19162	40.09
1976-77	12612	193635	15.35	285	10560	37.05	584	25064	42.95
1977-78	25187	519834	20.64	390	18522	47.49	598	31533	52.77
1978-79	38599	787384	20.40	238	10570	44.41	686	35500	51.75
1979-80	30024	580703	19.34	493	20275	41.13	656	30509	46.51
1980-81	32322	699834	21.65	754	32591	43.22	761	36608	48.11
1981-82	20493	468216	22.85	777	33531	43.15	832	41712	50.13
1982-83	10101	263232	26.06	618	23172	37.50	799	43185	54.05
1983-84	17368	521288	30.01	514	24259	47.20	1049	66874	63.76
1984-85	21841	930552	42.61	631	36551	57.93	1138	95538	83.92
1985-86	25690	994063	38.69	590	37839	64.13	938	80428	85.78
1986-87	16847	595727	35.36	467	31845	68.19	1134	94896	83.68
1987-88	21142	785994	37.18	498	32424	65.11	861	66611	77.37
1988-89	25541	879841	34.45	626	44409	70.94	733	65909	89.96
1989-90	75817	3548148	46.80	546	46875	85.85	1147	100986	88.05

(Contd…)

Table 13. (Contd…)

Year	Packet tea			Tea bags			Instant tea		
	Quantity	value	Unit value	Quantity	value	Unit value	Quantity	Value	Unit Value
1990-91	71514	3908642	54.66	496	43715	88.14	925	90068	97.30
1991-92	78321	4520917	57.72	483	71408	147.84	1283	158039	123.18
1992-93	65245	4040263	61.92	520	72536	139.49	1740	270592	155.51
1993-94	64917	4685722	72.18	1007	101456	100.75	1122	221463	197.56
1994-95	52042	3577669	68.75	1008	144180	143.04	1320	228667	173.23
1995-96	83965	6162394	73.39	861	125811	146.12	1230	260940	212.15
1996-97	81016	5714458	70.53	1716	252479	147.13	1868	446403	238.97
1997-98	78115	7490434	95.89	2169	449957	207.45	2483	578336	232.92
1998-99	82013	8904328	108.57	2415	498180	206.29	2428	629703	259.35
1999-2000	63518	6743290	106.16	2305	557207	241.74	2602	653770	251.26
2000-2001	69315	7195601	103.81	1917	385332	201.01	2783	831013	298.60
2001-2002	42719	5211372	121.99	2542	597103	234.89	2594	741979	286.04
2002-2003	33606	4084322	121.54	3178	668547	210.37	3053	881282	288.66
2003-2004	34013	4057973	119.31	4900	943075	192.46	3461	995752	287.71
2004-2005	35727	3536509	98.99	7095	1429124	201.43	3957	1152853	291.35
2005-2006(E)	30526	2850154	93.37	8379	1743198	208.04	3530	911374	258.18

Source: Tea Statistics (various issues), Tea Board, Kolkata.
(E) Estimated and subject to revision.

Table 14. Price Differentials of Different Types of Tea During 1966-67 to 2005-06

(fob Rs. / kg.)

Year	Packet tea	Tea bags	Instant tea	Bulk tea	Percentage of price difference over bulk tea		
					Packet Tea	Tea bags	Instant Tea
1966-67	9.88	—	—	8.18	20.78	—	—
1971-72	9.48	20.39	32.71	7.47	26.91	173	338
1973-74	10.59	24.80	31.24	7.63	38.66	225	309
1974-75	13.63	25.48	33.58	9.16	50.22	178	267
1975-76	15.99	37.67	40.09	11.22	42.51	236	257
1976-77	15.35	37.05	42.95	12.01	27.89	208	258
1977-78	20.64	47.49	52.77	23.29	-11.38	104	127
1978-79	20.40	44.41	51.75	20.61	-1.02	115	151
1979-80	19.34	41.13	46.51	18.12	6.73	127	157
1980-81	21.65	43.22	48.11	19.15	13.05	126	151
1981-82	22.85	43.15	50.13	18.15	25.90	138	176
1982-83	26.06	37.50	54.05	18.72	39.21	100	189
1983-84	30.01	47.20	63.76	24.79	21.06	90	157
1984-85	42.61	57.93	83.92	34.12	24.88	70	146
1985-86	38.69	64.13	85.78	30.25	27.90	112	184
1986-87	35.36	68.19	83.68	29.53	26.72	131	183
1987-88	37.18	65.11	77.37	31.10	19.55	109	149
1988-89	34.45	70.94	89.96	31.13	10.66	128	189
1989-90	46.80	85.85	88.05	42.97	8.91	100	105
1990-91	54.66	88.14	97.30	53.58	1.98	65	82
1991-92	57.72	147.84	123.18	55.61	3.79	166	122
1992-93	61.92	139.49	155.51	56.05	10.47	149	177
1993-94	72.18	100.75	197.56	65.19	10.72	55	203
1994-95	68.75	143.04	173.23	64.64	6.36	121	168
1995-96	73.39	146.12	212.15	71.25	3.00	105	198
1996-97	70.53	147.13	238.97	75.44	-6.51	95	217
1997-98	95.89	207.45	232.92	85.79	14.10	142	172
1998-99	108.57	206.29	259.35	107.81	0.70	91	141
1999-2000	106.16	241.74	251.26	100.61	5.52	140	150
2000-2001	103.81	201.01	298.60	89.41	16.11	125	234
2001-2002	121.99	234.89	286.04	89.98	35.57	161	218
2002-2003	121.54	210.37	288.66	86.53	40.46	143	234
2003-2004	119.31	192.46	287.71	86.95	37.22	121	231
2004-2005	98.99	201.43	291.35	87.73	12.83	130	232
2005-2006(E)	93.37	208.04	258.18	89.12	4.77	133	190

Source: Tea Statistics (various issues), Tea Board, Kolkata.
(E) Estimated and subject to revision.

Table 15. Export of Value Added Tea from India

(Qty. in 000' kg. and value in 000' Rs.)

Year	Packet Tea		Tea Bags		Instant Tea		Total Value-added Tea	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
1992	56023	3344462	596	82848	1604	235905	58223	3663215
1993	74294	5159617	943	100410	1592	287365	76829	5547392
1994	49642	3549229	1026	137278	1374	239035	52042	3925542
1995	81699	5725354	723	108031	853	172079	83275	6005464
1996	78957	5667687	1394	193369	1692	397741	82043	6258797
1997	89419	7894609	2131	421367	2282	529309	93832	8845286
1998	81423	9008811	2066	433523	2698	711273	86187	10153607
1999	74087	7612962	2756	614091	2627	634315	79470	8861368
2000	70774	7194474	1808	363930	2463	715795	75045	8274199
2001	45866	5606397	2516	566238	2731	799055	51113	6971690
2002	32790	3991579	2642	591087	2915	836141	38347	5418807
2003	35352	4268509	4277	826767	3407	963032	43036	6058308
2004	27506	3156194	7010	1388996	3760	1130066	38276	5675256
2005	37091	3352079	8578	1792816	3822	1004679	49491	6149574
2006(E)	21644	2133598	6266	1363360	2991	976412	30901	4473370

Source: Tea Digest – 2005 & 2006, Tea Board, Kolkata.
(E) Estimated and subject to revision.

Table 16. Share of Value Added Tea to Total Export of Tea from India

(Qty. in m. kg., value in Rs. Crore and share in percentage)

Year	Total Tea		Value-Added Tea		Share of Value-added tea in Total tea	
	Quantity	Value	Quantity	Value	Quantity	Value
1991-92	216.45	1212.27	80.08	475.03	36.99	39.19
1992-93	180.69	1058.7	67.51	438.34	37.36	41.4
1993-94	154.55	1062.04	67.05	500.86	43.38	47.16
1994-95	152.16	986.41	54.37	395.05	35.73	40.05
1995-96	167.47	1246.53	86.06	654.91	51.39	52.54
1996-97	169.04	1301.46	84.6	641.33	50.05	49.28
1997-98	211.26	2003.15	82.76	851.87	39.18	42.53
1998-99	205.86	2191.84	86.86	1003.22	42.19	45.77
1999-2000	192.44	1932.66	68.43	795.43	35.56	41.16
2000-2001	203.55	1889.79	74.01	841.18	36.36	44.51
2001-2002	190	1695.79	47.85	655.05	25.18	38.62
2002-2003	184.39	1664.92	39.84	563.41	21.61	33.84
2003-2004	183.07	1636.99	42.37	599.68	23.14	36.63
2004-2005	205.81	1924.71	46.78	611.85	22.73	31.79
2005-2006(E)	196.67	1793.58	42.44	550.48	21.58	30.69

Source: Tea Digest – 2005 &2006, Tea Board, Kolkata.
(E) Estimated and subject to revision.

Table 17. Different Grades of the Made Tea on the Basis of the Physical Appearance

BLACK TEA GRADES: [ORTHODOX TEA]

Kind of Tea	**Grade Name**	**Nomenclature**
Whole Leaf	FP	Flowery Pekoe
Broken	FTGF OP	Fine Tippy Golden Flowery Orange Pekoe
	TG OP	Tippy Golden Flowery Orange Pekoe
	TGF OP 1	Tippy Golden Flowery Orange Pekoe
	GF OP	Golden Flowery Orange Pekoe
	FOP	Flowery Orange Pekoe
	OP	Orange Pekoe
Broken	BOP 1	Broken Orange Pekoe one
	GF BOP	Golden Flowery Broken Orange Pekoe
	BPS	Broken Pekoe Souchong
	GBOP	Golden Broken Orange Pekoe
	FBOP	Flowery Broken Orange Pekoe
	BOP	Broken Orange Pekoe
Fannings	GOF	Golden Orange Fannings
	FOF	Flowery Orange Fannings
	BOPF	Broken Orange Pekoe Fannings
Dust	OPD	Orthodox Pekoe Dust
	OCD	Orthodox Churamani Dust
	BOPFD	Broken Orange Pekeo Fine Dust
	FD	Fine Dust
	D.A.	Dust A
	Spl. Dust	Special Dust
	G. Dust	Golden Dust
	OD	Orthodox Dust

(Contd…)

Table 17. (Contd…)

CTC TEA

Kind of Tea	Grade Name	Nomenclature
Broken	PEK	Pekoe
	BP	Broken Pekeo
	BOP	Broken Orange Pekeo
	BPS	Broken Pekeo Souching
	BP 1	Broken Pekoe one
	FP	Flowery Pekeo
Fannings	OF	Orange Fanings
	PF	Pekeo Fanings
	PF 1	Pekeo Fanning s One
	BOPF	Broken Orange Fannings
Dust	PD	Pekeo Dust
	D	Dust
	CD	Churamani Dust
	PD 1	Pekeo Dust One
	D 1	Dust One
	CD 1	Churamani Dust One
	RD	Red Dust
	FD	Fine Dust
	SFD	Super Fine Dusr
	RD 1	Red Dust One
	GD	Golden Dust
	SRD	Super Red Dust

GREEN TEA

Kind of Tea	Grade Name	Nomenclature
Whole Leaf	YH	Young Hison
	FYH	Fine Young Hison
Broken	GP	Gun Powder
	H	Hison
	FH	Fine Hison
Fannings	SOUMEE	Soumee
Dust	DUST	Dust Orange Fannings

Source: Tea Board, Kolkata.

Table 19. Primary Marketing of Indian Tea

(Quantity in 000' kg.)

Year	2003		2004		2005(E)	
	Qty.	Percentage to Total Sales	Qty.	Percentage toTotal Sales	Qty.	Percentage to Total Sales
NORTH INDIA						
Kolkata Auction	133765	20.64	117956	17.81	139592	19.91
Guwahati Auction	138664	21.39	127067	19.19	142857	20.38
Silisuri Auction	87090	13.43	91989	13.89	90422	12.9
Amritsar Auction	190	0.03	146	0.02	152	0.02
Jalpaiguri Auction	—	—	—	—	721	0.1
Sub Total North India	359709	55.49	337158	50.91	373744	53.32
Total Auction	359709	55.49	337158	50.91	373744	53.32
Export under FC	35609	5.49	38921	5.88	42000	5.99
Ex-Garden Sale	252959	39.02	286105	43.21	285231	40.69
Total Sale	648277	100	662184	100	700975	100
SOUTH INDIA						
Cochin Auction	50633	22.03	54599	23.66	60317	26.57
Coonoor Auction	40586	17.66	44279	19.19	41614	18.33
Coimbatore Auction	22331	9.71	18400	7.97	19830	8.74
Tea Serve	4403	1.91	18527	8.03	13665	6.02
Kolkata Auction	109	0.05	1363	0.59	1064	0.47
Guwahati Auction	—	—	28	0.01	—	—
Sub Total South India	118062	51.36	137196	59.45	136490	60.13
Total Auction	118062	51.36	137196	59.45	136490	60.13
Export under FC	8041	3.5	8727	3.78	10000	4.4
Ex-Garden Sale	103749	45.14	84858	36.77	80519	35.47
Total Sale	229852	100	230781	100	227009	100
ALL INDIA						
Indian Auction	477771	54.41	474354	53.12	510234	54.98
London Auction	—	—	—	—	—	—
Total Auction	477771	54.41	474354	53.12	510234	54.98
Export under FC	43650	4.97	47648	5.34	52000	5.61
Ex-Garden Sale	356708	40.62	370963	41.54	365750	39.41
Total Sale	878129	100	892965	100	927984	100

Source: Tea Digest – 2005-06, Tea Board, Kolkata.
(E) Estimated and subject to revision.

Table 20. Average Auction Prices of Tea

(Rs. / kg.)

Year	North India	South India	South Vs. North	
			Rs./kg. (lower by)	Percentage
1982	15.65	15.39	0.26	1.66
1983	24.26	22.88	1.38	5.69
1984	29.18	26.97	2.21	7.57
1985	23.93	21.44	2.49	10.41
1986	24.86	19.22	5.64	22.69
1987	26.07	20.08	5.99	22.98
1988	25.69	20.42	5.27	20.51
1989	37.63	33.31	4.32	11.48
1990	44.79	38.62	6.17	13.78
1991	42.88	33.07	9.81	22.88
1992	40.60	33.09	7.51	18.50
1993	51.04	42.69	8.35	16.36
1994	43.88	31.38	12.50	28.49
1995	50.92	41.25	9.67	18.99
1996	51.82	41.42	10.40	20.07
1997	70.69	59.31	11.38	16.10
1998	80.22	68.78	11.44	14.26
1999	80.56	57.09	23.47	29.13
2000	70.34	44.64	25.70	36.54
2001	69.80	46.02	23.78	34.07
2002	62.66	41.63	21.03	33.56
2003	61.31	39.93	21.38	34.87
2004	71.57	47.01	24.56	34.32
2005	63.61	42.67	20.94	32.92
2006(E)	71.62	50.79	20.83	29.08

Source: Tea Digest – 2005 & 2006, Tea Board, Kolkata.
(E) Estimated and subject to revision.

Table 21. Area under Tea in Different Countries

(Area in hectare)

Name of the Countries	1993	1994	1995	2002	2003	2004	2005(E)	Percentage to 2005 World Total
India	418363	425966	427065	515832	519598	521403	523000	17.69
Sri Lanka	221836	187310	189000	187971	188199	188720	188480	6.38
Indonesia	129231	128503	142202	150723	143620	142782	142782	4.83
Bangladesh	47888	47847	48036	49500	50000	51265	51000	1.73
China	1170800	1134600	1115300	1134200	1207300	1262310	1351900	45.73
Taiwan	23087	21218	21552	18329	19310	18208	17620	0.60
Japan	55700	54500	53700	49700	50000	50000	50000	1.69
Vietnam	70000	72000	73000	85000	87000	90000	91000	3.08
USSR/CIS	1600	1600	1600	40500	41300	41800	41950	1.42
Iran	34650	34650	34650	34500	34500	34000	34500	1.17
Turkey	89330	76971	76609	76600	76639	77000	78000	2.64
Kenya	104864	110222	114458	139976	131419	131418	141315	4.78
Uganda	20500	20500	20500	21170	21570	21720	21500	0.73
Tanzania	19415	19881	20153	21316	21984	22287	22715	0.77
Malawi	18705	18801	18963	18800	18694	18663	18700	0.63
Rwanda	12566	—	—	12862	12862	12849	13000	0.44
Burundi	8750	9065	7820	8625	8800	8900	9000	0.30
Argentina	41406	40000	40000	36600	36870	36960	36900	1.25
Zimbabwe	6455	6445	6707	6850	6850	6800	6500	0.22
Myanmar	59	61	62	73000	75000	76500	77700	2.63
South Africa	6164	6130	6307	6597	6435	6401	6435	0.22
Others	32323	32220	31248	31330	31781	32354	32500	1.10
WORLD	**2533692**	**2448490**	**2448932**	**2719981**	**2789731**	**2852340**	**2956497**	**100.00**

Source: Annual Bulletin of Statistics-2006, International Tea Committee, London.
(E) Estimated and subject to revision.

Table 22. India's Share in World Tea Area (1961 – 2005)

(Area in 000' hectare)

Year	World Area	Absolute increase / decrease	Area in India	Absolute increase / decrease	India's share as percentage of world area
1961	964	—	331	—	34.34
1971	1386	(+) 422	357	(+) 26	25.76
1981	2358	(+) 972	384	(+) 27	16.28
1991	2569	(+) 211	420	(+) 36	16.35
1997	2572	(+) 3	434	(+) 14	16.87
1998	2597	(+) 25	474	(+) 40	18.25
1999	2692	(+) 95	490	(+) 16	18.20
2000	2665	(-) 27	504	(+) 14	18.91
2001	2641	(-) 24	510	(+) 6	19.31
2002	2720	(+) 79	516	(+) 6	18.97
2003	2790	(+) 70	519	(+) 3	18.60
2004	2852	(+) 62	521	(+) 2	18.27
2005(E)	2956 (182.16)	(+) 104	523 (58.01)	(+) 2	17.69

Source: Tea Statistics (various issues), Tea Board, Kolkata,.
Note : (+) indicates increase and (-) indicates decrease in absolute terms.
Figures in parentheses indicate percentage increase over 1961.

Table 23. Production of Tea in Major Producing Countries over Years

(Quantity in 000' kg.)

Name of the Countries	1993	1994	1995	2002	2003	2004	2005(E)	2006(E)	Percentage to World Production in 2006
India	760826	752895	756016	838474	878129	892965	927984	955907	27.13
Sri Lanka	233276	243563	246424	310604	303254	308089	317196	310822	8.82
Indonesia	136587	128289	143675	162194	169819	164817	165854	139761	3.97
China	599941	588468	588423	745374	768140	835231	934857	1020000	28.95
Japan	92103	86303	84804	83677	91930	100262	100000	99500	2.82
Vietnam	37700	40000	40200	88000	93000	97000	112000	132000	3.75
Turkey	127715	134350	102713	142000	155000	165000	135000	142000	4.03
Kenya	211168	209422	244525	287102	293670	324609	328584	310607	8.82
Argentina	46000	42000	32000	66778	67278	64871	77000	80000	2.27
Others	307924	246269	238567	307322	323291	362109	337175	332879	9.45
WORLD	**2553240**	**2523214**	**2525020**	**3085149**	**3201809**	**3314953**	**3435650**	**3523476**	**100.00**

Source: Tea Digest – 2005 & 2006, Tea Board, Kolkata.
(E) Estimated and subject to revision.

Table 24. India's Share in World Tea Production (1961 – 2005)

(Figures in million kg.)

Year	World Production	Increase / Decrease	India Production	Absolute increase / decrease	India's share as percentage of world production
1961	859	—	354	—	41.21
1971	1120	(+) 261	435	(+) 81	38.84
1981	1885	(+) 765	560	(+) 125	29.71
1991	2631	(+) 746	754	(+) 194	28.66
1997	2743	(+) 112	810	(+) 56	29.53
1998	2991	(+) 248	874	(+) 64	29.22
1999	2908	(-) 83	826	(-) 48	28.40
2000	2914	(+) 6	847	(+) 21	29.07
2001	3060	(+) 146	854	(+) 7	27.91
2002	3085	(+) 25	838	(-) 16	27.16
2003	3202	(+) 117	878	(+) 40	27.42
2004	3315	(+) 113	893	(+) 15	26.94
2005(E)	3436 (300)	(+) 121	928 (162.15)	(+) 35	27.01

Source: Tea Statistics (various issues), Tea Board, Kolkata,.
Note : (+) indicates increase and (-) indicates decrease in absolute terms.
Figures in parentheses indicate percentage increase over 1961.

Table 25. Estimated World Demand and Supply of Tea

(In m. kg.)

Year	World Production	World Demand	Excess (+) or Shortage (-) during the year	World Exports	Retained for own consumption	Percent exports	Percent retained
1985	2341.97	2299.82	(+) 42.15	954.17	1387.8	40.74	59.26
1986	2329.07	2347.15	(-) 18.08	973.77	1355.3	41.81	58.19
1987	2395.61	2316.2	(+) 79.41	974.04	1421.57	40.66	59.34
1988	2498.76	2440.52	(+) 58.24	1036.79	1461.97	41.49	58.51
1989	2497.05	2475.63	(+) 21.42	1125.25	1371.8	45.06	54.94
1990	2577.1	2563.87	(+) 13.23	1134.73	1442.37	44.03	55.97
1991	2631.05	2581.2	(+) 49.85	1078.17	1552.88	40.98	59.02
1992	2438.2	2450.05	(-) 11.85	1017.04	1421.16	41.71	58.29
1993	2553.24	2588.26	(-) 35.02	1155.99	1397.25	45.28	54.72
1994	2523.21	2522.46	(+) 0.75	1036.38	1486.83	41.07	58.93
1995	2525.02	2561.8	(-) 36.78	1095.34	1429.68	43.38	56.62
1996	2654.07	2645.35	(+) 8.72	1128.87	1525.2	42.53	57.47
1997	2743.31	2745.8	(-) 2.49	1206.07	1537.24	43.96	56.04
1998	2991	2912.65	(+) 78.35	1307.6	1683.4	43.72	56.28
1999	2908.45	2913.67	(-) 5.22	1264.03	1644.42	43.46	56.54
2000	2913.74	2851.03	(+) 62.71	1331.37	1582.37	45.69	54.31
2001	3060.53	2982.92	(+) 77.61	1391.65	1668.88	45.47	54.53
2002	3085.15	2998.95	(+) 86.20	1442.79	1642.36	46.77	53.23
2003	3201.81	3147.95	(+) 53.86	1401.33	1800.48	43.77	56.23
2004	3314.95	3191.85	(+) 123.10	1540.89	1774.06	46.48	53.52
2OO5(E)	3435.65	3301.91	(+) 133.74	1567.28	1868.37	45.62	54.38

Source: Supplement to Annual Bulletin of Statistics-2006, International Tea Committee, London.
(E) Estimated and subject to revision.

Table 26. Tea Consumption in Various Countries (2005)

(Quantity in million kg.)

Country	Producing countries	Importing countries	Producing and importing	Per capita consumption (in grams)
Ireland	—	11.78	—	2960
Iraq	—	56.6	—	2250
U.K	—	129.61	—	2200
Turkey	153.18	—	5.5	2170
Libiya	—	11.77	—	2100
Syria	—	29.5	—	1710
Morocco	—	44.79	—	1490
Sri Lanka	27.24	—	—	1420
Iran	81.6	—	37	1230
Japan	142.67	—	56.2	1120
Chile	—	17.16	—	1090
Tunisia	—	10.53	—	1070
Egypt	—	66.87	—	960
Poland	—	31.3	—	820
USSR/CIS	223.65	—	231.8	800
Pakistan	—	112.05	—	760
Saudi Arabia	—	13.7	—	710
Australia	13.8	—	14	690
India	757	—	—	650
Canada	—	18.59	—	590
Sudan	—	14.67	—	440
South Africa	18.91	—	16.57	410
China	521.2	—	—	400
Kenya	12.93	—	—	400
USA	—	95.71	—	330
Indonesia	66.67	—	—	310
Germany	—	23.7	—	290
Bangladesh	41	—	—	280
France	—	13.55	—	230

Source: Supplement to Annual Bulletin of Statistics-2006, International Tea Committee, London.

Table 27. Tea Consumption in India (1947 – 2004)

(In million kg.)

Year	Particulars				
	Consumption	Growth in percentage	Average annual rate of growth in percentage	Production in m. kg.	Percentage of production
1947	98.50	—	—	254.80	38.70
1957	112.90	14.60	1.46	310.80	36.30
1967	180.70	60.10	6.01	384.80	47.00
1977	302.00	67.10	6.70	556.30	54.30
1987	446.00	47.60	4.76	674.30	66.00
1991	511.00	16.60	4.10	741.70	70.10
1997	597.00	22.10	3.60	810.60	78.30
1999	633.00	5.50	2.30	880.20	76.10
2004	735.00	10.50	2.10	950.00	77.90

Source: Tea Statistics (various issues), Tea Board, Kolkata.

Table 28. Estimated Domestic Consumption of Tea in India

(In million kg.)

Year	Packet Tea	Loose Tea	Total
1986	113	318	431
1987	118	328	446
1988	129	333	462
1989	145	335	480
1990	160	340	500
1991	176	335	511
1992	184	340	524
1993	192	345	537
1994	200	350	550
1995	207	355	562
1996	214	366	580
1997	227	370	597
1998	220	395	615
1999	228	405	633
2000	245	408	653
2001	260	413	673
2002	275	418	693
2003	290	424	714
2004	308	427	735
2005	328	429	757

Source: Tea Statistics (various issues), Tea Board, Kolkata.

Table 29. World Export of Tea over Years

(In 000' kg.)

Name of Countries	1986	1993	1994	1995	2002	2003	2004	2005(E)	2006(E)	Percentage of exports in World exports
India	203149	175318	150691	167996	201002	173684	197668	199050	203857	12.91
Sri Lanka	207567	209942	224235	235036	285985	290567	290604	298769	314831	19.94
Indonesia	78957	123926	84916	79227	100185	88175	98572	102294	96000	6.08
Bangladesh	27675	31914	23640	25428	13653	12173	13435	9007	4500	0.29
China	172028	201435	179679	166573	252273	259980	280193	286563	286463	18.15
Taiwan	9011	5142	4373	3172	2592	2713	2388	2175	2200	0.14
Japan	1261	328	345	492	806	845	923	1096	1000	0.06
Malaysia	1000	272	378	293	440	450	400	300	320	0.02
Vietnam	11075	18000	20000	18800	74812	59900	70000	88000	106000	6.72
Nepal	—	25	30	38	2090	2800	3100	3600	4000	0.25
Iran	1500	1700	1038	1600	8457	7014	8000	6500	6001	0.38
Turkey	798	39611	5199	2301	5160	7042	5904	7000	9000	0.57
Kenya	116456	188390	183147	237498	272459	269268	333802	339134	313721	19.87
Uganda	2792	10251	10971	10682	31073	34069	29686	33071	32699	2.07
Tanzania	14370	19387	18570	20511	22563	20416	24170	22498	24132	1.53
Malawi	40189	35270	38672	32648	39386	42015	46599	42978	42500	2.69
Mozambique	1820	300	500	400	750	800	900	900	1000	0.06
Congo/ Zaire	2321	2353	1501	2000	2100	2200	2200	2250	2400	0.15
Ethiopia	—	—	—	—	1100	1200	1200	1300	1500	0.10

(Contd…)

Table 29. (Contd…)

Name of Countries	1986	1993	1994	1995	2002	2003	2004	2005(E)	2006(E)	Percentage of exports in World exports
Mauritius	6364	4398	4036	2894	39	41	42	51	45	0.00
Rwanda	6715	7200	4500	3500	11979	12032	11537	11652	12859	0.81
Burundi	3449	5760	6009	7079	6510	6926	7170	7607	5903	0.37
Zimbabwe	11819	8065	9688	9156	17634	17056	14912	8451	11384	0.72
South Africa	—	—	—	1333	8569	7168	5785	2290	1300	0.08
Georgia/CIS	—	—	—	5500	7000	7000	7300	7400	7600	0.48
Argentina	36279	43549	43230	41113	57107	58191	66374	66389	70723	4.48
Brazil	9537	8335	8377	7252	3979	4209	3593	3407	3238	0.21
Peru	100	388	205	72	100	100	100	100	100	0.01
Ecuador	500	1512	1470	1074	1185	1094	1036	1050	1080	0.07
Cameroon		5780	3176	4173	4300	4400	4500	4600	4000	0.25
Papua & New Guinea	5213	6441	6300	5800	5500	5600	6500	5500	5700	0.36
Other countries	400	1000	1500	1700	2000	2200	2300	2300	2500	0.16
WORLD	**972345**	**1155992**	**1036376**	**1095341**	**1442788**	**1401328**	**1540893**	**1567282**	**1578555**	**100.00**

Source: Tea Statistics (various issues), Tea Board, Kolkata.
(E) Estimated and subject to revision.

Table 30. India's Share in World Tea Exports (1961 – 2005)

(In million kg.)

Year	World Exports	Absolute increase / decrease	Indian Exports	Absolute increase / decrease	India's share as percentage of world export
1961	546	—	206	—	37.73
1971	682	(+) 136	202	(-) 4	29.62
1981	853	(+) 171	242	(+) 40	28.37
1991	1078	(+) 225	203	(-) 39	18.83
1997	1206	(+) 128	203	0	16.83
1998	1307	(+) 101	210	(+) 7	16.07
1999	1264	(-) 43	192	(-) 18	15.19
2000	1331	(+) 67	207	(+) 15	15.55
2001	1392	(+) 61	183	(-)24	13.15
2002	1443	(+) 51	201	(+) 18	13.93
2003	1401	(-) 42	174	(-) 27	12.42
2004	1541	(+) 140	198	(+) 24	12.85
2005(E)	1567 (187)	(+) 26	199 (-3.40)	(+) 1	12.70

Source: Tea Statistics (various issues), Tea Board, Kolkata,.
Note : (+) indicates increase and (-) indicates decrease in absolute terms.
Figures in parentheses indicate percentage increase over 1961.

Table 31. Country-wise Exports from India (1947 - 2004)

(In million kg.)

Country / year	1947	1957	1967	1977	1987	1991	1997	1999	2004
United Kingdom	127.20	135.40	117.20	74.30	22.40	22.50	25.40	25.00	25.10
Per cent export	66.30	68.00	53.80	32.40	11.09	11.09	12.70	12.10	12.11
Ireland	9.00	8.30	6.20	6.40	2.10	2.50	2.60	2.50	2.50
Per cent export	4.70	4.20	2.80	2.80	1.04	1.23	1.28	1.20	1.19
Netherlands	1.50	0.90	3.70	3.40	1.60	1.90	2.70	2.60	2.60
Per cent export	0.80	0.50	1.70	1.50	0.79	0.90	1.33	1.27	1.26
West Germany	NIL	1.90	2.20	5.80	4.70	4.70	6.90	6.60	6.65
Per cent export	NIL	0.90	1.00	2.50	2.33	2.30	3.40	3.20	3.21
Rest of West Europe	0.60	0.10	0.50	0.90	0.50	0.60	0.80	0.80	0.80
Per cent export	0.30	0.05	0.20	0.40	0.20	0.30	0.40	0.40	0.40
Poland	NIL	NIL	1.80	5.30	10.70	11.90	14.00	14.70	14.75
Per cent export	NIL	NIL	0.80	2.80	5.30	5.90	6.90	7.10	7.11
Yugoslavia	NIL	NIL	0.50	4.70	1.40	0.20	0.30	0.40	0.40
Per cent export	NIL	NIL	0.20	2.00	0.70	0.10	0.15	0.17	0.16
Rest of East Europe	NIL	0.10	1.70	1.40	3.30	1.00	1.60	1.40	1.40
Per cent export	NIL	0.05	0.80	0.60	1.60	0.50	0.80	0.70	0.70
USSR	4.00	7.30	20.70	47.70	96.60	104.50	90.70	92.80	94.10
Per cent export	2.10	3.60	9.50	20.80	47.80	51.50	44.70	44.90	44.95
Afghanistan	NIL	NIL	5.70	8.60	3.60	1.60	0.80	1.20	1.20
Per cent export	NIL	NIL	2.60	3.70	1.80	0.80	0.40	0.60	0.60
Iran	3.90	5.60	1.80	6.60	18.90	14.80	11.70	12.80	12.80
Per cent export	2.00	2.80	1.10	2.90	9.40	7.30	5.80	6.20	6.15
Iraq	1.40	0.02	2.50	4.60	8.80	—	0.10	0.04	0.40
Per cent export	0.70	0.00	1.10	2.00	4.30	—	0.01	0.02	0.02
Persian Gulf Ports	4.40	2.60	3.00	6.20	7.00	5.20	6.80	7.02	7.02
Per cent export	2.30	1.30	1.40	2.70	3.50	2.60	3.35	3.40	3.40

(Contd….)

Table 31. (Contd…)

Country / year	1947	1957	1967	1977	1987	1991	1997	1999	2004
Jordan	NIL	NIL	1.4	0.6	—	0.5	0.1	0.6	0.6
Per cent export	—	—	0.6	0.3	0.05	0.2	0.2	0.3	0.36
Rest of Middle East	0.6	0.3	0.05	0.07	0.3	—	0.2	0.2	0.2
Per cent export	0.3	0.1	0.02	0.03	0.1	—	0.1	0.1	0.1
Pakistan	NIL	NIL	NIL	4.6	0.6	0.3	0.4	0.4	0.4
Per cent export	—	—	—	2	0.3	0.15	0.2	0.2	0.26
Japan	NIL	NIL	0.3	0.8	1.4	2	1.9	2.3	2.3
Per cent export	—	—	0.1	0.3	0.3	1	0.9	1.1	1.1
Arab Rep. Of Egypt	1.8	7.3	16.6	14.1	7.8	7.9	7.2	7.6	7.6
Per cent export	0.9	3.7	7.6	6.1	3.9	3.9	3.5	3.7	3.76
Sudan	0.7	2	10	13.6	0.1	—	0.1	0.1	0.1
Per cent export	0.4	1	4.6	5.7	0.05	—	0.05	0.06	0.06
Tunisia	NIL	NIL	3.8	1.2	1	1.7	1.5	1.9	1.9
Per cent export	—	—	1.7	0.5	0.5	0.8	0.7	0.9	0.9
Rest of Africa	NIL	NIL		0.4	3.7	7	9.8	9.5	9.5
Per cent export	—	—	—	0.2	1.8	3.4	4.8	4.6	4.6
Canada	8.2	7.7	3.9	2.5	0.8	0.6	0.1	0.15	0.15
Per cent export	4.3	3.9	1.8	1.1	0.4	0.3	0.05	0.07	0.07
USA	17.3	10.6	8.4	10	1.8	2.5	2.9	3.3	3.3
Per cent export	9	5.3	3.9	4.4	0.9	1.2	1.4	1.6	1.6
Australia	7	3.4	5.4	4.6	0.7	0.8	0.5	0.6	0.6
Per cent export	3.7	1.7	2.5	2	0.3	0.4	0.25	0.3	0.3
New Zealand	0.5	0.7	0.4	1.3	—	—	—	—	—
Per cent export	0.3	0.4	0.2	0.6	—	—	—	—	—
All other countries	3.6	5	0.1	0.5	4.3	8.1	13.4	11.95	11.95
Per cent export	1.9	2.5	0.05	0.2	2.1	4	6.63	5.81	5.81

Source: Tea Statistics (various issues), Tea Board, Kolkata.

Table 32. India's Share in World Exports (1947 – 2004)

(In million kg.)

Country/Year	1947	1957	1967	1977	1987	1991	1997	1999	2004
India	191.70	199.20	217.80	229.60	201.90	202.90	203.00	204.20	205.60
Percentage Share	53.30	39.90	35.60	28.20	20.70	17.90	13.20	18.50	18.25
Sri Lanka	130.30	166.80	216.50	185.50	201.20	212.40	234.85	238.05	242.50
Percentage Share	36.30	33.40	35.40	22.70	20.60	18.80	21.24	21.52	21.60
Indonesia	3.90	38.80	26.60	51.30	90.40	109.60	103.90	102.50	104.20
Percentage Share	1.10	7.80	4.30	6.30	9.20	9.70	9.40	9.60	9.70
Bangladesh	N.A	4.50	N	26.00	21.60	25.30	24.30	25.40	25.45
Percentage Share	N	0.90	N	3.20	2.20	2.20	2.40	2.30	2.32
Kenya	4.40	8.20	19.70	70.20	135.00	191.60	245.50	251.10	255.20
Percentage Share	1.20	1.60	3.20	8.60	13.80	16.90	22.20	22.70	22.73
Uganda	1.10	2.80	9.60	14.70	2.10	4.70	15.20	15.10	16.10
Percentage Share	0.30	0.60	1.60	1.80	0.20	0.40	1.40	1.40	1.42
Tanzania	0.50	2.40	6.20	120	11.40	15.00	18.80	19.90	20.95
Percentage Share	0.10	0.50	1.00	1.50	1.20	1.30	1.70	1.80	1.82
Malawi	5.90	8.80	16.80	29.90	33.40	41.20	36.50	35.40	36.20
Percentage Share	1.70	1.80	2.70	3.70	3.40	3.60	3.30	3.20	3.21
Mozambique	1.50	5.90	14.40	15.60	2.10	1.00	0.42	0.95	0.97
Percentage Share	0.40	1.20	2.40	1.90	0.20	0.09	0.04	0.05	0.08
Others	20.20	61.70	84.40	180.60	277.50	338.40	223.23	213.60	216.15
Percentage Share	5.60	12.30	13.80	22.10	28.40	29.90	25.12	18.93	19.25
Total	359.50	499.10	612.00	815.40	976.60	1132.10	1105.70	1106.20	1122.72

Source: Tea Statistics (various issues), Tea Board, Kolkata.
N.A - Not Available, N – Negligible.

Table 8. Average Yield of Tea in Different Countries

(Yield in kg. / hectare)

Name of the Countries	1951	1961	1971	1981	1991	2001	2004	2005(E)
India	901	1070	1215	1458	1742	1675	1713	1774
Sri Lanka	641	869	901	856	1090	1568	1633	1683
Indonesia	419	549	732	1192	974	1120	1154	1162
Bangladesh	795	838	289	926	946	1163	1085	1188
China	N.A	N.A	N.A	N.A	N.A	615	662	692
Taiwan	N.A	N.A	N.A	N.A	N.A	1047	1109	1067
Japan	N.A	1730	1724	1670	1526	1793	2005	2000
Vietnam	N.A	N.A	N.A	N.A	N.A	976	1078	1231
USSR/CIS	N.A	585	898	1746	N.A	369	374	389
Iran	N.A	373	N.A	N.A	N.A	1702	1176	725
Turkey	N.A	428	1290	789	1563	1864	2143	1731
Kenya	865	N.A	N.A	1152	2039	2239	2470	2325
Uganda	N.A	N.A	N.A	N.A	N.A	1593	1644	1755
Tanzania	N.A	N.A	N.A	N.A	N.A	1158	1377	1337
Malawi	N.A	N.A	N.A	N.A	N.A	1960	2684	2031
Rwanda	N.A	N.A	N.A	N.A	N.A	1389	1104	1266
Burundi	N.A	N.A	N.A	N.A	N.A	1035	867	870
Argentina	N.A	145	599	N.A	N.A	1639	1755	2087
Zimbabwe	N.A	N.A	N.A	N.A	N.A	3291	2755	2290
Myanmar	N.A	N.A	N.A	N.A	N.A	867	234	232
Malaysia	N.A	716	1121	N.A	N.A	1746	857	906
South Africa	N.A	N.A	N.A	N.A	N.A	1463	890	346
AVERAGE WORLD YIELD	N.A	N.A	N.A	N.A	1026	1151	1162	1162

Source: Annual Bulletin of Statistics-2006, International Tea Committee, London.
(E) Estimated and subject to revision.

Table 33. Apparent Quantity of Sales and Price Realised of Tea at Auctions in Producing Countries

(Qty. in million kg. and price equivalent in US $)

Year	Indian Auctions		Chittagong Auctions		Colombo Auctions		Jakarta Auctions	
	Qty.	Price	Qty.	Price	Qty.	Price	Qty.	Price
1995	428.37	1.48	41.00	1.17	229.44	1.41	13.34	1.06
1996	443.12	1.38	48.54	1.11	229.98	1.88	22.42	1.14
1997	459.03	1.84	43.67	1.64	254.97	2.03	29.83	1.64
1998	442.36	1.85	44.90	1.49	256.03	2.08	33.56	1.68
1999	480.77	1.69	40.88	1.20	260.45	1.63	24.17	1.05
2000	507.14	1.37	42.15	1.12	276.91	1.75	33.22	1.20
2001	463.69	1.31	47.08	1.06	279.46	1.61	41.80	0.97
2002	456.55	1.15	50.72	1.03	280.02	1.55	37.43	1.01
2003	477.77	1.20	47.79	1.17	273.23	1.54	33.77	0.95
2004	474.35	1.42	52.93	1.07	269.87	1.78	32.21	1.02
2005	510.23	1.32	54.16	1.21	273.06	1.84	36.97	1.04

(Contd…)

Table 33. (Contd…)

Year	Mombassa Auction		Limbe Auctions		Currency per US $					
	Qty.	Price	Qty.	Price	Indian Rs.	Bangladesh Taka	SL Rs.	Kenyan Shilling	Mal. Tambala	US Cents
1995	173.76	1.29	10.98	0.77	32.43	40.28	51.25	N.A	N.A	100
1996	189.80	1.42	14.43	0.79	35.43	41.79	55.27	N.A	N.A	100
1997	166.62	2.00	17.21	1.25	36.26	43.82	58.90	N.A	N.A	100
1998	243.57	1.89	18.03	1.19	41.27	46.91	64.59	N.A	N.A	100
1999	210.79	1.78	12.97	0.94	43.06	49.09	70.40	N.A	N.A	100
2000	221.60	2.02	14.99	1.02	44.94	52.14	77.01	N.A	N.A	100
2001	276.22	1.53	14.54	0.87	47.19	55.81	89.38	N.A	N.A	100
2002	270.64	1.49	17.24	0.91	48.60	57.89	95.66	N.A	N.A	100
2003	285.84	1.54	15.9	0.93	46.58	58.15	96.51	N.A	N.A	100
2004	298.09	1.55	17.22	1.00	45.32	59.51	101.19	N.A	N.A	100
2005(E)	306.83	1.47	11.93	0.92	44.10	64.33	100.50	N.A	N.A	100

Source: Annual Bulletin of Statistics-2006, International Tea Committee, London.
(E) Estimated and subject to revision.

Table 34. Geographical Distribution of Tea Areas in India over Years

(Area in hectare)

State/Region	1951	1961	1971	1981	1991	2001	2005 (E)
Assam	155674 (49.13)	162367 (49.02)	182325 (51.14)	203038 (52.84)	233284 (55.48)	269154 (52.80)	272000 (52.01)
West Bengal	79580 (25.12)	82705 (24.97)	88499 (24.82)	93971 (24.46)	101922 (24.24)	110820 (21.74)	114500 (21.89)
Others	13339 (4.21)	11856 (3.58)	11905 (3.34)	12670 (3.30)	9976 (2.37)	15139 (2.97)	21000 (4.02)
Total North India	248593 (78.46)	256928 (77.57)	282729 (79.30)	309679 (80.59)	345182 (82.09)	395113 (77.50)	407500 (77.92)
Tamil Nadu	33375 (10.53)	32723 (9.88)	34646 (9.72)	37073 (9.65)	38634 (9.19)	75625 (14.83)	76252 (14.58)
Kerala	33203 (10.48)	39784 (12.01)	37271 (10.45)	35589 (9.26)	34678 (8.25)	36940 (7.25)	37120 (7.10)
Karnataka	1669 (0.53)	1794 (0.54)	1870 (0.52)	1901 (0.49)	1976 (0.47)	2128 (0.42)	2128 (0.41)
Total South India	68247 (21.54)	74301 (22.43)	73787 (20.70)	74563 (19.41)	75288 (17.91)	114693 (22.50)	115500 (22.08)
Total All India	316840 (100.00)	331229 (100.00)	356516 (100.00)	384242 (100.00)	420470 (100.00)	509806 (100.00)	523000 (100.00)

Source: Tea Statistics (various issues), Tea Board, Kolkata.
Figures in parentheses indicate percentage to all India total.

Table 35. Linear and Compound Growth Rates of Tea Areas in Major Producing States

(Area in hectare)

State / Region	Linear Growth Rate (A_t)			Compound Growth Rate (CGR)	
	b_0	b_1	R^2	b_1	CGR in percentage
Assam	181320.00* (210.4230)	2798.16* (33.8322)	0.930	1.0124* (38.754)	1.24
West Bengal	87228.80* (24.5736)	794.909* (28.910)	0.940	1.0079* (41.763)	0.79
Others	10297.50* (124.3310)	186.916* (12.9234)	0.262	1.0125* (32.6382)	1.25
North India	278846* (162.5318)	3779.99* (31.7294)	0.922	1.0111* (27.6381)	1.11
TamilNadu	24090.90* (297.6431)	1435.18* (26.8992)	0.743	1.0280* (24.6978)	2.80
Kerala	35296.80* (214.3296)	39.0795* (14.8723)	0.142	1.0011* (3.964)	0.11
Karnataka	1785.85* (112.6781)	12.0051* (5.0392)	0.913	1.0061* (4.6238)	0.61
South India	61176.50* (383.5867)	1486.15* (28.6238)	0.723	1.0164* (18.9163)	1.64
All India	339374.00* (164.2638)	5288.36* (29.3276)	0.902	1.0122* (19.4682)	1.22

Note: Hereafter, '*' and '**' refer significance at one per cent and at five per cent levels respectively, t = 1,....,…,32 refers to the time series 1974 to 2005, R^2 refers to the coefficient of multiple determination, CGR abbreviates for compound growth rate expressed as percentage. Figures in parentheses, wherever presented below estimated parameters are their respective 't' values.

Table 36. Ownership Pattern of Tea Estates

(Estates in number)

REGION	SIZE OF ESTATE (in ha.)	ESTATES									
		Number					Percentage to Total				
		1985-86	1990-91	1995-96	2000-01	2004-05	1985-86	1990-91	1995-96	2000-01	2004-05
	Upto 50	136	112	4312	44170	59601	12.52	10.61	80.75	97.72	98.30
	50-100	124	131	140	149	146	11.42	12.41	2.62	0.33	0.24
North India	101-200	234	221	220	234	234	21.55	20.93	4.12	0.52	0.39
	201-400	307	288	322	297	302	28.27	27.27	6.03	0.66	0.50
	>400	285	304	346	352	346	26.24	28.79	6.48	0.78	0.57
	Total	1086	1056	5340	45202	60629	100.00	100.00	100.00	100.00	100.00
	Upto 50	10654	10676	31738	66563	68154	97.87	97.77	99.25	99.63	99.64
	50-100	38	43	43	46	47	0.35	0.39	0.13	0.07	0.07
South India	101-200	57	57	53	53	53	0.52	0.52	0.17	0.08	0.08
	201-400	100	108	107	109	104	0.92	0.99	0.33	0.16	0.15
	>400	37	35	38	37	40	0.34	0.32	0.12	0.06	0.06
	Total	10886	10919	31979	66808	68398	100.00	100.00	100.00	100.00	100.00

(Contd…)

Table 36. (Contd…)

(Area in hectare)

REGION	SIZE OF ESTATE (in ha.)	AREA OWNED									
		Hectare					Percentage to Total				
		1985-86	1990-91	1995-96	2000-01	2004-05	1985-86	1990-91	1995-96	2000-01	2004-05
	Upto 50	3466	2607	8902	55865	67857	1.12	0.83	2.62	14.29	16.71
	50-100	9129	9794	10713	11157	10979	2.94	3.12	3.16	2.85	2.70
North India	101-200	34623	32468	32479	33859	32976	11.17	10.34	9.57	8.66	8.12
	201-400	95787	84081	90181	83787	86370	30.89	26.78	26.58	21.43	21.26
	Above400	167089	185051	196958	206238	208008	53.88	58.93	58.06	52.76	51.21
	Total	310094	314001	339233	390906	406190	100.00	100.00	100.00	100.00	100.00
	Upto 50	14104	14130	25620	50060	52034	18.92	18.73	29.17	44.12	45.16
	50-100	3134	3111	3078	3337	3399	4.20	4.12	3.50	2.94	2.95
South India	101-200	8607	8570	7931	7964	7938	11.54	11.36	9.03	7.02	6.89
	201-400	30093	31377	31161	32047	30534	40.36	41.59	35.48	28.25	26.50
	Above400	18623	18255	20042	20052	21308	24.98	24.20	22.82	17.67	18.49
	Total	74561	75443	87832	113460	115213	100.00	100.00	100.00	100.00	100.00

Source: Compiled from Tea Statistics (various volumes), Tea Board, Kolkata.

Table 37. Proportion of Tea Area under Different Age Groups over a Decade

(Area in hectare)

STATE / REGION	1994-95							2004-05						
	Age Group (In Years)							Age Group (In Years)						
	< 5	5-10	11-20	21-30	31-40	41-50	50	< 5	5-10	11-20	21-30	31-40	41-50	50
Assam	13149 (7.48)	18629 (10.59)	26339 (14.98)	24589 (13.98)	22108 (12.57)	15129 (8.60)	55938 (31.80)	15508 (6.73)	33496 (14.54)	33959 (14.74)	30780 (13.36)	28940 (12.57)	19951 (8.66)	67676 (29.38)
West Bengal	4487 (7.28)	4829 (7.83)	6292 (10.20)	6080 (9.86)	7719 (12.52)	3783 (6.13)	28483 (46.18)	5114 (5.30)	13363 (13.84)	9313 (9.65)	8907 (9.23)	10688 (11.07)	8979 (9.30)	40184 (41.62)
Others	2037 (24.75)	2002 (24.32)	1525 (18.53)	572 (6.95)	369 (4.48)	626 (7.61)	1100 (13.36)	4594 (33.77)	2884 (21.20)	510 (3.75)	493 (3.62)	439 (3.23)	758 (5.57)	3926 (28.86)
Total North India	19673 (8.00)	25460 (10.36)	34156 (13.90)	31241 (12.71)	30196 (12.29)	19538 (7.95)	85521 (34.80)	25216 (7.41)	49743 (14.61)	43782 (12.86)	40180 (11.80)	40067 (11.77)	29688 (8.72)	111786 (32.83)
Tamil Nadu	10798 (22.47)	3257 (6.78)	5025 (10.46)	4070 (8.47)	3523 (7.33)	4357 (9.07)	17028 (35.43)	11224 (17.74)	15031 (23.76)	5612 (8.87)	4116 (6.51)	3823 (6.04)	4641 (7.34)	18809 (29.73)
Kerala	4332 (11.78)	550 (1.50)	451 (1.23)	752 (2.04)	1359 (3.70)	3611 (9.82)	25720 (69.94)	3493 (9.46)	1444 (3.91)	865 (2.34)	653 (1.77)	1099 (2.98)	3381 (9.15)	25998 (70.39)
Karnataka	91 (4.34)	80 (3.81)	86 (4.10)	202 (9.62)	142 (6.77)	924 (44.02)	574 (27.35)	42 (1.98)	93 (4.38)	158 (7.45)	82 (3.86)	105 (4.95)	903 (42.55)	739 (34.83)
Total South India	15221 (17.33)	3887 (4.43)	5562 (6.33)	5024 (5.72)	5024 (5.72)	8892 (10.12)	44222 (50.35)	14759 (14.43)	16568 (16.19)	6635 (6.49)	4851 (4.74)	5027 (4.91)	8925 (8.72)	45546 (44.52)
Total All India	34894 (10.46)	29347 (8.80)	39718 (11.91)	36265 (10.87)	35220 (10.56)	28430 (8.52)	129743 (38.89)	39975 (9.03)	66311 (14.98)	50417 (11.39)	45031 (10.17)	45094 (10.18)	38613 (8.72)	157332 (35.53)

Source: Tea Statistics (various issues), Tea Board, Kolkata.
Figures in parentheses indicate percentage to total area of respective state / region.

Table 39. Results of Fourier analysis for Area under Tea

Region	Years	Fourier coefficient		R^2P	R^2M	K
		A_p	B_p			
a) NORTH INDIA						
	5	-38.56	-5.16	1640.08	3.21E+06	4.64E-04
	6	387.56	541.91	486428	"	2.16
	7	492.89	684.68	798392	"	12.16
	8	1352.73	7.63	1.39E+06	"	0.54
	9	-204.51	-139.18	58642	"	1.04
	10	-3368.61	-226.42	194653	"	24.82
b) SOUTH INDIA						
	5	61.48	-67.34	7012.81	2361.04	6.18
	6	-41.69	43.43	3894.36	"	3.29
	7	98.33	-41.23	16586.32	"	13.68
	8	1.47	26.28	845.61	"	0.73
	9	32.62	-32.77	2031.47	"	1.69
	10	84.69	56.36	8963.86	"	26.32
c) ALL INDIA						
	5	18.93	-59.31	5278.62	3.16E+06	1.60E-04
	6	321.38	684.62	523764	"	1.96
	7	587.13	665.87	918526	"	11.67
	8	1379.85	38.58	1.45E+06	"	0.73
	9	-168.49	-164.76	58346.14	"	1.79
	10	-269.63	-187.34	124718	"	23.91

Table 40. Implied Productivity of Different Size Groups

Size Group (in ha.)	Productivity (kg. / ha.)						
	1975-76	1980-81	1985-86	1990-91	1995-96	2000-01	2003-04
North India							
Upto 50	861	1009	1709	1333	928	1500	1726
50-100	992	945	1589	1377	1277	1176	1308
101-200	1123	1120	1215	1253	1374	1286	1460
201-400	1331	1361	1523	1565	1423	1511	1455
Above 400	1564	1627	1714	1776	1905	1787	1716
South India							
Upto 50	275	188	683	823	623	1536	1762
50-100	1002	1044	985	1153	1046	1094	1215
101-200	1551	1600	1532	1631	1758	1385	1576
201-400	1826	1809	2141	2144	2235	1657	1650
Above 400	1937	1767	1895	2393	2418	1850	1774
All India							
Upto 50	568	599	1196	1183	776	1518	1744
50-100	997	995	1287	1315	1162	1135	1262
101-200	1337	1360	1374	1442	1566	1335	1518
201-400	1385	1585	1832	1855	1829	1584	1553
Above 400	1750	1697	1805	2085	2161	1818	1745

Table 41. Average Labour Employed and Average Labour Productivity

Region	1995			2000			2004		
	Labour Employed (Nos.)	Labour/ha.	Productivity (kg./person)	Labour Employed (Nos.)	Labour/ha.	Productivity (kg./person)	Labour Employed (Nos.)	Labour/ha.	Productivity (kg./person)
Assam	567398	2.51	710	602531	2.26	746	617518	2.27	705
West Bengal	258179	2.55	655	253459	2.36	716	262672	2.30	817
Others	16192	1.38	624	17410	1.03	574	16527	0.81	726
North India	841769	2.48	675	873400	2.23	734	896717	2.21	738
Tamil Nadu	110749	2.26	1065	255780	3.44	515	266027	3.50	613
Kerala	72282	1.97	896	77086	2.09	894	90358	2.44	688
Karnataka	3987	1.90	1177	3789	1.79	1427	4508	2.12	1247
South India	187018	2.13	1002	336655	2.97	612	360893	3.13	639
All India	1028787	2.41	735	1210055	2.40	700	1257610	2.41	710

Source: Tea Statistics (various issues), Tea Board, Kolkata.

Table 42. Results of Fourier analysis of Productivity

Region	Years	Fourier coefficient		R^2P	R^2M	K
		A_p	B_p			
a) NORTH INDIA						
	5	-1.58	-2.46	8.72	187.68	0.06
	6	11.61	12.67	238.64	"	1.19
	7	-5.36	-0.96	28.91	"	0.21
	8	-3.48	7.89	78.93	"	0.37
	9	-2.87	-7.97	81.06	"	0.46
	10	5.71	-9.85	297.98	"	1.78
b) SOUTH INDIA						
	5	-5.79	13.69	234.85	352.42	0.76
	6	-11.48	-11.66	369.08	"	1.17
	7	16.30	-51.42	2487.35	"	7.38
	8	-45.92	-4.56	2296.49	"	6.91
	9	27.46	11.84	1096.36	"	3.18
	10	-18.63	5.95	426.84	"	1.39
c) ALL INDIA						
	5	-1.48	-1.58	4.63	128.40	0.05
	6	7.91	8.64	149.67	"	1.23
	7	-3.83	-0.53	18.51	"	0.20
	8	-1.26	7.01	52.63	"	0.27
	9	-1.98	-6.43	48.62	"	0.29
	10	-8.83	2.33	89.08	"	0.69

Table 43. Fourier Results for Production

Region	Years	Fourier coefficient		R^2P	R^2M	K
		A_p	B_p			
a) NORTH INDIA						
	5	-0.56	-0.63	0.71	33.8	0.02
	6	3.5	3.84	26.95	"	0.8
	7	-1.28	0.45	1.83	"	0.05
	8	0.56	2.74	7.83	"	0.23
	9	-0.87	-2.69	7.99	"	0.24
	10	9.74	-2.91	103.31	"	3.06
b) SOUTH INDIA						
	5	-0.37	1.03	1.21	1.84	0.66
	6	-1.01	-0.96	1.94	"	1.06
	7	1.43	-3.77	16.23	"	8.83
	8	-3.61	-0.29	13.14	"	7.15
	9	2.33	0.94	6.3	"	3.43
	10	-1.46	0.55	2.44	"	1.33
c) ALL INDIA						
	5	-0.93	0.4	1.03	49.38	0.02
	6	2.49	2.88	14.47	"	0.29
	7	0.15	-3.32	11.03	"	0.22
	8	-3.05	2.45	15.32	"	0.31
	9	1.46	-1.74	5.17	"	0.1
	10	8.28	-2.36	74.08	"	1.5

Table 45. Geographical Distribution of Tea Production

(In 000' kg.)

State/Region	1950-51	1960-61	1970-71	1980-81	1990-91	2000-01	2004-05(E)
Assam	150370 (52.69)	182311 (51.44)	223665 (51.36)	305130 (54.45)	400554 (53.11)	449219 (53.04)	435649 (48.79)
West Bengal	78158 (27.39)	86258 (24.34)	104087 (23.90)	128259 (22.89)	155216 (20.58)	181536 (21.43)	214541 (24.03)
Others	4997 (1.75)	4736 (1.34)	4579 (1.05)	4401 (0.79)	7156 (0.95)	10001 (1.18)	11994 (1.34)
Total North India	233525 (81.82)	273305 (77.12)	332331 (76.32)	437790 (78.12)	562926 (74.64)	640756 (75.66)	662184 (74.16)
Tamil Nadu	25225 (8.84)	39768 (11.22)	57531 (13.21)	71597 (12.78)	119937 (15.90)	131812 (15.56)	163015 (18.26)
Kerala	25775 (9.03)	39545 (11.16)	42729 (9.81)	47631 (8.50)	66803 (8.86)	68947 (8.14)	62146 (6.96)
Karnataka	874 (0.31)	1779 (0.50)	2877 (0.66)	3409 (0.61)	4526 (0.60)	5407 (0.64)	5620 (0.63)
Total South India	51874 (18.18)	81092 (22.88)	103137 (23.68)	122637 (21.88)	191266 (25.36)	206166 (24.34)	230781 (25.84)
Total All India	285399 (100.00)	354397 (100.00)	435468 (100.00)	560427 (100.00)	754192 (100.00)	846922 (100.00)	892965 (100.00)

Source: Tea Statistics (various issues), Tea Board, Kolkata.
Note: Figures in parentheses indicate percentage to all India total.

Table 46. Production of Tea in India by Different Methods of Manufacturing

(Quantity in million kg.)

Year	CTC		Orthodox		Legg Cut		Green Tea		Total	
	Quantity	Percent	Quantity	Percent	Quantity	Percent	Quantity	Percent	Quantity	Percent
(a) North India										
1961	117.8	43.30	125.2	46.00	24.4	9.00	4.7	1.70	272.1	100.00
1971	210.2	63.30	103.5	31.10	11.3	3.40	7.3	2.20	332.3	100.00
1981	299.3	68.40	131.5	30.00	-	-	7.0	1.60	437.8	100.00
1991	461.9	82.10	93.4	16.60	-	-	7.6	1.40	562.9	100.00
1996	542.8	90.70	47.6	8.00	-	:	7.8	1.30	598.2	100.00
1997	549.5	90.90	47.2	7.80	-		8.0	1.30	604.7	100.00
1998	594.1	88.60	69.8	10.40	-	-	6.8	1.00	670.7	100.00
1999	576.1	92.40	41.1	6.60	-	-	6.0	1.00	623.2	100.00
2000	592.6	92.50	42.5	6.60	-	-	5.6	0.90	640.7	100.00
2001	606.5	93.20	39.8	6.10	-	-	4.5	0.70	650.8	100.00
2002	591.5	93.60	36.5	5.80	-	-	3.8	0.60	631.8	100.00
(b) South India										
1961	3.3	4.10	76.2	94.00	1.6	2.00	-	-	81.1	100.00
1971	28.9	28.00	71.4	69.30	2.1	2.00	0.7	0.70	103.1	100.00
1981	58.2	47.50	63.8	52.00	-	-	0.6	0.50	122.6	100.00
1991	141.7	74.10	47.4	24.80	-	-	2.2	1.20	191.3	100.00
1996	138.1	75.90	43.4	23.80	-	-	0.5	0.30	182.0	100.00
1997	150.6	73.40	54.2	26.40	-	-	0.5	0.20	205.3	100.00
1998	144.1	70.80	58.8	28.90	-	-	0.5	0.20	203.4	100.00
1999	172.1	84.90	30.2	14.90	-	-	0.4	0.20	202.7	100.00
2000	170.2	82.50	35.4	17.20	-		0.6	0.30	206.2	100.00
2001	167.4	82.40	34.8	17.10	-	-	0.9	0.40	203.1	100.00
2002	171.4	82.90	34.4	16.60	-	-	0.9	0.40	206.7	100.00
(c) All India										
1961	121.1	34.30	201.4	57.00	26	7.40	4.7	1.30	353.2	100.00
1971	239.1	54.90	174.9	40.20	13.4	3.10	8	1.80	435.4	100.00
1981	357.5	63.80	195.3	34.90	-	-	7.6	1.40	560.4	100.00
1991	603.6	80.00	140.8	18.70	-	-	9.8	1.30	754.2	100.00
1996	680.9	87.30	91	11.70	-	-	8.3	1.10	780.2	100.00
1997	700.1	86.40	101.4	12.50	-	-	8.5	1.00	810.0	100.00
1998	738.2	84.50	128.6	14.70	-	-	7.3	0.80	874.1	100.00
1999	748.2	90.60	71.3	8.60	-	-	6.4	0.80	825.9	100.00
2000	762.8	90.10	77.9	9.20	-	-	6.2	0.70	846.9	100.00
2001	773.9	90.60	74.6	8.70	-	-	5.4	0.60	853.9	100.00
2002	762.9	91.00	70.9	8.50	-	-	4.7	0.60	838.5	100.00

Source: Tea Statistics (various issues), Tea Board, Kolkata.

Table 47. Apparent Annual per capita Tea Consumption in Different Countries

Country	1995-97	1996-98	1997-99	1998-00	1999-01	2000-02	2001-03	2002-04
a) Major Producers								
India	0.62	0.63	0.63	0.64	0.65	0.65	0.65	0.65
Sri Lanka	1.29	1.29	1.29	1.28	1.27	1.37	1.38	1.42
Kenya	0.43	0.39	0.41	0.37	0.25	0.28	0.32	0.4
Turkey	1.8	2.13	2.4	2.4	2.17	2.01	1.98	2.17
South Africa	0.51	0.5	0.49	0.48	0.48	0.47	0.46	0.41
Japan	1.08	1.08	1.07	1.08	1.14	1.14	1.14	1.12
b) Major Importers								
U.K	2.46	2.51	2.44	2.33	2.27	2.26	2.24	2.2
Germany	0.24	0.27	0.27	0.26	0.25	0.25	0.28	0.29
Russia	0.63	0.65	0.68	0.69	0.73	0.76	0.78	0.8
U.S.A	0.32	0.33	0.33	0.34	0.33	0.33	0.33	0.33
Canada	0.48	0.53	0.57	0.58	0.59	0.59	0.61	0.59
Kuwait	2.34	2.32	2.46	2.43	2.18	2.18	2.29	2.34
Sudan	0.64	0.67	0.64	0.58	0.53	0.47	0.44	0.44
Iraq	0.51	1.23	1.77	2.14	2.32	2.65	2.42	2.25
Iran	1.4	1.49	1.5	1.5	1.57	1.37	1.33	1.23
Afganistan	1.68	1.74	1.22	1.04	1.14	1.36	1.84	2.03
Australia	0.9	0.9	0.83	0.8	0.75	0.74	0.71	0.69
Poland	0.78	0.78	0.79	0.79	0.82	0.82	0.82	0.82
Pakistan	0.78	0.75	0.78	0.82	0.79	0.75	0.74	0.76

Source: Annual Bulletin of Statistics 2005-06, International Tea Committee, London.
Note: Apparent Consumption (Triennial Average) and Average Consumption per head of Total population in kg.

Table 48. Fourier Results for Domestic Price

Cycle Length	Fourier coefficient		R^2P	R^2M	K
	A_p	B_p			
5	-0.35	0.23	0.18	0.2	0.9
6	-0.35	0.57	0.45	"	2.28
7	-0.27	-0.56	0.39	"	1.97
8	-0.61	1.29	2.04	"	10.32
9	-0.06	0.45	0.21	"	1.04
10	0.02	-0.61	0.41	"	2.06

Table 49. Seasonal Indices of Prices in Different Auction Centres

	Kolkata	Gauhatti	Siluguri	Cochin	Coonoor	Coimbatore
January	95.1	103.09	99.13	101.54	102.84	109.45
February-	91.29	97.99	92.63	104.34	104.3	105.95
March	88.68	97.59	87.5	106.93	104.19	103.94
April	101.76	93.44	89.88	104.77	102.62	100.82
May-	101.34	90.77	102.71	101.09	100.73	99.14
June	104.96	100.33	107.5	95.46	98.34	95.56
July	108.29	107.15	97.88	90.73	90.91	93.31
August	102.55	100.14	97.68	90.37	90.77	91.76
September	100.18	97.36	100.14	96.25	96.56	92.61
October	100.77	100.54	104.17	100.93	99.79	97.55
November	102.07	102.84	108.25	101.28	104.91	104.55
December	98.92	102.79	104.35	100.95	104.05	105.46

Note: The computations pertain to the time period 1996 to 2005

Table 52. Spatio-Temporal Trends of Quantity and Value of Tea Exports from India

Destination	Quantity Exported (in 000' kg.)				Value Realised (in 000' Rs.)			
	1980-81	1990-91	2000-01	2003-2004	1980-81	1990-91	2000-01	2003-04
United Kingdom	41087	21840	21629	20752	754979	1134264	2093444	1771154
Ireland	5341	1969	3846	2553	100842	102155	548676	373872
Netherlands	1062	1527	2523	3390	28642	107964	342857	391363
Germany	4959	4231	4908	5128	144812	411859	907634	1073166
CIS/Russian	65940	112848	86805	57554	1286221	5973318	6486756	4069050
Poland	13824	9083	11576	5714	239779	407900	646857	330087
U.S.A	3570	1483	7438	8449	68393	83983	1016458	1107603
Canada	2464	600	959	1689	38453	25296	92426	163076
Iran	11755	11048	4693	1634	283609	628917	626055	102281
U.A.E	8523	5560	21980	25701	184250	302403	2648247	2808438
Iraq	6221	2945	13336	-	89468	237	939025	-
Saudi Arabia	2347	4361	507	994	59229	278044	48951	87572
Afghanistan	11344	743	268	4414	183675	21371	26406	215335
Japan	1095	2656	3592	3520	28880	221578	799395	746543
Pakistan	-	249	4821	6541	-	9689	397623	289515
Others	52204	17097	14672	35041	861498	911961	1277056	2840851
Total	231736	198240	203553	183074	4352730	10620939	18897866	16369906

Source: Tea Statistics (various issues), Tea Board, Kolkata.

Table 53. Proportionate Spatial Distribution of Indian Tea Exports and Value Realised

Destination	Percentage quantity exported				Percentage value realised				Unit value realised			
	1980-81	1990-91	2000-01	2003-04	1980-81	1990-91	2000-01	2003-04	1980-81	1990-91	2000-01	2003-04
United Kingdom	17.73	11.02	10.63	11.34	17.34	10.68	11.08	10.82	18.38	51.93	96.79	85.35
Ireland	2.30	0.99	1.89	1.39	2.32	0.96	2.90	2.28	18.88	51.88	142.66	146.44
Netherlands	0.46	0.77	1.24	1.85	0.66	1.02	1.81	2.39	26.97	70.7	135.89	115.45
Germany	2.14	2.13	2.41	2.80	3.33	3.88	4.80	6.56	29.2	97.34	184.93	209.28
CIS/Russian	28.45	56.92	42.64	31.44	29.55	56.24	34.33	24.86	19.51	52.93	74.73	70.7
Poland	5.97	4.58	5.69	3.12	5.51	3.84	3.42	2.02	17.34	44.91	55.88	57.77
U.S.A	1.54	0.75	3.65	4.62	1.57	0.79	5.38	6.77	19.16	56.63	136.66	131.09
Canada	1.06	0.30	0.47	0.92	0.88	0.24	0.49	1.00	15.61	42.16	96.38	96.55
Iran	5.07	5.57	2.31	0.89	6.52	5.92	3.31	0.62	24.13	56.93	133.4	62.6
U.A.E	3.68	2.80	10.80	14.04	4.23	2.85	14.01	17.16	21.62	54.39	120.48	109.27
Iraq	2.68	1.49	6.55	-	2.06	0.00	4.97	-	14.38	47.4	70.41	-
Saudi Arabia	1.01	2.20	0.25	0.54	1.36	2.62	0.26	0.53	25.24	63.76	96.55	88.1
Afghanistan	4.90	0.37	0.13	2.41	4.22	0.20	0.14	1.32	16.19	28.76	98.53	48.78
Japan	0.47	1.34	1.76	1.92	0.66	2.09	4.23	4.56	26.37	83.43	222.55	212.09
Pakistan	-	0.13	2.37	3.57	-	0.09	2.10	1.77	-	38.91	82.48	44.26
Others	22.53	8.62	7.21	19.14	19.79	8.59	6.76	17.35	-	-	-	-
Total	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	18.78	53.58	92.84	89.42

Source: Tea Statistics (various issues), Tea Board, Kolkata.

Table 54. Export Share of Important Producers in the Total Import of Major Consumers

(Quantity in 000' kg. and share in percentage)

Destination	Quantity and share of Indian Exports							Quantity and share of Sri Lankan Exports						
	1951	1961	1971	1981	1991	2001	2004	1951	1961	1971	1981	1991	2001	2004
United Kingdom	136270	123215	68852	40971	23751	16102	19787	50429	72385	46731	17741	11699	8080	5307
	(66.16)	(59.73)	(34.08)	(16.98)	(11.77)	(8.82)	(10.01)	(36.43)	(37.49)	(23.27)	(9.70)	(5.55)	(2.82)	(1.84)
Germany	1279	1583	3341	5082	5095	4178	5222	361	1258	2948	4848	3596	5120	5840
	(0.62)	(0.77)	(1.65)	(2.11)	(2.53)	(2.29)	(2.64)	(0.26)	(0.65)	(1.47)	(2.65)	(1.71)	(1.79)	(2.03)
Ireland	13816	6499	5396	5583	2633	3055	2994	738	2411	1586	1565	319	417	462
	(6.71)	(3.15)	(2.67)	(2.31)	(1.31)	(1.67)	(1.51)	(0.53)	(1.25)	(0.79)	(0.86)	(0.15)	(0.15)	(0.16)
Netherlands	2378	1601	2273	1463	3760	3258	3160	1640	3489	3204	3195	2827	3380	3589
	(1.15)	(0.78)	(1.12)	(0.61)	(1.86)	(1.78)	(1.60)	(1.18)	(1.81)	(1.60)	(1.75)	(1.34)	(1.18)	(1.25)
Canada	9165	6374	3813	2009	650	524	1170	7229	8788	6035	4575	2202	1361	1430
	(4.45)	(3.09)	(1.89)	(0.83)	(0.32)	(0.29)	(0.59)	(5.22)	(4.55)	(3.01)	(2.50)	(1.04)	(0.47)	(0.50)
U.S.A	14309	10767	8840	3866	1656	6180	7781	12765	19029	20182	13647	3298	2998	3346
	(6.95)	(5.22)	(4.38)	(1.60)	(0.82)	(3.38)	(3.94)	(9.22)	(9.85)	(10.05)	(7.46)	(1.56)	(1.05)	(1.16)
Pakistan	-	-	-	-	323	3306	3487	-	88	12798	21657	7809	2692	2986
	-	-	-	-	(0.16)	(1.81)	(1.76)	-	(0.05)	(6.37)	(11.85)	(3.70)	(0.94)	(1.04)
A.R.E	1648	15612	9169	18756	7834	313	100	10797	1585	9683	17373	20399	3751	920
	(0.80)	(7.57)	(4.54)	(7.77)	(3.88)	(0.17)	(0.05)	(7.80)	(0.82)	(4.82)	(9.50)	(9.68)	(1.31)	(0.32)
Australia	4229	1876	3021	1775	653	757	4905	19714	19557	14692	5064	2856	2715	2831
	(2.05)	(0.91)	(1.50)	(0.74)	(0.32)	(0.41)	(2.48)	(14.24)	(10.13)	(7.32)	(2.77)	(1.35)	(0.95)	(0.98)
New Zealand	926	527	302	185	12	8	43	6120	6760	6287	2264	543	1129	973
	(0.45)	(0.26)	(0.15)	(0.08)	(0.01)	(0.00)	(0.02)	(4.42)	(3.50)	(3.13)	(1.24)	(0.26)	(0.39)	(0.34)
USSR/CIS	1028	11874	40935	77807	106499	82210	53392	-	145	2002	1693	5144	48391	54769
	(0.50)	(5.76)	(20.26)	(32.25)	(52.80)	(45.02)	(27.01)	-	(0.08)	(1.00)	(0.93)	(2.44)	(16.88)	(19.00)
Total	205983	206292	202052	241246	201720	182588	197668	138425	193101	200798	182823	210823	286667	288255
	(100.00)	(100.00)	(100.00)	(100.00)	(100.00)	(100.00)	(100.00)	(100.00)	(100.00)	(100.00)	(100.00)	(100.00)	(100.00)	(100.00)

(Cotd…)

Table 54. (Contd….)

Destination	Quantity and share of Indonesian Exports							Quantity and share of Kenyan Exports						
	1951	1961	1971	1981	1991	2001	2004	1951	1961	1971	1981	1991	2001	2004
United Kingdom	7763	10083	5273	1340	6856	13327	12141	1788	5735	22320	24136	71543	62218	53474
	(19.11)	(31.27)	(13.12)	(1.88)	(6.22)	(13.36)	(12.32)	(42.68)	(51.06)	(65.11)	(31.91)	(40.75)	(24.10)	(16.02)
Germany	173	3607	3409	1877	3438	6426	5840	-	-	293	127	1426	1035	603
	(0.43)	(11.19)	(8.48)	(2.63)	(3.12)	(6.44)	(5.92)	-	-	(0.85)	(0.17)	(0.81)	(0.40)	(0.18)
Ireland	1027	89	256	30	1042	468	494	-	87	1033	3883	3865	4151	5152
	(2.53)	(0.28)	(0.64)	(0.04)	(0.95)	(0.47)	(0.50)	-	(0.77)	(3.01)	(5.13)	(2.20)	(1.61)	(1.54)
Netherlands	14994	-	12654	4356	6027	5861	5787	78	482	2657	2699	5974	1272	1348
	(36.90)	-	(31.48)	(6.11)	(5.47)	(5.88)	(5.87)	(1.86)	(4.29)	(7.75)	(3.57)	(3.40)	(0.49)	(0.40)
Canada	163	30	383	1766	592	538	1105	714	542	1520	2088	2210	1591	1184
	(0.40)	(0.09)	(0.95)	(2.48)	(0.54)	(0.54)	(1.12)	(17.04)	(4.83)	(4.43)	(2.76)	(1.26)	(0.62)	(0.35)
U.S.A	2502	3481	5595	14478	13105	6939	5776	480	1515	4228	5137	3692	4674	2715
	(6.16)	(10.80)	(13.92)	(20.32)	(11.89)	(6.96)	(5.86)	(11.46)	(13.49)	(12.33)	(6.79)	(2.10)	(1.81)	(0.81)
Pakistan	-	-	-	12558	22292	9521	10517	-	-	-	11020	44829	63185	84340
				(17.62)	(20.23)	(9.55)	(10.67)				(14.57)	(25.54)	(24.48)	(25.27)
A.R.E	3480	-	-	10756	15718	409	738	-	-	-	2620	21018	48838	84106
	(8.57)			(15.09)	(14.26)	(0.41)	(0.75)				(3.46)	(11.97)	(18.92)	(25.20)
Australia	1336	5660	9094	7817	5245	4964	3082							
	(3.29)	(17.55)	(22.62)	(10.97)	(4.76)	(4.98)	(3.13)	25	47	280	28	871	1226	15
New Zealand	303	54	613	560	1244	1482	1447	(0.60)	(0.42)	(0.82)	(0.04)	(0.50)	(0.47)	(0.00)
	(0.75)	(0.17)	(1.52)	(0.79)	(1.13)	(1.49)	(1.47)							
USSR/CIS	5154	6432	2099	3992	-	35244	39068	-	-	-	-	-	-	-
	(12.69)	(19.95)	(5.22)	(5.60)	(0.00)	(35.34)	(39.63)	-	-	-	-	-	-	-
Total	40630	32243	40202	71259	110218	99721	98572	4189	11232	34280	75629	175557	258118	333802
	(100.00)	(100.00)	(100.00)	(100.00)	(100.00)	(100.00)	(100.00)	(100.00)	(100.00)	(100.00)	(100.00)	(100.00)	(100.00)	(100.00)

Source: Annual Bulletin of Statistics (various issues), International Tea Committee, London.
Figures in parentheses indicate percentage to total.

Table 55. Fourier Results for Exports, Value of Exports and Unit Value Realised

Region	Years	Fourier coefficient		R^2P	R^2M	K
		A_p	B_p			
a) Quantity of tea exported						
	5	0.88	-4.45	20.61	1.79	11.50
	6	-4.27	-2.00	22.19	"	12.38
	7	1.86	-2.80	11.32	"	6.32
	8	9.90	0.70	98.46	"	54.93
	9	3.27	-1.29	12.34	"	6.89
	10	3.19	3.85	24.98	"	13.94
b) Value of exports						
	5	-12.10	11.59	280.64	136.11	2.06
	6	-11.48	20.78	563.37	"	4.14
	7	-4.79	-25.59	677.93	"	4.98
	8	-23.74	25.35	1206.46	"	8.86
	9	-4.26	25.02	643.94	"	4.73
	10	14.35	-30.37	1128.50	"	8.29
c) Unit value realised						
	5	-0.48	0.24	0.29	0.30	0.96
	6	-0.68	1.08	1.63	"	5.49
	7	0.18	-1.23	1.55	"	5.22
	8	-1.45	1.39	4.03	"	13.56
	9	-0.59	1.06	1.48	"	4.98
	10	0.31	-1.42	2.12	"	7.12

Table 56. Results of Unit Root Test (ADF Based) for Black Tea Prices at Different Auction Markets

Variable	level	First Difference	Lags	Critical Value
Kolkata	-4.0214*	-	(0)	-3.4665 (at 1 per cent level)
Guwahati	-4.0825*	-	(0)	
Siliguri	-4.4963*	-	(0)	
Cochin	-3.2612**	-5.5116*	(0)	-2.8770 (at 5 per cent level)
Coonoor	-3.3466**	-6.0989*	(0)	
Coimbatore	-3.2670**	-5.3984*	(0)	
Colombo	-2.1208***	-6.4071*	(0)	
Jakarta	-3.8343*	-	(0)	-2.5749 (at 10 per cent level)
Mombassa	-2.1858***	-6.9592*	(0)	
Limbe	-2.9260**	-6.8220*	(0)	

Note: Critical value based on MacKinnon (1991).
* significant at 1 per cent level
** significant at 5 per cent level

Table 58. Reduced Form Vector Error Correction Estimates for Different Auction Markets

	D(COC)	D(COO)	D(COI)	D(COL)	D(MOM)	D(LIM)
ECM	-0.6532 (-6.6045)	-0.4915 (-3.7618)	-0.2851 (-2.5117)	-0.1880 (-1.4530)	-0.0670 (-0.4571)	0.0683 (0.5536)
D(COC(-1))	-0.0338 (-0.3044)	0.3049 (2.0772)	0.2417 (1.8960)	0.3292 (2.2646)	0.07265 (0.4410)	-0.0948 (-0.6841)
D(COC(-2))	-0.2470 (-2.3512)	-0.0348 (-0.2507)	-0.1462 (-1.2130)	-0.0666 (-0.4849)	-0.0192 (-0.1233)	0.0136 (0.1044)
D(COO(-1))	0.3784 (4.1210)	-0.1151 (-0.9487)	0.2296 (2.1793)	0.1398 (1.1635)	0.3283 (2.4110)	0.1220 (1.0658)
D(COO(-2))	0.1742 (1.8503)	-0.0420 (-0.3376)	0.1495 (1.3840)	0.1671 (1.3561)	0.1279 (0.9163)	0.0993 (0.8458)
D(COI(-1))	-0.3195 (-2.4553)	-0.0269 (-0.1568)	-0.2790 (-1.8685)	-0.4249 (-2.4953)	-0.3569 (-1.8498)	0.0253 (0.1561)
D(COI(-2))	0.0486 (0.4043)	0.0472 (0.2972)	0.0293 (0.2127)	-0.0950 (-0.6034)	-0.2608 (-1.4616)	-0.1027 (-0.6844)
D(COL(-1))	0.0486 (3.2231)	0.1776 (2.1835)	0.1742 (2.4647)	0.0831 (1.0321)	-0.0915 (-1.0029)	0.0323 (0.4208)
D(COL(-2))	-0.1236 (-2.0117)	-0.0799 (-0.9850)	-0.0902 (-1.2797)	-0.0462 (-0.5755)	0.0960 (1.0538)	-0.1056 (-1.3784)
D(MOM(-1))	0.1091 (2.0187)	-0.0024 (-0.0342)	0.1719 (2.7721)	0.1114 (1.5752)	-0.0445 (-0.5556)	-0.0869 (-1.2894)
D(MOM(-2))	-0.0289 (-0.5176)	-0.1075 (-1.4561)	-0.0989 (-1.5419)	0.0792 (1.0834)	-0.0732 (-0.8833)	0.0009 (0.0140)
D(LIM(-1))	-0.0200 (-0.3088)	-0.0113 (-0.1331)	-0.0552 (-0.7431)	0.0181 (0.2140)	0.0423 (0.4411)	-0.1574 (-1.9493)
D(LIM(-2))	0.1849 (2.9324)	0.1099 (1.3196)	0.1773 (2.4501)	0.0999 (1.2109)	0.0367 (0.3926)	0.0590 (0.7507)
C	-0.0086 (-1.6289)	-0.0070 (-1.0092)	-0.0069 (-1.1337)	-0.0004 (-0.0707)	-0.0005 (-0.0701)	0.0016 (0.2530)
R-squared	0.41179	0.17649	0.26900	0.11484	0.08645	0.07303
Adj. R-squared	0.36809	0.11531	0.21470	0.04909	0.01559	0.00417
F-statistics	9.4240	2.8850	4.9538	1.7466	1.2739	1.0605
Log likelihood	236.0724	183.4388	210.0494	185.2224	161.6364	194.3241
AIC	-2.3499	-1.7930	-2.0745	-1.8118	-1.5622	-1.9081
SBC	-2.1098	-1.5528	-1.8344	-1.5717	-1.3221	-1.6680

Note: Figures in parentheses indicate t-ratio.
COC- Cochin Auction Market; COO- Coonoor Auction Market;

COI- Coimbatore Auction Market; COL- Colombo Auction Market (Sri Lanka);
MOM- Mombassa Auction Market (Kenya); LIM- Limbe Auction Market (Malawi);