DOCTORAL DISSERTATION

STRATEGIC COST MANAGEMENT OF TEA INDUSTRY IN BANGLADESH

バングラデシュにおける紅茶産業の戦略的原価管理

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Dedication

The thesis is dedicated to
my father Late Professor M. Shamsul Huq,
who used to believe in the power of small ideas and
my mother Mrs. Jahanara Begum,
whose love is always a source of my inspiration.

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I am thankful to my mother, Mrs. Jahanara Begum, whose love and affection were always sources of my inspiration. I remember my father Late Professor M. Shamsul Huq, who would be extremely happy to see my academic achievement. I am also indebted to all other members of my family. All of them were very supportive and kind to me.

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Sheikh Mohammed Rafiul Huque

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Chapter IV

Abstract

Tea is a major cash crop as well as an export earner of Bangladesh. Tea industry is an agro-based labor-intensive industry of Bangladesh. The tea industry of the country depicts a positive trend in the growth of production in recent years. The demand of tea in the market of Bangladesh is increasing by 3.5%. The supply of tea, on the other hand, is increasing by 1% each year. Various factors such as, age of tea bush, poor management of green leaves after plucking, under utilization of cultivable land hinder the production of tea in the country. About 42% of the tea plantation area of the country has old bushes (aged more than 41 years). Total 11,546 hectare of cultivable land is kept fallow each year due to lack of capital. A large number of least developed gardens (sick gardens) have low level of production and the cost of production of these gardens is very high.

The study focuses on the problems that are being faced by the tea industry of Bangladesh and addresses these problems from the perspective of management accounting. Both primary and secondary data were collected for the study. Primary data on cost of production were collected from nineteen tea estates of Bangladesh for three consecutive years using a stratified random sampling technique. In addition, personal interview was conducted in four tea estates using a judgmental sampling technique to investigate the problems associated in the value chain system. Two field surveys were carried out in the Japanese Farmers' Cooperative Association situated in the Shizuoka prefecture of Japan to gather information about the tea manufacturing process, price-cost determination mechanism and value chain system of the Japanese tea industry. Secondary data on tea industry were collected from various published materials.

This study primarily concentrates on the non-environmental factors, which profoundly affect the quantity of production and quality of tea produced in Bangladesh. The cost of production of tea by the various tea estates of Bangladesh is also analyzed. This research examines and compares the cost incurred in this respect examining the process of value chain of the different types of tea estates and analyses the performance of these tea estates. It also attempts to put forward strategic solutions of these problems by using the tools of strategic cost management. This study has used various methods such as, SWOT analysis, value chain analysis and cost driver analysis to analyze the situation of the tea estates of the country. A simulation analysis was also carried out. The simulation analysis mainly focuses on cost analysis of the poorly-managed tea estates and explains the structure of profitability after executing strategic decisions. This type of analysis is done to demonstrate the theoretical feasibility of the framework of the study.

The results of the regression analyses show that the independent variables (young, mature and old bush area) significantly influence the production of tea both in the well-managed and poorly-managed tea estates. The results of the regression analyses conclude that well-managed tea estates secure leading positions in Bangladesh by producing huge quantity of good quality tea. The well-managed tea estates are cost efficient due to highly motivated management and staffs, efficient workforce and apposite management of workforce, low maintenance cost of machineries and appropriate management of withering of green leaves. In addition, efficient maintenance of tea bushes and application of right quantity of insecticides helps the tea bushes to enhance production. It was found that the well-managed tea estates operated very efficiently and there was no bottleneck in the production process. Besides, these tea estates had enough capacity to tackle a crisis. The poorly-managed tea estates, on the other hand, had poor operating system especially in the area of carrying and processing of leaves and also in the stage of withering during the peak season. These created severe bottlenecks in the total operation process.

This study notes that strategic decisions are needed to improve the performance of poorly-managed tea estates of the country. The strategic alliance of the low performing tea estates could be the option in this respect. In Japan, cooperative farming model is widely practiced in the tea estates. A strategic cooperative alliance (SCA) model is developed in this respect adopting the concept of Japanese model with some modifications. This model shows that strategic cooperative alliance firms establish a common leaf processing facility. This model, if adopted, can reduce fixed cost related to the establishment of multiple factories. Besides, cooperative alliances model can use their common fund for land development and maintenance of tea bush, which may solve the problem of scarcity of resources.

A simulation analysis was done to portray the situation of strategic alliance gardens and poorly-managed tea estates. The poorly-managed tea estates were selected in the SCA model to construct a strategic alliance among them. Only small (less than 200 hectare) and low performing tea estates (yield 601~1000 kilogram) were selected for the simulation analysis. It was observed that the young bush area had significant influence on the production of tea. The objective of the SCA model was to minimize old bush area by replanting of tea bushes. Three poorly-managed tea estates were chosen to construct the strategic alliance among them. It was assumed in the model that the poorly-managed tea estates would operate efficiently like well-managed tea estates after the successful adoption of SCA model. The simulation model predicts that total production of a poorly-managed tea estate would be 99,962 kilogram (100 ton) if no strategic initiative is taken. The simulation model predicts that unit cost of black tea of

the poorly-managed tea estates would be 91.09 taka per kilogram. Average selling price of the poorly-managed tea estates would be around 62.70 taka. The model predicts that a poorly managed tea estate would operate with a loss of 2,837,762 taka. A strategic grower in the SCA model, on the other hand, could sell 937 ton of green leaf to the central leaf-processing center with a price of 9.10 taka per kilogram. The price includes 15% mark up on the cost of production of green leaf. Besides, the total production of black tea of the SCA gardens would be 647 ton per year. The cost per unit of black tea in the SCA model would be 52.33 taka per kilogram, which is much lower than the price of the poorly-managed tea estates. The average selling price of black tea of well-managed tea estates is 66.91 taka per kilogram which would be considered as the expected selling price of SCA gardens. The simulation model depicts that the central leaf processing center in the SCA model could obtain profit of around 9,427,826 taka per year.

The research also suggests that adopting the proposed analytical framework would provide additional insight and value into strategic planning and execution processes. The simulation results show the importance of focusing on process improvements. The simulation model depicts that SCA model may help the low performing tea estates to change their condition from loss making tea estates to profitable one. Moreover, gardens under the strategic alliance can secure brand image in the tea industry after adopting the SCA model which would help them to secure a strategic position in the tea market of Bangladesh. The SCA gardens can sell finished product to the auction market using a brand name. It is believed that the outcome of the study would help to strengthen the performances of the tea industry and tea businesses in Bangladesh. The model, which is proposed by the study, may be implemented in the sugarcane, tobacco, dairy and poultry industries of Bangladesh and other parts of the world.

Chapter I

Introduction, Objectives and Methodology

Agriculture commodities occupy a major portion of the international trade. Although many countries are gradually shifting towards industrial activities, agro-based industry still plays an important role on their economy. The agriculture products of the developed countries mainly comprise food grains like wheat, rice and other coarse grain and they comprise a sizeable fraction of their export. On the other hand, the developing countries of the world export agricultural commodities such as, tropical beverages (tea, coffee, cocoa), bananas, sugar, oilseeds and natural rubber to the developed and developing countries. For example, Malaysia is the largest producer and exporter of palm oil and this country holds third position in rubber production. Similarly, sugar is the main export item of Mauritius and it comprises about 56% of the total agricultural output of the country[1].

China, India, Sri Lanka and some other Asian countries such as, Bangladesh and Indonesia are the major exporters of tea. The coffee market, on the other hand, is dominated by the Latin American countries. It can be observed that from 1990 to 2000 the balance of trade in agricultural products such as fruits, tea, vegetables, coffee and

cocoa was quite favorable for developing countries (Figure 1.1). There also exists competition in price among these products. The demands for these products are almost constant which may be due to the low population growth of the major importing countries. A reverse situation can be observed in cereal consumption in the developing countries (Figure 1.1). The demand for cereal in the developing countries fluctuates due to the scarcity of food. An introduction of an effective value chain management system with an emphasis on strategic cost management could help the developing countries to boost their share of export market.

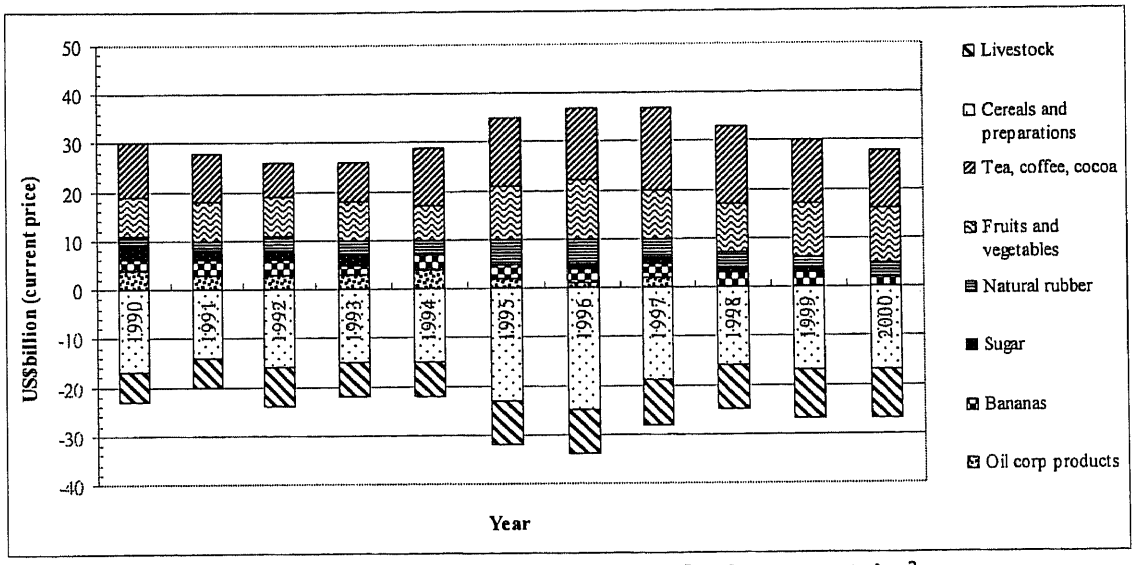

Figure 1.1: Trade balance of developing countries[2]

The tea drinking habit actually started in 2737 BC, when the Chinese Emperor, Shennong, drank hot water with a mixture of dried leaves accidentally from a tea plant unknown during that time[3]. This tea drinking habit later on spread to Japan. Still now, the Japanese people consider Eisai, a Buddhist priest, as the 'Father of Tea' in Japan, due to his significant contribution in spreading of this habit to the Japanese[4]. Gradually,

tea-drinking habit had become a ritual in Japan[5]. This habit was gradually taken up by the Dutch and English people[6].

During the British regime plantation of tea had extended in India, Sri Lanka and Bangladesh. The colonial British administration started tea plantation in the Indian subcontinent at the beginning of nineteenth century. Gradually, the tea industries of the sub-continent have become a major producer of tea in the world. According to a recent report, India, Bangladesh and Sri Lanka accounted for 55% of the total world production of tea[7]. In recent years, the dominance of these countries in the world tea market had declined as some other countries like Kenya, Indonesia, Vietnam, and Malawi are coming up with good quality tea with quite competitive price. At the global level, tea industries are facing several problems such as, rise in the production cost, market stagnancy and sometimes reduction of price. The tea market had observed a stagnant period in the recent years as the world demand and supply gap was not very big. Sometimes an excessive supply of tea dulls the market. For this reason, quality actually counts much in the tea market rather than the quantity of production. It has been observed that the average market price of tea was 1.35 US dollar in 1992 and this price had dropped to 1.24 US dollar in 2002[8].

The strategic cost management is an outcome of the amalgamation of the value chain, strategic positioning and cost driver analysis[9]. Among these three core concepts, value chain analysis has a significant influence on other concepts of strategic cost management. A study introduces the concept of value chain for the strategic improvement of firms[10]. This concept is further developed[11]. It is observed that the core

idea of value chain is linked to the set of value creating activities all the way from basic raw material sources to component supplier through the ultimate end-use product delivered to the final consumers' hands[12]. It observed that if the value chain can be expressive, strategic decision can be made more easily depending on the understanding of the firm's competitive advantage[13]. It is observed that the basic choice of a business to compete either by having lower cost (cost leadership) or by offering superior products (product differentiation) [14]. These two approaches seek very different conceptual frameworks[15].

Strikingly, no studies were done on agriculture industry, especially on tea industry of Bangladesh, with an application of the strategic cost management. Some rigorous studies were done on agricultural economics and some other general issues of management[16], but these studies actually did not address the issues on strategic cost management.

1.1 Objectives of the Study

(a) The main objective of this study is to focus on the problems of the tea industry in Bangladesh. This study addresses and analyzes these problems from the perspective of management accounting. Although few environmental factors associated with tea production are examined, this study primarily concentrates on the non-environmental factors, which profoundly affect the production and quality of tea in Bangladesh. These factors are age of tea bush, yield, efficient management of cultivable land, total management of tea estates and cost consciousness etc.

(b) This study also examines the pattern of cost involved in tea production. It compares the level of cost in the process of value chain among the various tea estates and attempts to investigate the performances of the tea estates. It is expected that the analyses done in this respect would assist to identify the factors acting behind the performance of good tea estates. It is further understood that these analyses would help the poorly performing tea estates to devise their strategies and fix loopholes in their production systems.

(c) This study focuses on the strategic solutions of these problems using the tools of strategic cost management. A model for the tea industry of Bangladesh is developed in this respect. In the proposed model, some efforts are made to simulate the conditions of the low performing tea estates. Besides, the application of this model in improving the overall condition of the low performing tea estates is also examined.

1.2 Background of the Study and Research Gap

Tea is a major cash crop as well as constant export earner of Bangladesh. This industry is an agro-based labor-intensive industry of Bangladesh and has significant influence on the national economy. The tea industry of Bangladesh occupies about 2% of the total world production and 1% of the total world export[17]. Between 1970 and 1980, tea industry played a significant role on the economy of Bangladesh by earning huge foreign currencies. The emergence of garments industry in the 1980s has gradually dwarfed the export performance of the tea industry of the country.

The first tea garden was established in 1857 at Malnicherra[18], two miles away from Sylhet town of Bangladesh, and it is situated in the north-eastern region of Bangladesh. This was actually the beginning of tea plantation in Bangladesh. Most of the tea gardens of the country are situated in the north-eastern (Sylhet, Moulvibazar and Habigonj districts) and south-eastern parts (greater Chittagong districts) of Bangladesh. At present there are very few newly established smallholding tea gardens operating in the north-western part of Bangladesh. The British companies were the pioneer of tea plantation in Bangladesh. By 1903, there were 15 European planters in Northern Sylhet, 102 in Southern Sylhet and 26 in Habigonj district situated under the Greater Sylhet district[19]. In 1947, Bangladesh acquired 103 tea estates from the then British government. The total tea plantation area at that time was 28,734 hectare and the annual production was 18.36 thousand ton with a yield of 639 kilogram per hectare[20].

At present, there are 162 tea estates in Bangladesh and these include the smallholding tea estates of the north-western part of the country. Of the 162 tea estates, Sterling Companies[21] operate 28 tea estates and on the other hand, Bangladeshi owners operate 134 gardens. These Bangladeshi owners are Bangladesh Tea Board, National Tea Company, private limited companies, proprietary owners and some smallholding managements. The Sterling Companies control the 'A' category[22] gardens in Bangladesh. They also handle 49% of the total tea production by utilizing 39% of tea plantation area. The productivity and quality of management of these companies are far better than the majority of the Bangladeshi local companies. Starling Companies produce 1,543 kilogram of tea per hectare, whereas the average yield of the Bangladeshi companies and proprietary estates are only 1,064 kilogram per hectare[23].

Tea industry of Bangladesh shows a positive trend of growth in tea production in the previous years. The export of tea slows down due to the high domestic consumption of tea in Bangladesh. In terms of quantity, 22.68 thousand ton was exported in 1999. The quantity of export decreased to 11 thousand ton in 2004[24]. The demand of tea in the market of Bangladesh increases at the rate of 3.5% each year and the supply of tea on the other hand, increases at the rate of 1% each year. If this trend continues Bangladesh may have to import tea from foreign countries after 2015[25].

The production of tea in Bangladesh is quite inadequate due to low productivity. A study observes that yield per hectare in Bangladesh was 1,145 kilogram in 1998, whereas total yield in India and Sri Lanka was 1,708 and 2,030 kilogram per hectare respectively[26]. Age of tea bush, poor management of green leaves after plucking, non-utilization of suitable area in the tea estates especially in the low performing tea estates have direct bearing on low productivity. About 42% of total cultivated tea area of Bangladesh has old bushes (more than 41 years) and due to inefficient management and lack of capital 11,546 hectare of land suitable for tea plantation is left outside the tea plantation area[27]. In addition, a large number of poorly developed gardens (sick gardens[28]) faces low production and high cost due to the lack of financial support from government. The poor conditions of these non-functioning gardens have negative impact on the total tea production. The tea estates of Bangladesh do not have strict cost management system and for this reason they do not know the actual cost of the product at each step of operation. Generally, the Bangladeshi companies consider that significant reductions of wage of the workers, reduction of number of labors, curtailment of salaries of the managers are some suitable and effective cost management

tools. They often adopt such strategies, and these efforts actually negatively affect the level of motivation of the employees and reduce the level of production as well.

Strikingly, no study was done on agriculture related industry, especially on tea industry of Bangladesh, with a focus on the strategic cost management. Few studies had focused on the tea industry with an emphasis on agriculture economics, socio-economic situation of the workers and management of tea industry. An intensive study has done on the tea industry of Assam. This study focuses on the productivity of tea and factors of production for example, effect of tea plantation area, labor hours, usage of fertilizer and age of tea bush in production[29]. A Stochastic Frontier Production Function model is employed to measure the technical efficiency of the tea industry in Assam[30]. This study mainly deals with the concepts of agricultural economics. It finally concludes that the high percentage of vacancy and old age bushes actually reduce the productivity of tea. It is opined that there exist a lack of proper training for the tea planters and further suggests that planters should be trained so that they can use infilling, replanting and replacement planting techniques and help to increase productivity[31].

An intensive investigation has done in the area of agriculture economics taking Sri-Lankan tea industry as an example. This study focuses on the productivity of tea and it also discusses the size of tea gardens, management of gardens and environmental factors of two major tea zones in Sri-Lanka. This research concentrates on the factors of production like land, labor and use of fertilizer in two tea zones in Sri-Lanka. It is further observed that rainfall and altitude have direct affect on the production of tea in Sri-Lanka. This research uses various methods such as, returns to scale, input-output

model to analyze the data and finally recommends privatization of the tea estates and segmentation of land for zones[32]. A study focuses on the competitive advantage of tea production and performances of firms. It is observed that there exists significant intra-industry heterogeneity within the value added aspect of tea industry in Sri Lanka. There also exists a significant difference within the groups both in terms of resource and strategy based sources of competitive advantage. It is suggested that it is essential to move from the usual strategic groups that are based on the strategies of firms. This study also suggests take up unique resource and strategies for the firms[33].

A deep study examines the working conditions of tea estates in Bangladesh and focuses on the socio-economic and health condition of the workers which adversely influence the productivity of the workers. This study attempts to look at the relationships among productivity and other socio-economic factors such as socio-cultural and religious barriers; geographical isolation and bonded nature of workers, very low education and poor health status of the workers; extremely inadequate wages and fringe benefits; poor benefits; and unfavorable working conditions. It is concluded that in addition to the above factors, absence of reproductive health facilities, absence of schooling facilities and lack of plucking facilities affect the productivity of female workers[34].

A rigorous study on small scale tea production in Kenya focuses on value chain of tea and cocoa industry and investigates how the market condition affects the livelihood of vulnerable people. It is observed that there exist problems of overstaffing, ineffective management and limited investment to modernize machineries in Kenya. In addition, this study observes that the quality of leaves varies within the regions and this in turn

affect the quality of processed tea in Kenyan Tea Development Agency (KTDA). Moreover, it is observed that road communication creates adverse affect on the collection of green leaf which threatens the existence of KTDA system in Kenya[35].

From the above review and analysis, it can be concluded that no research in the past had focused on the cost management issues especially on strategic cost management issues of the tea industry in Bangladesh. The present study attempts to fill the research gap in this respect.

1.3 Scope of the Study

This research focuses on the issues of strategic decision making of the tea industry of Bangladesh. It addresses the issues on cost analysis using tools of strategic cost management and suggests strategic model for the low performing tea estates in Bangladesh. It has dealt with the issues like world demand and supply of tea, factors affecting production and production and price of tea and gradually narrowed down its focus on Bangladesh. The prime focus of this study was to address cost management of the tea industry of Bangladesh. In doing so, it has addressed and examined various types of costs associated with tea production and side by side put forwarded a model which may be adopted for solving the problems related to strategic cost management that are being faced by the tea industry of the country. The scope of the study in this respect is structured in Figure 1.2, which concentrates on the world tea production, consumption, demand and supply and side by side addresses the production and cost aspects of the tea industry of Bangladesh. This simple model, which is formulated to understand the intricate relationships among many aspects of tea industry in the world, concentrates on

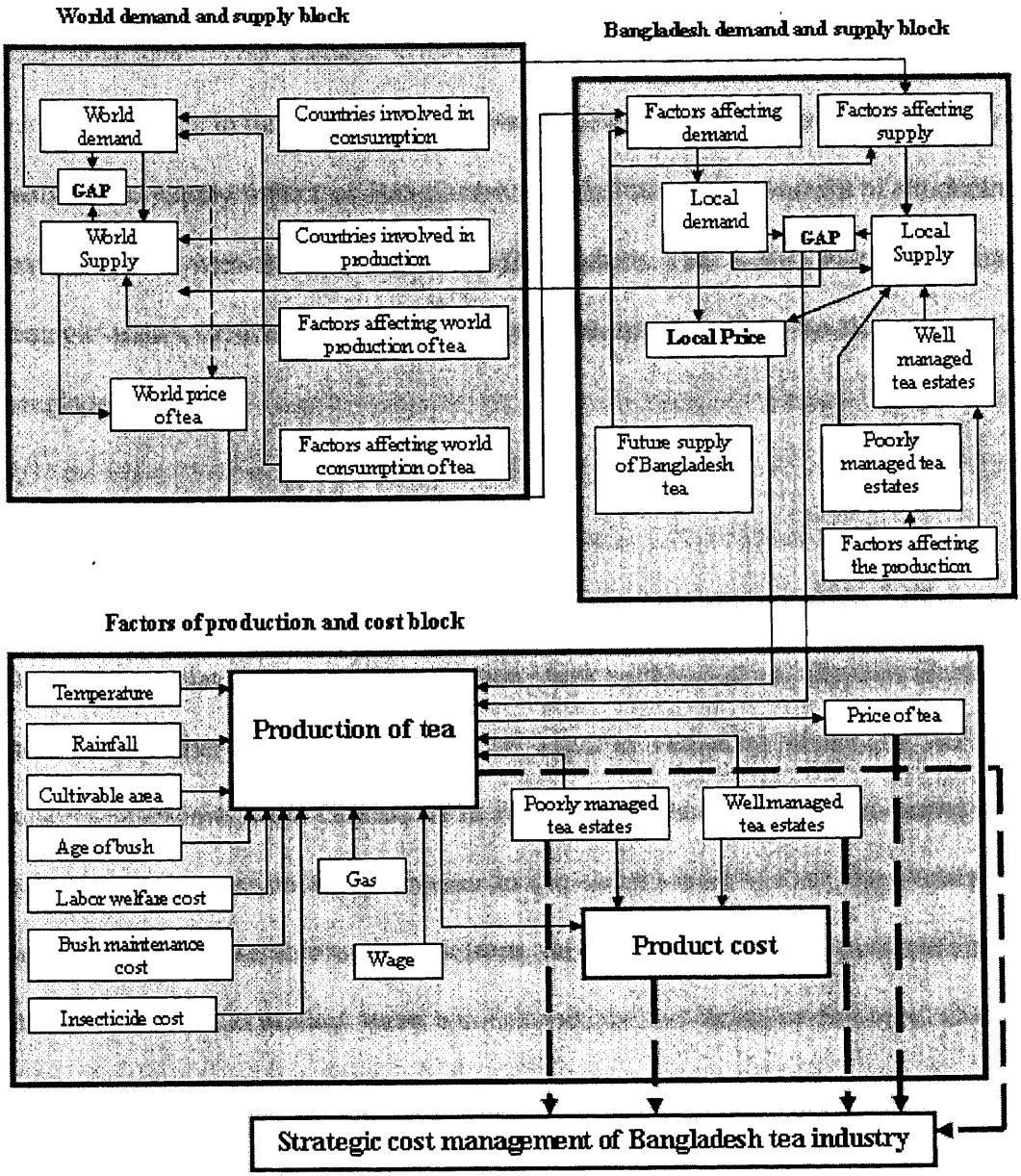

Figure 1.2: Production and cost block of tea industry in Bangladesh

world demand and supply of tea, demand and supply of tea in Bangladesh, and related factors of production and cost. The world demand and supply issue, which is mentioned in the model, addresses the issues like world production, export, consumption and prices of different auction markets. These factors actually affect the demand and supply of tea

in Bangladesh. In addition, performances [36] of the well-managed [37] and poorly-managed [38] tea estates affect the supply characteristics of tea industry in Bangladesh. This in turn affects the auction price and performances of tea industry. The demand and supply aspect of Bangladesh also influences the factors of production and cost associated with the tea industry in Bangladesh. This model helps to evaluate the strategic issues, which facilitates to develop strategic model for the tea industry of Bangladesh.

1.4 Methodology of the Study

Both primary and secondary data were collected from the tea industry in Bangladesh. Primary data related to cost of production were collected from nineteen tea estates for three consecutive years using stratified random sampling technique. In addition, personal interviews were conducted in four tea estates using the judgmental sampling technique to investigate the problems in the value chain system. Secondary data on world situation were also collected from various internationally published materials. Moreover, two field studies were administered in the Japanese Farmers' Cooperative Association located in Shizuoka prefecture in Japan. The objective of the field surveys was to gather information regarding the manufacturing process, price-cost determination mechanism and value chain system, which exist in the Japanese tea industry.

1.4.1 Study Area, Sample Size and Sampling Method

There are 162 tea estates in Bangladesh. These tea estates are situated in seven tea valleys. These are: Balisera, Monu-Doloi, Juri, Lungla, Luskerpore, North-Sylhet and Chittagong. Among these valleys, the first six valleys are situated in the greater Sylhet

district of the north-eastern region of Bangladesh. The Chittagong valley is situated in the south-eastern district of Chittagong (Figure 1.3). The north-eastern part of

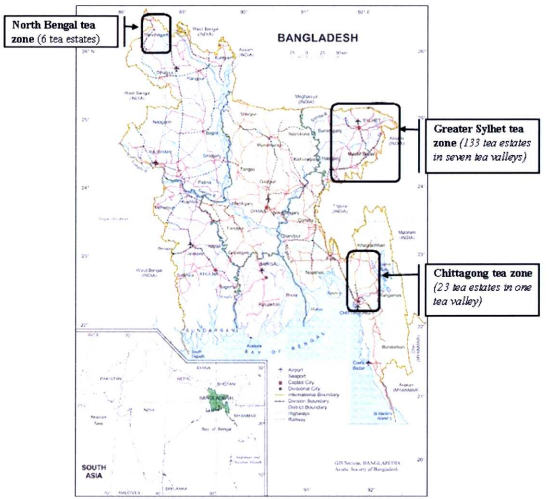

Figure 1.3: Tea zones in Bangladesh[39]

Bangladesh (comprises six valleys) have 133 tea estates. In addition, there are 23 tea estates in Chittagong valley. The Chittagong valley is situated in the south-eastern part of Bangladesh. It may be mentioned here that in recent time six more tea estates have been established in the north-western part of Bangladesh (Figure 1.3). The tea estates are situated in the north and south-eastern part of Bangladesh and they produce major portion of tea of the country. For this reason, this area is purposefully selected for study.

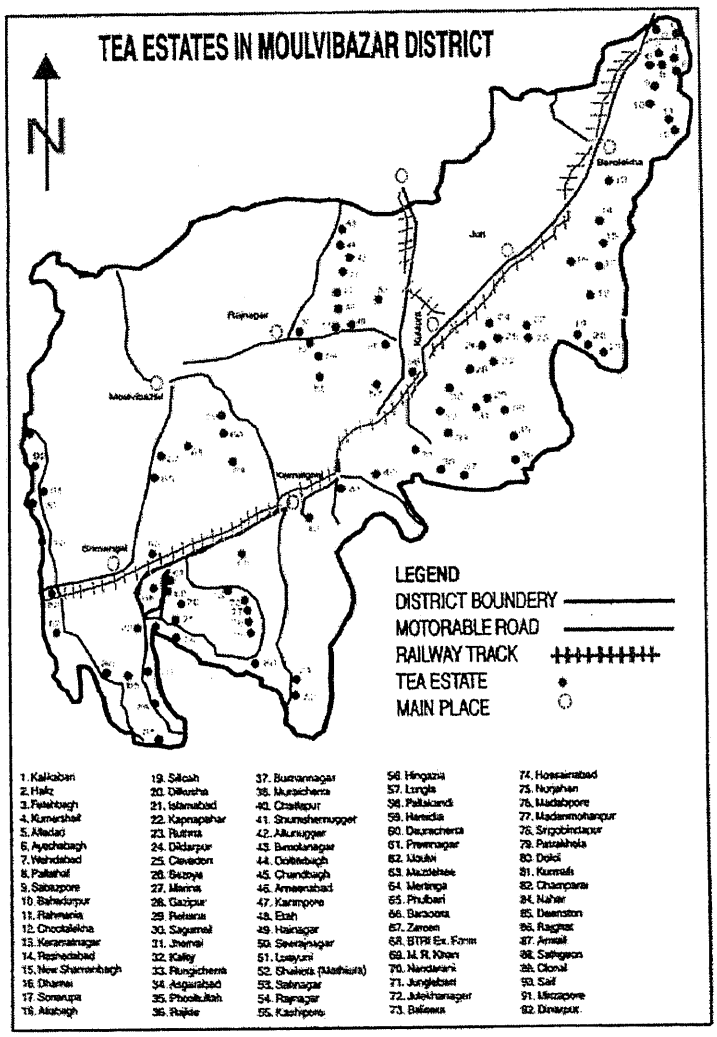

Figure 1.4: Tea estates in Moulvibazar district[40]

Moulvibazar district of Bangladesh has ninety tea estates. Among the seven tea valleys, four tea valleys (Balisera, Monu-Doloi, Juri and Lungla) are located in this district. The location of the tea estates in the Moulvibazar district is shown in Figure 1.4.

In addition to these, there are two tea valleys namely, Luskerpore valley and North-Sylhet valley. These valleys have 43 tea estates. These two valleys are located in Habigonj and Sylhet district of Bangladesh. Figure 1.5 depicts the location of the tea estates in these valleys.

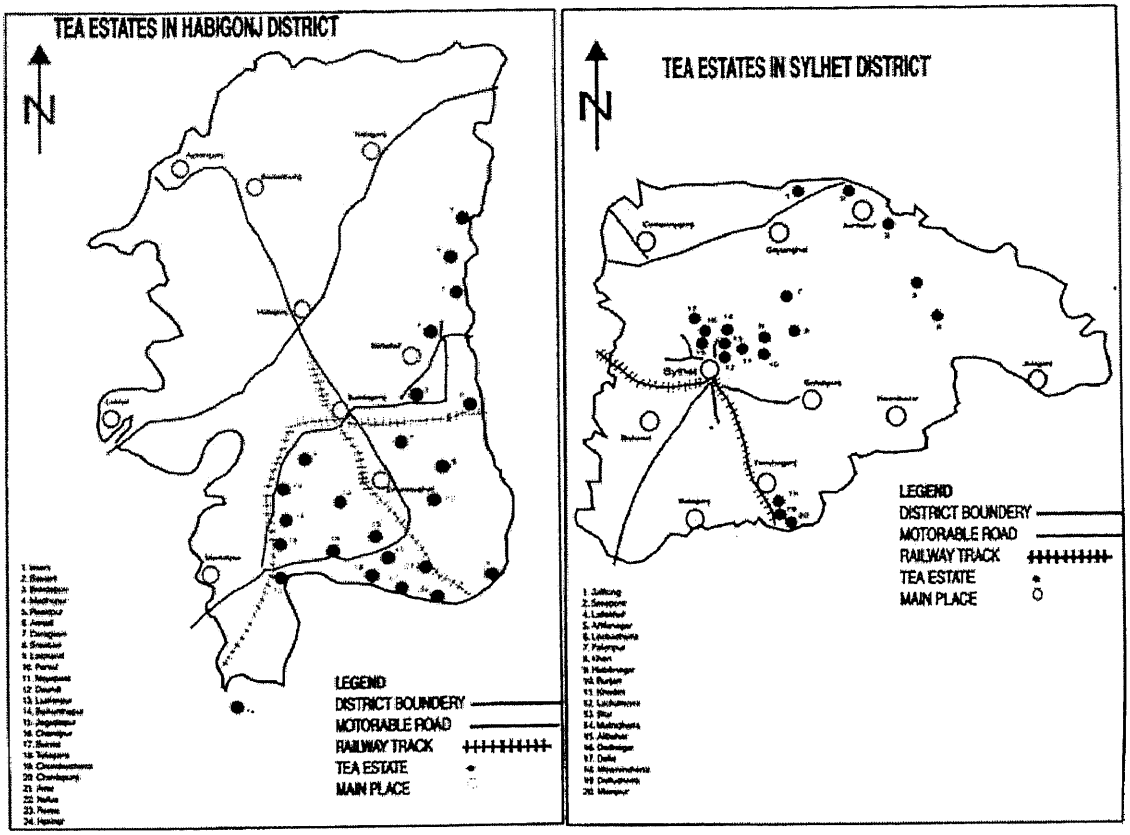

Figure 1.5: Tea estates in Habigonj and Sylhet districts[41]

There are 23 tea estates in the Chittagong valley. This area is located in the greater Chittagong district of Bangladesh. The location of the tea estates in the Chittagong valley is shown in Figure 1.6.

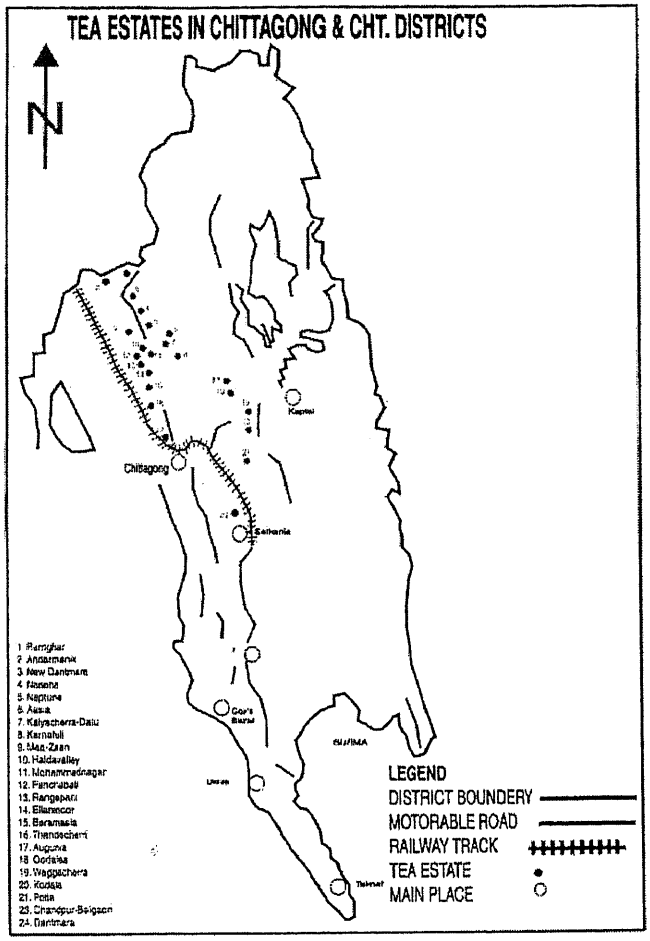

Figure 1.6: Tea estates in Chittagong valley[42]

This study also carried out a questionnaire survey. A structured questionnaire survey was administered into nineteen tea estates for collecting data related to cost of production of tea for three consecutive years and the cost related to value chain of the tea industry in Bangladesh. There are 156 tea estates in the study area and a stratified random sampling technique has been applied to select nineteen tea estates from the study area. Let us assume that a population has N elements divided into k strata with N_1 elements in the 1^{st} stratum, N_2 elements in the 2^{nd} stratum, and N_k elements in the Kth stratum, where $N_1+N_2+.....N_k = N$. In case of stratified sampling method, random samples of size n_i $(i=1,2,3....k)$ are drawn from the k strata and combined to produce the

total sample of size n where $n = n_1 + n_2 + \ldots\ldots n_k$ [43]. The tea estates of Bangladesh are located in seven tea valleys. In this study, each valley was considered as a stratum. A stratified random sampling technique was administered to select the location of the tea estates based on the strata. However, the yield of the tea estates[44] was deemed as the level of performance. The ownership structure and level of performance of the tea estates were taken into consideration while selecting samples from the study area. The detail distribution of the sample gardens is shown in Figure 1.7 and Figure 1.8. Moreover, data were collected using questionnaires from four tea estates situated in Moulvibazar district. These four tea estates were selected using judgmental sampling technique depending on the ownership structure and level of performance. The survey focused on the cost incurred in the value chain of the tea estates and the associated problems in the system of value chain. Two manufacturing plants of green tea in Japan were surveyed to investigate the ideas of strategic decision making of the plants, which might be incorporated in Bangladesh. The field survey focused on the manufacturing system of green tea in Japan, value chain process and the price-cost determination mechanism. All these ideas helped to develop strategic model for the tea industry in Bangladesh.

Secondary data related to factors of production like granted area, tea area, suitable area for extension, age of tea bush, production, human resources, availability of facilities were collected from available published sources in Bangladesh. Environment related data like rainfall, temperature were collected from various reports of Bangladesh Bureau of Statistics and Bangladesh Tea Board. Moreover, data related to the price of auction, volume of sales, sales values, export, import and production of tea were collected from

various materials published by National Brokers Limited in Bangladesh, International Tea Committee and Japanese Tea Association.

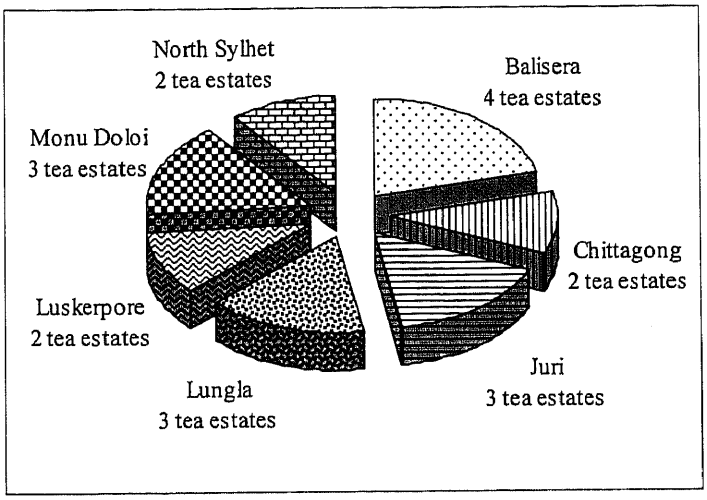

Figure 1.7: Distribution of sample tea estates and the tea valleys[45]

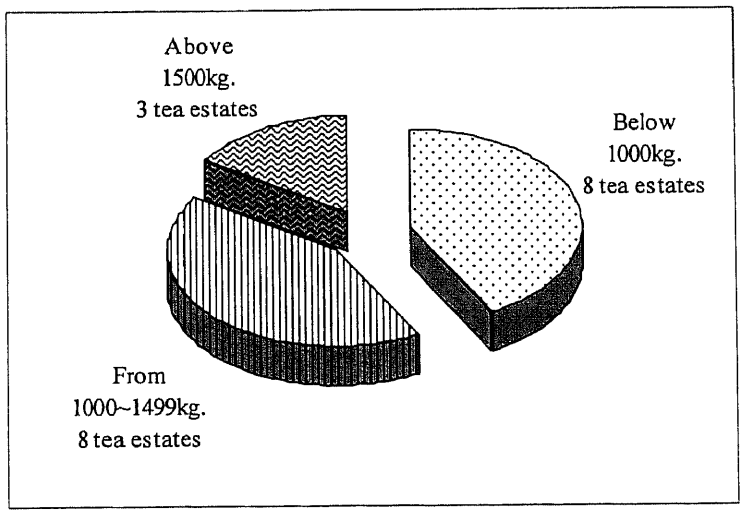

Figure 1.8: Distribution of sample tea estates depending on yield per hectare[46]

1.4.2 Data Analyzing Techniques

Tables and figures help to visualize data and information. This study has used these tools. In addition, complex statistical analyses such as correlation and regression analysis were also administered. Strategic cost management tools like SWOT analysis,

value chain analysis and cost driver analysis were used to develop a model for the tea estates in Bangladesh. The strategic cost management tools actually helped to devise a strategic solution for the tea industry in Bangladesh. The simulation analysis adopted in this study primarily focuses on cost analysis of the poorly-managed tea estates and explains the structure of profitability after executing strategic decisions. It is used to demonstrate the theoretical feasibility of the framework. The research also suggests that adopting the proposed analytical framework will provide additional insight into strategic planning and execution processes.

Correlation Analysis

Correlations analysis is a group of techniques to measure the strength of the association between two variables. The correction of these two variables is measured by correlation coefficient, which is known as Karl Pearson correlation coefficient. The coefficient of correlation describes the strength of the relationship between two sets of interval scaled or ratio scaled variables. Designated r, it is often referred to as *Pearson's r* and as the *Pearson product moment correlation coefficient.* It can assume any value from -1.00 to +1.00. A correlation coefficient of -1.00 or +1.00 indicated perfect correlation. There are zero correlation, weak negative or positive correlation and strong negative or positive correlation[47]. The basic and applied formula of correlation is given below[48]:

$$r = \frac{\sum(x-\bar{x})(y-\bar{y})}{(n-1)s_x s_y} \qquad \text{(Basic formula)}$$

$$r = \frac{n(\sum xy)-(\sum x)(\sum y)}{\sqrt{\left[n(\sum x^2)-(\sum x)^2\right]\left[n(\sum y^2)-(\sum y)^2\right]}} \qquad \text{(Applied formula)}$$

Where,

r = correlation coefficient

n = number of period of paired observations

x = independent variable x

y = dependent variable y

$\bar{x}$ = mean of independent variable

$\bar{y}$ = mean of dependent variable

s_x = standard deviation of independent variable

s_y = standard deviation of dependent variable

$\sum x$ = The x variable summed

$\sum y$ = The y variable summed

$(\sum x)^2$ = The x variable squared and the squares summed

$(\sum x)^2$ = The x variable summed and the sum squared

$(\sum y)^2$ = The y variable squared and the squares summed

$(\sum y)^2$ = The y variable summed and the sum squared

$\sum xy$ = The sum of the products of x and y

Regression Analysis

Regression equation defines the linear relationship between two or more variables. In this case, one variable is dependent variable *(Y)*, other variable is independent *(x)* variable, and it affects the result of *Y*. In other words, the dependent variable *Y* bases on the selected value of the independent variable *x*. The linear equation is given below[49]:

$$\hat{Y}=a+\hat{b}_1x_1+\hat{b}_2x_2+.....+\hat{b}_kx_k+\varepsilon$$

Where,

$\hat{Y}$= Dependent variable

x_1= Independent variable 1

x_2= Independent variable 2

$\hat{b}_1$ = beta coefficient variable 1 (net change in Y for each change in x_1)

$\hat{b}_2$ = beta coefficient variable 2 (net change in Y for each change in x_2)

Simulation Analysis

A simulation simply predicts the performance of an operations system under a specific set of inputs[50]. Simulation is not the only method of analyzing and improving operations systems. In particular, it might be possible to experiment with the real system or to use another modeling approach[51]. A study observes that simulation analysis is applicable in various fields such as manufacturing systems, food processing etc.[52]. A simulation analysis was administered in this study to predict the situation of the low performing tea estates and predicted the condition after adopting the model.

SWOT Analysis

SWOT stands for Strengths, Weaknesses, Opportunities and Threats. SWOT analysis is a framework for generating strategic alternatives from a situation analysis. The General Electric Growth Council used this form of analysis in the 1980's. Because it concentrates on the issues that potentially have the most impact on the organization or industry[53]. A SWOT analysis was done on the tea industry in Bangladesh to explore the areas which require strategic initiatives.

Value Chain Analysis

Value chain analysis is one of the major tools of strategic cost management, which is necessary for analyzing the sources of competitive advantage[54]. The value chain disaggregates a firm into its strategically relevant activities in order to understand the behavior of costs and the existing and potential sources of differentiation[55]. This study focused on the value chain analysis of well-managed and poorly-managed tea estates. In addition, this study explained associated cost of each process in the value chain for strategic decision making.

Cost Analysis

Direct costing is a method of internal reporting that emphasizes the distinction between variable and fixed costs for the purpose of better decision making[56]. This approach was applied to analyze the cost of each process of value chain in the well-managed and poorly-managed tea estates. This approach helped to identify the financial conditions of those tea estates. Activity based costing (ABC), which is a system that first formulates overhead costs for each of the activities of an organization, and then assigns the costs of activities to the products, services or other cost objects that caused that activity[57]. Activity-based costing is a common-sense method of assigning costs. Each organization that uses ABC, assigns costs in a manner that makes sense for the organization[58]. The ABC approach was used to simulate the cost of the low performing gardens. Cost drivers[59], which is a tool of activity based costing approach, were used to compare the financial situation of low performing tea estates and condition after adopting the model.

1.5 Organization of the Thesis

This thesis is divided into five chapters.

a) Chapter I of this thesis focuses on introduction, objective and methodology of the study, background of the study and research gap.

b) Chapter II contains a literature review on tea industry. The literature review section discusses the past studies done on the historical framework of the tea industry of Bangladesh, favorable climatic condition of tea plantation, comparison of global markets and other studies on tea industry.

c) Chapter III focuses on tea industry in Bangladesh. This chapter depicts the current trend of tea industry in Bangladesh, management structure of the tea industry of Bangladesh, factors which affect the production of tea and cost analysis of sample tea estates. This chapter also concentrates on SWOT analysis of tea industry in Bangladesh.

d) Chapter IV focuses on the strategic solution of tea industry in Bangladesh. Some strategic cost management tools such as, value chain analysis and cost driver analysis were used to analyze the situation of high performing and low performing tea estates. A simulation operation was conducted to evaluate the post implementation performance of low performing tea estates.

e) Finally, the concluding chapter (Chapter V) contains a summery and conclusion and discusses the scope of the applicability of the model in agriculture and related industries.

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[36] Performance of each tea estate in Bangladesh depends on the quantity of production rather than the quality of green leaf. It is observed that there is a link between altitude and quality of green leaf, and this may be observed in India, Sri Lanka or other tea zones of the world. Most of the tea gardens in Bangladesh are situated in the plain land or slightly hilly areas. Besides, geographical locations of the gardens are also same and which is why, in Bangladesh, the quality of green leaves does not vary due to the geographical locations of the gardens. Actually the quality of tea varies depending on the management of the gardens.

[37] *Well-managed gardens:* The yield of well managed tea estates is above 1,500 kilogram per hectare. Bangladesh Tea Board defines this type of tea estates for evaluating the performance of tea estates. Besides, high yield may have linkages with well management of tea estates like bush management, management of inputs, effective processing of green leaf and deployment of workers.

[38] *Poorly-managed gardens:* The yield of well managed tea estates is below 1,000 kilogram per hectare. Bangladesh Tea Board has given this definition. Low yield may have linkages with poor management of tea estates like bush management, management of inputs, effective processing of green leaf and deployment of workers.

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Chapter II

Literature Review

This chapter focuses on the theoretical aspects of the tea industry in the world and concentrates on the tea industry in Bangladesh. It contains the historical background of the cultivation of tea, environmental aspects of the plantation of tea, trends in the tea production and trend in the export and import of tea in the world market. In addition, this chapter reviews some previous studies on tea industry.

2.1 History of the Cultivation of Tea

There is a popular story about the invention of tea. This story is about the origin of tea drinking habit about five thousand years ago. A Chinese emperor, named Shennong (神農), who had some expertise in the area of science. The emperor used to drink boiled water and he believed that boiled water was safe for his body. He encouraged others to drink boiled water. One day, the emperor while on his way to a distant place, took a break in journey and ordered his servants to boil water for him. The emperor accidentally found few dried leaves in the boiled water before drinking it. The inquisitive and curious monarch took a sip of the brew. He liked the flavor and the restorative properties of this brew. It is believed that the idea of tea drinking started from this time[1]. The idea of tea drinking and the methods of the preparation of tea were

brought by few Japanese priests from China. The preparation and drinking habit of tea at that time, usually observed among the people of various religious groups. The first tea was brought from China in the form of small cake, made from tea leaves. From the ancient literature, it is gathered that the first batch of tea seeds were brought in 805 by a priest, named Saicho (最澄). A year later, a priest named Kukai (空海), brought another batch of tea seeds. Tea became a popular drink among the royal people when Emperor Saga (嵯峨天皇) encouraged to grow tea plants in Japan. The seeds of tea were imported from China and cultivation of tea began afterwards. In 1191, a famous Zen priest, named Eisai (栄西), while returning from China, brought few seeds of tea plants in Kyoto. The oldest specialty book on tea written in Japanese titled, *kissa yojouki* (喫茶養生記: How to stay healthy by drinking tea) was written by him. He gave encouragement to Japanese people to drink tea by his writing on tea[2]. For his writing on tea, he is considered as the 'Father of Tea' in Japan[3].

The idea of tea and the taste of it were unclear to European prior to sixteenth century. Europeans did not even know the procedure of preparation of this refreshing drink. The first European, named Jasper de Cruz, after knowing much about tea, wrote it in 1560. The Portuguese government had interest about tea through his writing and they gained the first right of trading tea with China afterwards. They invented a route and shipped tea from China to Lisbon. Several Dutch ships had carried the imported tea to France, Holland and other Baltic countries. Few years later Dutch navy gained the right of trading tea around the area in the Pacific Ocean[4]. The Dutch people were actively involved in trading of tea in the western countries until 1650. The British tasted tea at first when the samples of tea arrived in England between the year 1652 and 1654. Tea

became the national drink of England within a short period of time and held the position of ale which was most popular drink during that time[5].

China was probably the sole supplier of tea in Europe and they refused to renew the contract with England in 1833. The refusal had created adverse pressure on British tea market. The per capita consumption of tea rose to 1.2 pound at that time. England had no other choice other than searching various locations like Indian highlands (British Colony) for the supply of their tea. The control of tea plantation, production and distribution became an important part of British Colonialism in the mid of nineteenth century for few reasons: breaking the monopoly of China, galloping expansion of market in Europe and ensuring constant source of supply of tea. They looked for supply of tea from Indian region as tea could not produce in England due to unfavorable climatic condition[6].

A committee was set up by Lord Willam Bentik to find out the feasible location of cultivating tea in the Indian highlands. In a report in 1834, the committee suggested feasible area to cultivate tea were the north-eastern and southern part of India[7]. These places are known as Nilgiri and and Western Ghats in India (Figure 2.1). Tea was planted in Darjeeling at first in 1855[8]. By 1895, there were about 56 Sterling companies operated in India and their paid-up capital was more than Rs.[9] 69 million. They produced around 58.5 million pounds of tea during that time[10]. The plantation of tea was controlled by the famous British Companies like Duncan Brothers, Willam Magor, Alex Lawrie and James Finley[11].

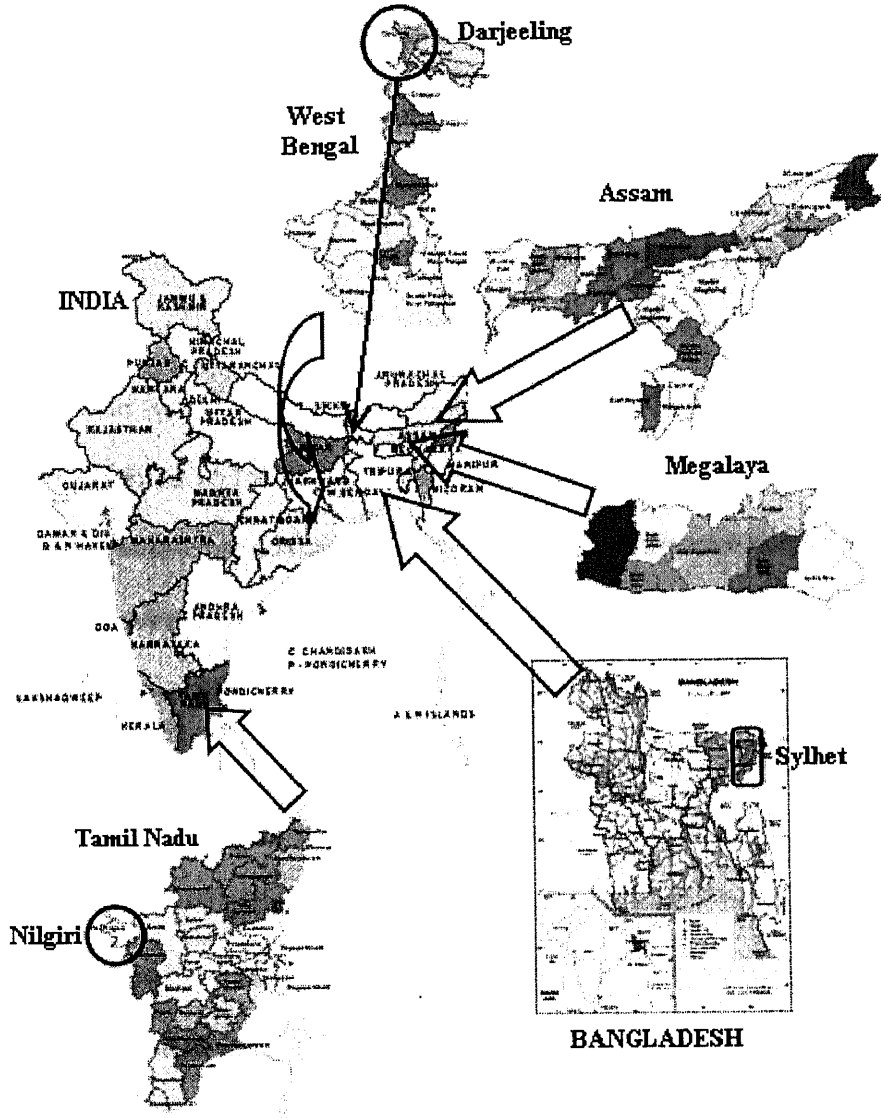

Figure 2.1: Tea zones in the Indian subcontinent during nineteenth century[12]

Bangladesh occupies only a tiny part of tea production. The tea cultivation in Bangladesh had emerged concurrently with the tea plantation in north-eastern part of India in the early nineteenth century. The first tea garden was established in 1857 at Malnicherra, two miles away from Sylhet town, situated in the north-eastern part of Bangladesh. This was the beginning of plantation of tea in Bangladesh and the

expansion process has been continuing. The British companies were the pioneer of tea plantation in Bangladesh. By 1903, there were 15 European planters in Northern Sylhet, 102 in Southern Sylhet and 26 in Habigonj district of Sylhet. During the partition of India and Pakistan in 1947, the part of Bangladesh (the then East Pakistan) owned only 133 tea estates. The tea area at that time was 30,353 hectare and the yearly production capacity was 18,844 ton[13]. The export of tea from Bangladesh was low at that time due to high internal demand in West Pakistan. In 1971, after the liberation war[14] Bangladesh inherited 153 tea estates. The total tea plantation area was 43,398 hectare. Many gardens were closed after the war due to financial crisis and few gardens were undertaken by government at that time[15].

2.2 Environment and Tea Cultivation: Bangladesh Perspective

2.2.1 Influence of Environmental Factors on the Tea Production

Climatic condition of a country has very significant influence on the production of tea. Substantial and even rainfall play a vital role on the growth of tea bush. In addition, other climatic conditions like temperature, photo period and latitude determine the cropping season of tea. It is observed by the researchers that 1,270 mm annual rainfall is required for the cultivation of tea, unless there are alternative mitigation measures which may help in the growth of tea plant. It is also observed that average temperature below 12° centigrade, affects the production of tea. The optimum temperature for the cultivation of tea ranges from 12.7° to 28° centigrade. Otherwise, growth of tea is adversely affected. The cropping season varies from 5 to 12 months in the tea producing countries. It is observed that the countries within the latitude from 18° north and 21° south can pluck green leaf throughout the year. The countries which are situated outside

this range can pluck from 6 to 9 months only[16]. Table 2.1 depicts that the climatic condition and cropping seasons of major tea producing countries in the world.

Table 2.1: Cropping seasons and climatic condition of the tea zones of the world[17]

Location	Altitude	Latitude	Mean temp degree C[18]		Cropping seasons (months)
			January	July	
Hankow, China	48.8 meter	31° north	4.4	28.9	6-7
Tocklai, India	88.4 meter	27° north	15.6	28.3	8-9
Sylhet, Bangladesh	35 meter	24°54' north	18.3	28.3	9
Srimongol, Bangladesh	23.5 meter	24°19' north	17.8	28.3	9
Chittagong, Bangladesh	Sea level	22°16' north	19.4	27.8	9
Vientaine, Laos	91 meter	18° north	21.1	27.8	12
Kandy, Srilanka	503 meter	7° north	22.8	23.9	12
Nuwara Eliya, Srilanka	183 meter	7° north	13.9	15	12
Kericho, Kenya	2195 meter	0°	18.8	16.7	12
Bandoong, Java, Indonesia	607 meter	6° south	23.9	25	12
Cholo, Malawi	914 meter	16° south	22.8	16.7	10-12
Shizuoka, Japan	14 meter	34°58' north	6.1	25.7	6-7

2.2.2 Environmental Condition of the Tea Zones in Bangladesh

Location of Bangladesh

Bangladesh is situated by the side of the Bay of Bengal, surrounded by India and Myanmar. It is situated between 20°34' and 26°38' latitude (north) and 88°01' to 92°41' longitude (east). The total area of Bangladesh is 147,570 sq. km. The major tea producing zones in India like Darjeeling and Assam are very close to the border of Bangladesh. Bangladesh is primarily a flat country and most of its land is made by the alluvium of the deltas of Ganges, Brahmapurta and Meghna rivers. The north-eastern and south-eastern part of Bangladesh is hilly. Most of the tea estates are situated in those areas. About 75% of the land of Bangladesh is less than 3 meter above the mean sea level (MSL). The maximum elevation is 1,280 meter above the MSL, the Saichal Range, in Rangamati district[19]. There are three distinct seasons in Bangladesh. These are:

summer season (February to May), rainy season (May to October) and winter season (October to February). The winter season is usually dry and less humid as rainfall does not occur in this season.

Rainfall in Bangladesh

The annual rainfall varies from place to place in Bangladesh. In the north-western parts such as Rajshahi, annual rainfall varies from 1200 to 1500 millimeters. On the other hand, the annual rainfall in north-eastern part (Sylhet) is around 5,000 millimeters. The annual rainfall in the Chittagong region is not more than 3,000 millimeter. The extreme situation is observed in the northern part of Bangladesh. The annual rainfall varies from 1,100 to 2,000 millimeter (Figure 2.2). It is also observed that Mymensingh, Sylhet and Chittagong districts have more rainfall comparing to other districts in Bangladesh[20]

.

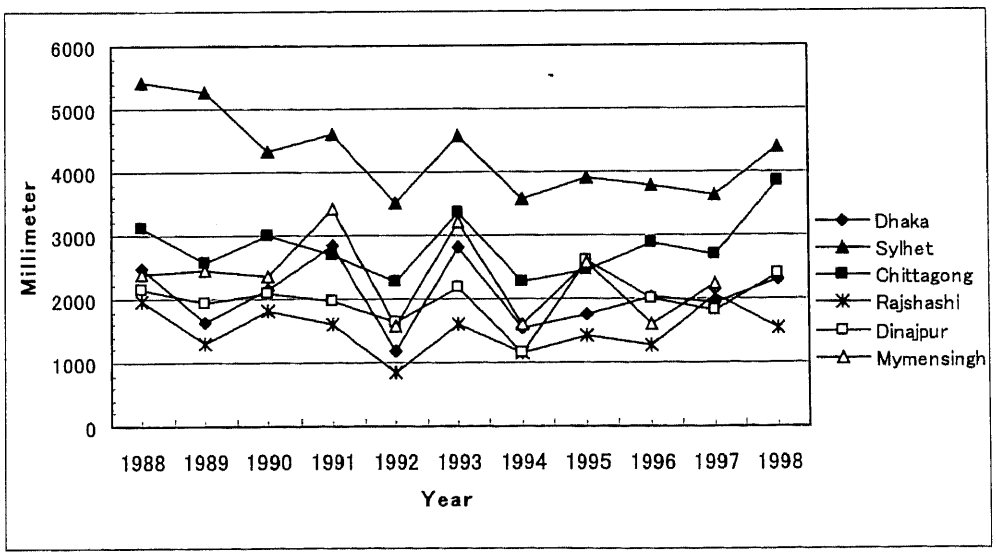

Figure 2.2: Annual rainfall in selected areas of Bangladesh

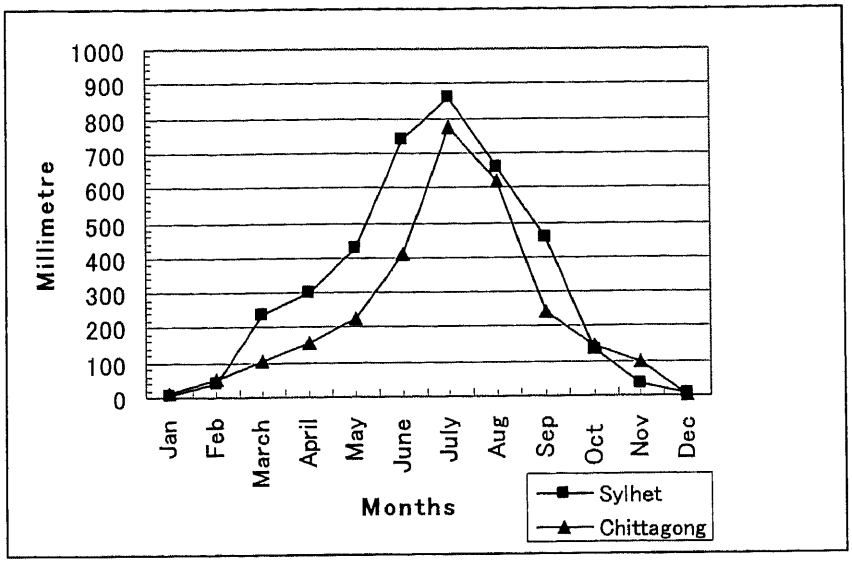

Figure 2.3: Monthly rainfalls in tea zones

Figure 2.3 depicts that Sylhet and Chittagong regions witness dry season from November to March and rainy season starts from April and continues till October. About 80% of the rainfall can be observed during June to September[21].

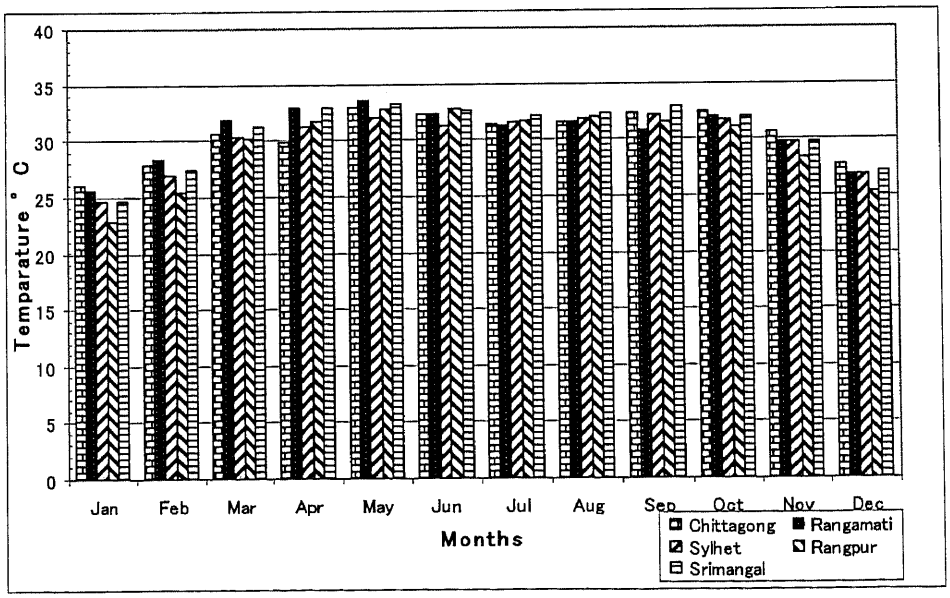

Figure 2.4: Monthly average maximum temperature

Temperature in Bangladesh

The temperature is highest in the month of April or May and it dips slightly during the rainy season from June to August. The temperature reduces gradually after the monsoon season. The winter season is observed from December to February. The average temperature is not very low when compared with the European countries and few other Asian countries like China or Japan. In Bangladesh, average temperature varies from 25° centigrade to 35° centigrade[22]. Figure 2.4 depicts month wise average maximum temperature of the tea zones in Bangladesh. The temperature in Srimangol (a district of Greater Sylhet District), which has large number of tea estates, is highest among various other tea plantation zones.

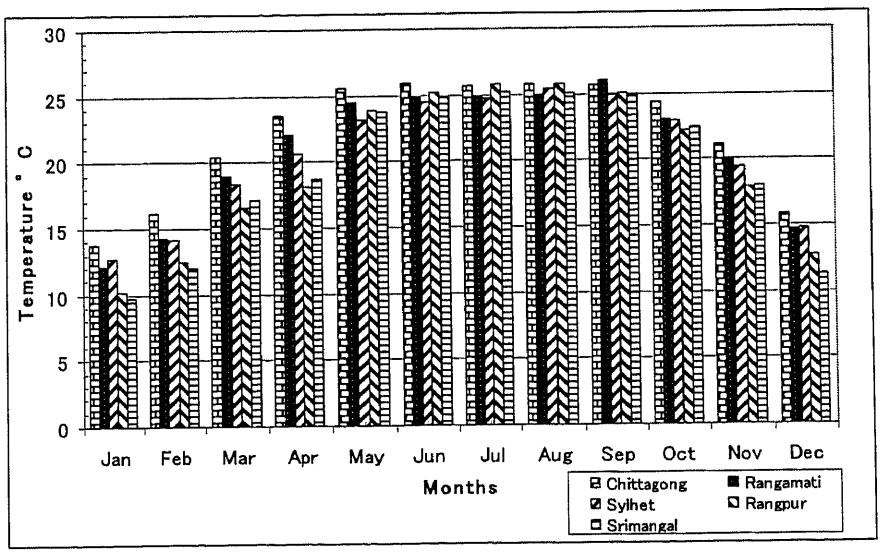

Figure 2.5: Monthly average minimum temperature

Figure 2.5 depicts average minimum temperature in the tea zones. It is also observed that the temperature in Srimangol is lowest comparing to other tea plantation regions in Bangladesh. The British companies established the tea estates in Sylhet region considering the environmental factors, like rainfall and temperature. Later the Chittagong region is found suitable for the plantation of tea. It is observed that there is a

scarcity of water in the tea estates during winter season. Surplus of water is observed during the rainy season which can also be seen in Figure 2.3.

A balanced rainfall is essential for the production of good quality leaf. The tea estates require mechanized irrigation system for healthy production of tea due to the lack of rainfall during dry season. It was observed that there was an absent of irrigation practice in the tea estates during winter season. The mean temperature of the Sylhet region varies from 19.96° to 30.38° centigrade and temperature of the Chittagong region varies from 21.98° to 30.50° centigrade[23]. This range of temperature falls outside the acceptable range (12.7° to 28° centigrade) for the good quality leaf production[24]. By effective irrigation practice and proper management of the shade tree in the tea estates, these problems can be solved[25].

2.3 Global Tea Market: A Comparison with Bangladesh

2.3.1 Trend in the Major Producing Countries

Asia leads the tea industry of the world. In 2005, the total tea production of the major Asian countries was 2,626 thousand ton, which was 82% of total production of the world. African countries, on the other hand, seized about 15% share of production[26]. Major tea production of the world is limited to only few countries, and among them China and India occupy a major portion of the share of tea production (28% and 20% respectively). Kenya, Sri Lanka, Turkey, Indonesia and Japan produce about 3% to 10% of the total share of production. In addition, Bangladesh, Malawi and Argentina contribute to some extent to this industry with a small share of around 2% for each country[27]. Figure 2.6 and Figure 2.7 depict the trend of tea production of the major

producing countries of the world. It can be observed that the production of tea in China, India, Kenya, Sri-Lanka, Vietnam, and Turkey are growing steadily with minor fluctuations.

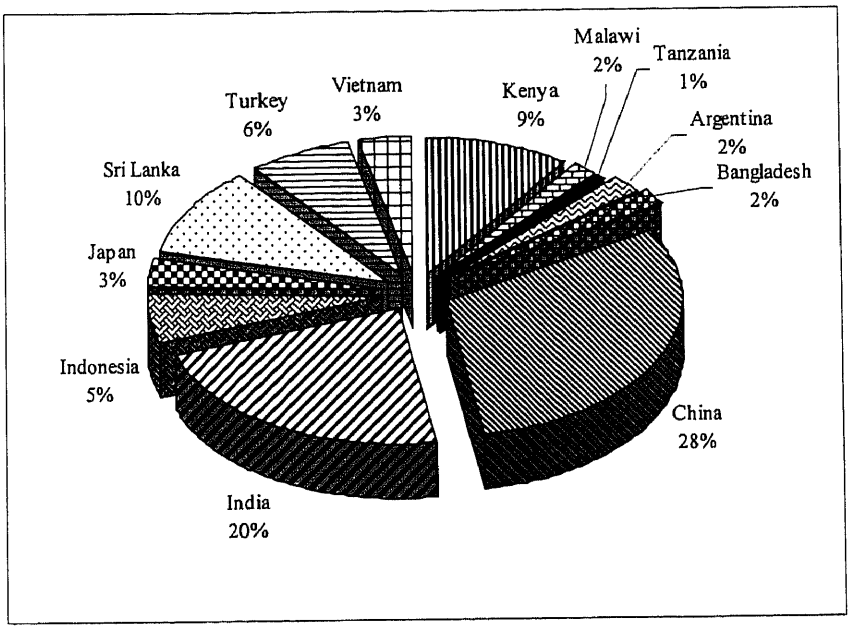

Figure 2.6: Share of major tea producing countries of the world

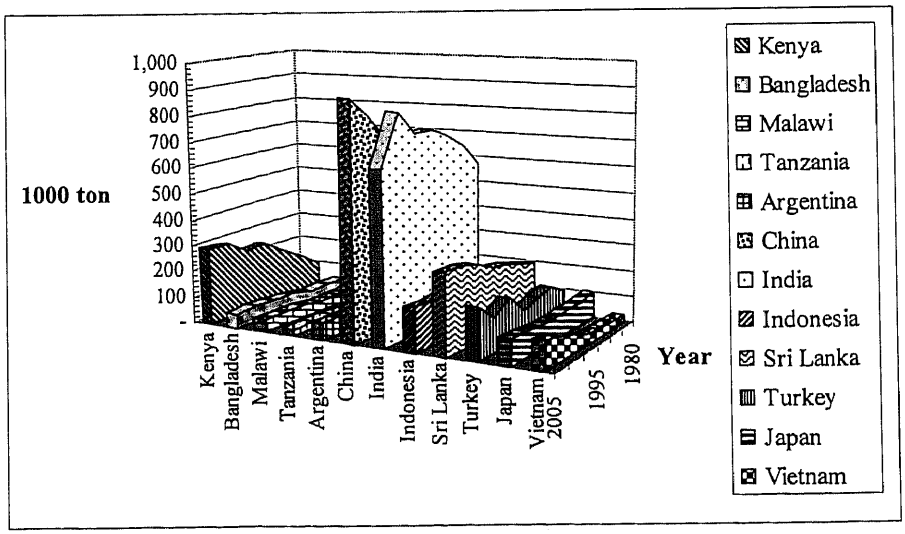

Figure 2.7: Trend in tea production: Major tea producing countries

2.3.2 Trend in Tea Export: Major Tea Exporting Countries

Sri Lanka holds 19% of the export market share. China and Kenya hold second position with an 18% of the market share. India, Vietnam, Indonesia and Argentina on the other hand, occupy 11%, 6% and 4% export share respectively. Bangladesh has less than 1% of the export market share and it seems that its export is gradually declining[28]. In Figures 2.8 and 2.9, the trend in the export of tea by the major exporting countries of the world is shown.

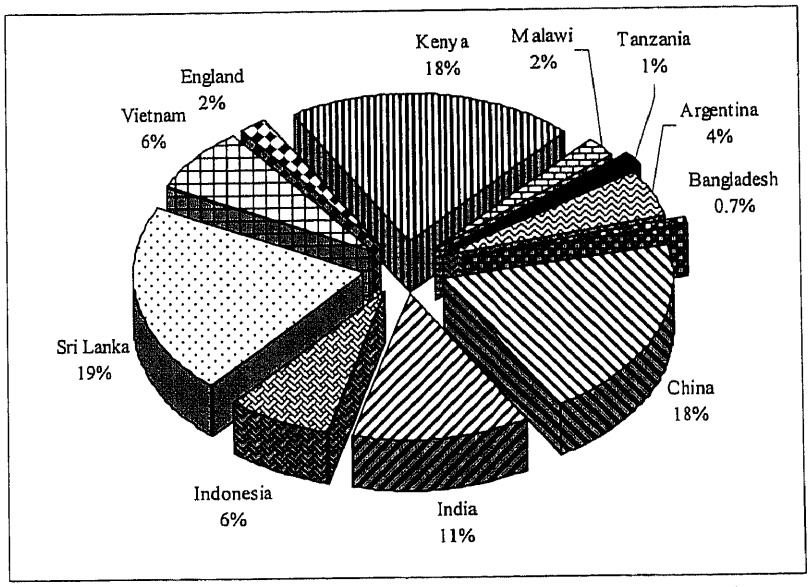

Figure 2.8: Share of the major tea exporting countries of the world

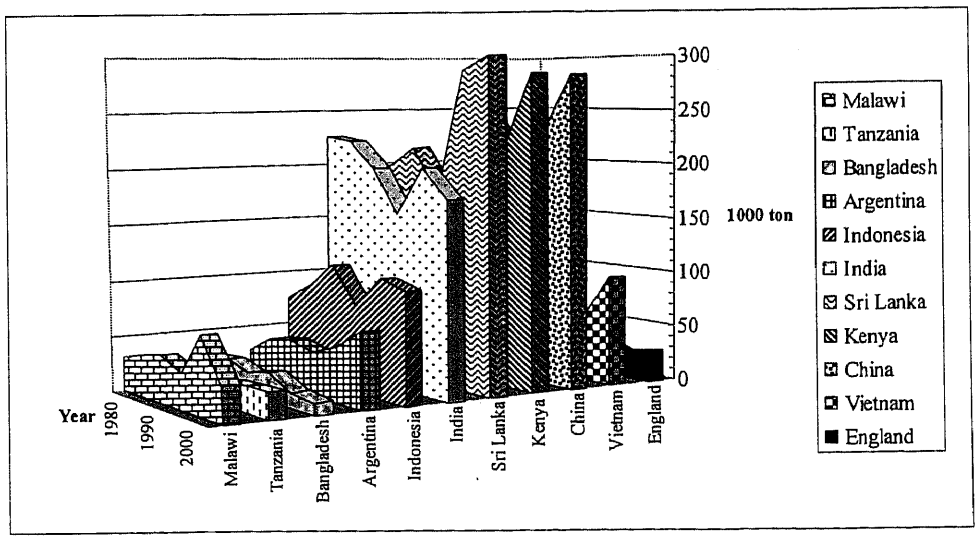

Figure 2.9: Trend in the major tea exporting countries of the world

The analysis of data generates some conclusions (Figure 2.6 and 2.8). Sri-Lanka leads with 19% export market share, though it has only 10% production share. Per head consumption of tea in Sri-Lanka is very high, which is 1.42 kilogram[29]. Actually, low number population steers Sri Lanka to secure this position in the export market. Low internal consumption in Vietnam and Argentina, on the other hand, help these countries to secure good positions in the export market.

2.3.3 Tea Importing Countries and Trend in Tea Import

Russia leaded imports of tea with 12% share in 2004. United Kingdom, Pakistan and United States, on the other hand, occupied 11%, 8% and 7% share respectively. In addition, Japan, Morocco and Germany are very lucrative markets for tea exporters. Japan held 4% share of import market. Morocco and Germany, on the other hand, held 3% share of the import market[30] (Figure 2.10). Figure 2.11 illustrates the trend in tea import by the countries of the world.

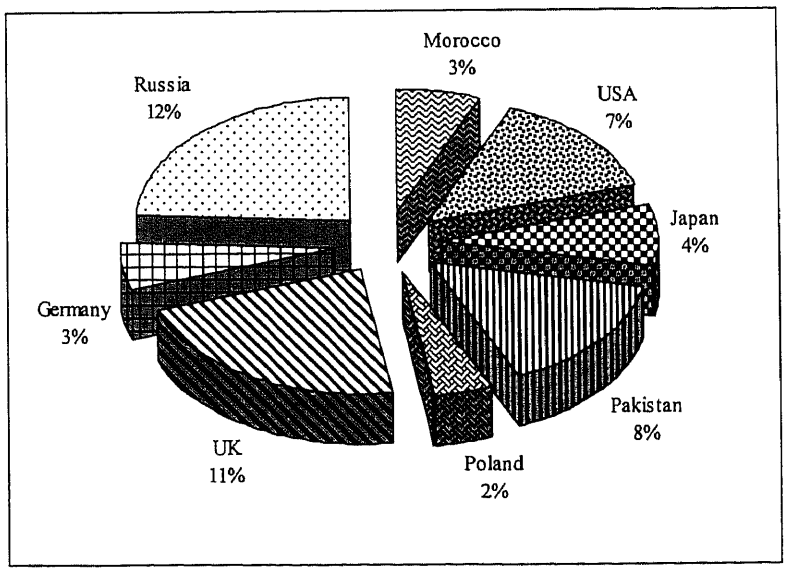

Figure 2.10: Share of major tea importing countries of the world

Russia, America and Japan are lucrative markets for tea exporters. Tea is sold to Russia in loose condition after packaging and in small tea bags. The market of tea bag is growing steadily in Russia. A survey observed that the market of loose tea in Russia dropped to 2% in 2004 and the market for tea bag secured 15% market share. Tea bags draw popularity due to the marketing campaign, which focuses on saving time and convenience in use[31]. In America, coffee grasps the major share of hot drinks, though popularity of tea is increasing gradually. Americans believe that tea is suitable during illness or leisure time. For this reason, the retail volume of selling tea is approximately one twentieth of coffee. The tea drinkers in America favor expensive tea, like herbal and green tea. They believe that these are healthy drinks[32]. The tea market in Japan, on the other hand, is growing steadily after the introduction of plastic bottles (PET bottles). The young Japanese are gradually becoming habituated with tea bags. At present, the market of tea bag is very promising in Japan[33].

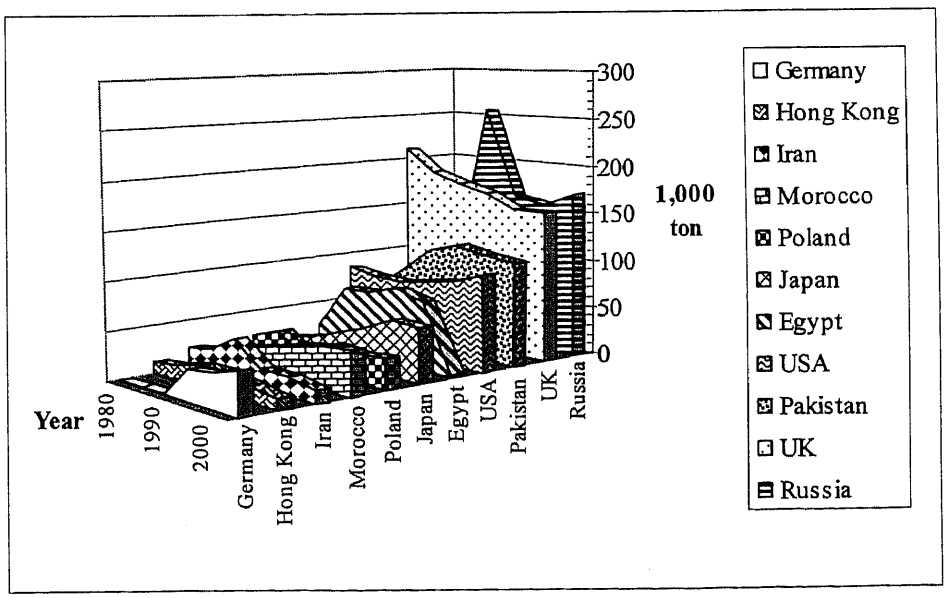

Figure 2.11: Trend of major importing countries in the world

It can be noticed from Figure 2.11 that tea export to United Kingdom is slowing down gradually (Figure 2.11). There is boom in the coffee market and coffee shops in United Kingdom. The appeal of tea products to the consumers seems to wane amid their new-found passion for coffee shops outlets and the spectacular rise in soft drink consumption. Consumers still buy tea products in lesser quantities. The market of premium products like fruit tea, herbal tea and green tea is expanding now in United Kingdom instead of black tea[34]. Moreover, there are few emerging markets of tea. The trend of growth of tea market in Germany is very significant among them. The promotion campaign positions tea as healthy drink for the consumers. As a result, the demand of black tea, green tea and other specialty teas draws attention of consumers in Germany[35]. The export of tea to Egypt is sharply declining since 1999, due to the foreign currency policy of the government keep foreign currency reserve to an optimum level by lowering import of tea and providing privileges to the local producers[36].

2.3.4 Price in the Auction Markets: A Comparison

Black tea is sold mainly through auction markets in South Asian and African countries by open bidding method. Brokers actually represent the buyers and sellers in the auction markets. On behalf of the bidders, tea tasters judge the quality of tea from each lot by tasting samples and price is determined accordingly. Due to the above mechanism in the auction market, good quality tea gets higher price comparing to inferior quality tea. It is observed that good quality green leaf helps to produce quality-processed tea. Furthermore, good garden receives higher price in the auction market of Bangladesh, through bidding process.

Figure 2.12 illustrates the trend in price of various auction markets of the world. It can be observed that tea produced in India received higher price in comparison to other markets. The prices of tea in the auction market in Sri-Lanka (Colombo) and Kenya (Mombassa) were also very remarkable. Tea in Bangladesh (Chittagong market) on the other hand, got lower than average price. Table 2.2 gives a picture of the price of black tea in various auction markets. The average price of tea in India was US dollar 2.07 per kilogram. This was the highest price in the auction markets. The Kenyan and Sri-Lankan markets had also remarkable prices, which are around 1.69 and 1.65 US dollar per kilogram respectively. The average price of tea in Bangladesh (in the Chittagong auction market) was only 1.22 US dollar per kilogram. It is understood that as low quality of tea is produced in Bangladesh, the price of tea is low in the auction markets. The poor quality tea produced in the country may have association with the poor management of the tea plants by the tea estates of the country. Old plants, for example, deter the production of good quality green tea leaves and finally quality of processed tea.

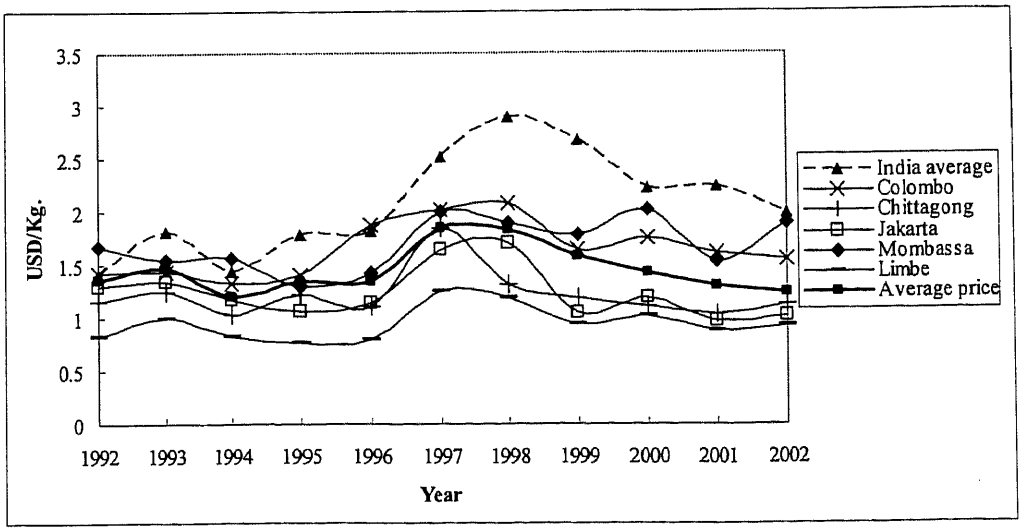

Figure 2.12: Price trend of major auction markets

Table 2.2: Price comparison among the auction markets[37]

Auction market	Country	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	Average
Calcutta	India	1.69	1.80	1.58	1.71	1.66	2.20	2.13	2.06	1.80	1.62	1.4	**1.79**
Guwahati	India	1.54	1.64	1.39	1.53	1.42	1.86	1.91	1.87	1.53	1.46	1.25	**1.61**
Siliguri	India	1.44	1.57	1.22	1.47	1.35	1.80	1.81	1.69	1.35	1.34	1.16	**1.50**
Cochin	India	1.35	1.43	1.1	1.3	1.26	1.70	1.8	1.44	1.18	1.11	0.99	**1.37**
Coimbatore	India	1.25	1.43	0.99	1.3	1.19	1.66	1.67	1.33	0.96	0.95	0.84	**1.27**
Coonoor	India	1.18	1.34	0.89	1.24	1.08	1.57	1.57	1.26	0.87	0.90	0.76	**1.19**
India average		**1.41**	**1.81**	**1.44**	**1.78**	**1.81**	**2.52**	**2.89**	**2.67**	**2.224**	**2.24**	**1.99**	**2.07**
Colombo	Sri Lanka	1.42	1.43	1.32	1.41	1.88	2.02	2.08	1.63	1.75	1.61	1.55	**1.65**
Chittagong	Bangladesh	1.16	1.24	1.03	1.22	1.11	1.85	1.31	1.19	1.12	1.04	1.12	**1.22**
Jakarta	Indonesia	1.30	1.34	1.17	1.06	1.14	1.65	1.7	1.05	1.20	0.97	1.01	**1.24**
Mombassa	Kenya	1.67	1.55	1.57	1.29	1.42	2.00	1.89	1.78	2.02	1.53	1.89	**1.69**
Limbe	Malawi	0.82	1.00	0.82	0.77	0.79	1.25	1.19	0.94	1.02	0.88	0.91	**0.94**
Average price		**1.35**	**1.47**	**1.21**	**1.34**	**1.34**	**1.84**	**1.83**	**1.58**	**1.42**	**1.30**	**1.24**	

(In USD[38] per kilogram)

2.4 Review of Literature on Tea Industries

There are very few studies on tea industry and most of the studies focus on the area of agricultural economics, general management and social welfare. An in-depth study focuses on the tea industry in Assam of India. The study focuses on the factors of production such as, tea area, labor hours, and usage of fertilizer and age of tea bush and their associations with tea production[39]. This study uses Stochastic Frontier Production Function model to measure the technical efficiency of tea industry in Assam[40]. This model addresses the issues and concepts of agricultural economics. It is concluded that high percentage of vacancy of land, and vis-a-vis existence of old bushes in the gardens actually reduces the productivity of tea in Assam. It is suggested that planters should be trained so that they can take initiatives such as, infilling, replanting and replacement planting in the tea estates[41]. This study helps to understand the field level problems associated with tea plantation, which further can help other studies to discuss various areas of tea production of the countries of the world for example, Bangladesh in this

respect.

An intensive study, taking Sri-Lankan tea industry as the case study, focuses on productivity and this study concentrates on the size of tea gardens, management and environmental factors of two tea zones in Sri Lanka. This study focuses on factors of production like land, labor and use of fertilizer in two tea zones of Sri Lanka. It also observes the affect of rainfall and altitude on the production of tea. Several tools of economics such as returns to scale, input-output model are used to analyze data. This study concludes that problems of tea estates can be addressed by privatizing the tea estates and segmenting the land[42].

An in-depth study focuses on the competitive advantage and performance of the firms in Sri Lanka. This study observes that there exists a intra-industry heterogeneity within the value added tea industry segments in Sri-Lanka. There exist significant differences within the groups in terms of both resource and strategy based sources of competitive advantages. It is suggested that it is important to redirect usual strategic groups, which is based on the strategies of firm, rather to incorporate both unique resources and strategies for obtaining success[43].

A study focuses on the working conditions of tea plantations in Bangladesh and addresses socio-economic and health condition of the workers, which is thought, have significant influence on the productivity of workers. It also attempted to examine the association among productivity and socio-economic factors. The socio-cultural and religious barriers are such as, geographical isolation, bonded workers, poor education

and poor health status of the workers, inadequate wage, fringe benefits, and lack of congenial working conditions. The study concludes that in addition to the above factors absence of reproductive health facilities, absence of schooling facilities and lack of plucking amenities affect the productivity of female workers[44].

A rigorous study conducts on small-scale tea production in Kenya. The research focuses on value chain of tea and cocoa industry and investigates how the market condition actually affects the livelihood of the vulnerable people. The study further observes that there are problems of overstaffing, ineffective management and limited investment to buy machineries in Kenya. It is further noticed that quality of leaves varies within the regions, which in turn affect the quality of processed tea of Kenyan Tea Development Agency (KTDA). Furthermore, this study observes that poor road communication has adverse affect on the collection of green leaf, which actually weakens the KTDA system considerably[45].

A study focuses on the scope of development of the Indian tea industry identifying competitive advantages in three core areas like corporate, subaltern production system and tiny enterprises. The study points five aspects for improving competitiveness of Indian tea industry such as markets, economic basis, technology, resource and institutional capacity. The study further observes three roads to development of tea industry in India such as, corporate road, entrepreneurial road and grounded praxis road[46].

A study on Indian tea industry stretches on diversifying the product of tea due to stagnation of market. The study emphasizes on value addition of black tea and green tea by adding herbs with existing products. The study stretches on exploring the markets for white tea, chamomile tea, aroma tea and bio-tea which could be the alternatives for the Indian tea producers to secure market[47].

Another study focuses on marketing strategy for Indian tea industry and suggests to initiate new marketing strategies. The study emphasizes on promoting the tea by giving more emphasis on packed tea and tea bags and there have been a significant growth in that area. The study further points on the scope of selling tea through vending machines in India, which is left unexplored[48].

A study focuses on determinants of quantity and quality of black tea in India. The study identifies the determinants of quality of green leaf such as soil condition, sufficient manpower to pluck green leaf, exact time of plucking, timely application of appropriate pesticides and insecticides. In addition, this study further stretches on proper withering of green leaf, cutting of withered leaf, proper fermentation and drying during processing of green leaf. The study observes that these factors have significant influence on quality of processed leaf[49].

2.4.1 Research gap and present study

It is understood that no study in the past have been done on agriculture industry, especially on tea industry in Bangladesh, with a focus on cost and management accounting and strategic cost management. The present study attempts to fill the gap of

research in this respect.

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Chapter III

Tea Industry of Bangladesh: Trend, Production and Cost Factors

This chapter focuses on the tea industry of Bangladesh and examines the trend in the growth of the industry and factors related to the cost and production of tea. The history of and trend in the expansion of tea industry in Bangladesh are reviewed in this chapter. In addition, this section also addresses the management structure of the tea estates vis-a-vis trends of production, export and consumption of tea. A SWOT analysis of the industry is also done in this respect. SWOT Analysis is a strategic planning tool used to evaluate the strengths, weaknesses, opportunities and threats involved in a project or in a business venture or in any other situation of an organization or individual requiring a decision in pursuit of an objective[1]. This analysis helps to understand the current situation of tea industry in Bangladesh. The final part of the chapter focuses on the factors related to the production of tea and associated costs. Several graphical analyses are done and regression tools employed to analyze the trend in the growth of the tea industry. This section attempts to identify the gray areas of the tea industry in Bangladesh which urgently demands strategic decisions for its development.

3.1 Bangladesh Tea Industry at a Glance

Tea is a major cash crop and a big export earning agricultural product of Bangladesh. Tea industry of Bangladesh occupies 2% of the world production and 0.7% of the world export (Table 3.1). It provides employment to about 350 thousand people[2]. About 50% women are comprised in this total working population[3]. About 400 thousand people depend on the total workforce of this industry[4]. The authorities of the estates provide basic needs such as, free housing, subsidize food, and free medical services to the workers. At present Bangladesh tea industry has 162 tea gardens. British companies operate 28 gardens and there are 128 gardens belong to Bangladeshi owners. In addition, there are very few newly established smallholding tea gardens (only 6 gardens) operating in the north-western part of Bangladesh and these gardens make insignificant contribution to the tea industry. At present about 51,825 hectare of land is under tea cultivation in Bangladesh. This occupies around 46% of total area allocated by the government for the purpose of tea cultivation[5]. The average size of the tea estate of Bangladesh is around 337 hectare[6].

Table 3.1: Tea industry in Bangladesh at a glance[7]

Total tea estates	162
Total grant area	114,913 hectare
Total tea area	52,202 hectare
Area suitable for extension	12,733 hectare
Average yield per hectare	1,247 kilogram
Average yearly production	60 thousand ton
Average yearly export	11 thousand ton
Share of world production	2%
Share of world export	0.7%
Contribution to national GDP	0.81%
Contribution to national employment	3.3%

3.1.1 Trend in the Expansion of Tea Areas in Bangladesh

In 1947, during the partition of India and Pakistan, Bangladesh owned 103 tea estates. These tea estates possessed an area of 28,734 hectares. The annual production was 18.36 thousand ton and yield was only 656 kilogram per hectare. The then Pakistani government forced this industry to expand their tea area to meet their huge demand of tea. The government introduced a law of mandatory expansion of the tea area in 1961 to meet the increasing demand. The law stated that each tea estate must increase 3% of its total cultivation area every year[8]. About 35.86% of the area had been increased during the decade. The yield per hectare had also increased significantly during this decade[9]. In 1971, during the war of liberation the tea industry experienced a huge set back as most of the gardens near to Indian border were badly damaged due to war. The industry revived from this miserable situation through intensive financial support from the foreign donor countries and also tremendous hard work of the tea planters[10]. Table 3.2 shows that the tea industry attained a massive expansion till 1970 and in comparison to the earlier decades the expansion plan gradually slowed down. It can be concluded from the table that the Bangladesh Tea Board focuses on boosting their yield rather concentrating on the expansion of tea area in the following decades.

Table 3.2: Trend of expansion of the tea plantation area in Bangladesh[11]

Year	Plantation area (Hectare)	Yield per hectare in kilogram
1947	28,734	639
1960	31,418 (9.34%)	605
1970	42,685 (35.86%)	735
1980	43,528 (1.97%)	920
1990	47,385 (8.86%)	953
2000	50,150 (5.84%)	1,176
2003	52,202 (4.09%)	1,247

(Parentheses indicate growth rate based on decades)

3.1.2 Management Structure of the Tea Industry in Bangladesh

Bangladesh Tea Board controls the tea industry of Bangladesh. It leases out land for long term (for thirty five years) to the companies for tea cultivation. The Bangladesh Tea Board has recently modified the leasing system from ninety nine years to thirty five years to have proper control on the tea estates that show poor performances. A tea bush provides good quality green leaves until 40 years of its life cycle and which is why this modified leasing system (thirty five years) helps to assess the performance of the tea estates in an efficient manner. The tea estates in Bangladesh are managed by five categories of management groups. In addition to these five categories of management groups, there are six tea estates in North Bengal area which are operated by the smallholders and the contribution of these tea estates to the industry is not worth mentioning. The five categories of management groups are mentioned and discussed below.

a. Sterling Companies (British Companies)
b. National Tea Companies
c. Bangladesh Tea Board
d. Bangladeshi owned private limited companies
e. Proprietary owned tea estates

The British Companies control 28 tea estates and produce 29,030 tons of black tea which is around 49% of the total tea production of Bangladesh. These tea estates utilize only 39% of plantation area. The average yield per hectare of these tea estates is 1,543 kilogram[12]. The high level of production of these companies are due to the better management of tea bushes, proper application of fertilizer, timely irrigation and efficient

handling and processing of green leaves. On the other hand, Bangladeshi owners manage 128 tea estates and produce 30,083 tons of black tea which is about 51% of the total production of tea in Bangladesh[13]. These tea estates utilize 61% of tea area. The average yield of these tea estates is 1,064 kilogram per hectare[14]. It can be observed from Table 3.3 that James Finlay Company manages their tea estates much efficiently than the other British companies and they have much higher yield per hectare. The yield of the tea estates under the Bangladesh Tea Research Institute is much higher in comparison to the rest of the tea estates owned by Bangladeshi owners. The overall situation of the proprietary owned tea estates is the worst among the various categories of the tea estates. The Bangladesh Tea Board has allocated 20% of land to these tea estates but they have utilized only 40% of their allocated land for cultivation. The unutilized land of these tea estates comprises about 17% of total tea plantation area of Bangladesh. The average yield of these tea estates is only 892 kilograms per hectare. The level of production of the tea estates falling under this category is lowest when compared with other types of tea estates. As a result, the total performance scenario of the tea estates of the country appears quite pitiable due to the poor level of operation of the private and proprietary owned tea estates[15].

Table 3.3: Management structure of the tea estates in Bangladesh[16]

Type of mgt.	Tea estates	Grant area (hectare)	Total tea area (hectare)	Land use	Production (ton)	Yield per hectare (kilogram)
a. Sterling Companies (British Companies)						
James Finlay Ltd.	7	15,949.62	8,004.16	50.18%	11,853	1,579
Duncan Brothers	16	18,487.27	9,518.89	51.35%	13,533	1,566
Deundi Tea	4	3,828.42	2,261.44	59.07%	3,133	1,509
New Sylhet Tea Estates	1	1,069.78	623.91	58.32%	512	868
Average		**34.75%**	**39.37%**	**51.82%**	**49%**	**1,543**
b. Bangladeshi owned companies						
Bangladesh Tea Board	3	2,524.49	1,465.43	58.05%	1,684	1,315
National Tea Company. Ltd.	13	11,279.84	5,615.62	49.78%	57,737	1,163
Private Limited Companies	53	37,073.66	15,075.36	40.66%	15,256	1,109
Proprietary owned tea estates	59	23,086.30	9,260.25	40.11%	7,406	892
Average		**65.25%**	**60.62%**	**42.48%**	**51%**	**1,064**

3.1.3 Tea Valleys and Level of Production

The tea estates of Bangladesh are divided into seven tea valleys. Among these seven tea valleys, six valleys are situated in the north-eastern region and one is situated (Chittagong valley) in the south-eastern region of the country. Table 3.4 depicts that tea estates which are situated in the Balisera valley and utilizes highest amount of land allocated for the cultivation of tea. The level of production of these tea estates is also higher. The Luskerpore and Monu-Doloi valleys also play significant role in this respect. On the other hand, the tea estates situated in Juri, North Sylhet and Chittagong areas show disappointing performance when land use pattern, level of production and yield per hectare are taken into consideration. The performance of the estates under the Chittagong valley is the worst among the lot and this is due to the fact that most of the

low performing tea estates are situated in this valley[17].

Table 3.4: Comparison between the tea valleys[18]

Valley	Tea estates	Grant area (hectare)	Total tea area (hectare)	Land use	Production (ton)	Yield per hectare
Balisera	27	26,718.78	13,548.12	50.71%	18,590	1,491
Luskerpore	19	15,967.98	8,705.75	54.52%	11,809	1,505
Monu-Doloi	14	13,413.82	7,094.47	52.89%	8,840	1,397
Lungla	29	16,038.58	6,738.13	42.01%	6,547	1,068
Juri	28	15,791.56	7,465.63	47.28%	6,322	923
North Sylhet	16	10,191.17	4,266.56	41.87%	3,632	928
Chittagong	23	15,227.59	4,006.40	26.31%	3,374	950

3.2 Trend Analysis of Tea Industry in Bangladesh

3.2.1 Trends in Production, Export and Internal Consumption

It can be observed from Figure 3.1 that production trend of this industry is not impressive comparing to the trend of internal consumption. Besides, it can be observed that the amount of export is decreasing gradually. The soaring local demand of tea reduces export of tea. The total quantity of tea exported in 1990 was 27 thousand tons and this figure dropped to 13 thousand tons in 2004. The level of domestic consumption, on the other hand, was 19 thousand tons in 1990 which had increased to 43 thousand tons in the year 2004[19]. One study observed that the rate in the growth of production of the tea industry was 1% each year, whereas the domestic consumption had been increasing at the rate of 3.5% each year[20]. The high level of domestic consumption of tea is due to the rapid urbanization, high level of population growth, significant improvement of the living standard of middle income people and due to the improvement of the quality of packaging of tea[21]. It can be observed from Table 3.5 that consumers belong to the middle income group spend large segment of their income in purchasing food, beverage and tobacco. Tea is a beverage and the spending pattern of

the people in this respect is also reflected in the pattern of tea consumption. In recent years, the blending companies of Bangladesh offer various types of blends with superior packaging. It seems that the high quality of packaging of tea motivate buyers to consume more tea[22].

Table 3.5: Consumer price index (CPI) of middle income group in Bangladesh[23]

Period	General	Food, beverage and tobacco	Non-food
Weight	100	64.47	35.53
1991-92	154.44	154.30	154.69
1992-93	158.67	157.17	161.38
1993-94	163.87	161.80	167.69
1994-95	178.40	176.77	181.38
1995-96	190.27	189.13	191.86
1996-97	195.07	191.85	200.99
1997-98	208.70	205.55	214.46
1998-99	277.29	229.72	223.10
1999-2000	236.16	239.13	230.77
2000-2001	239.91	241.40	237.20

(Base: 1985-86= 100)

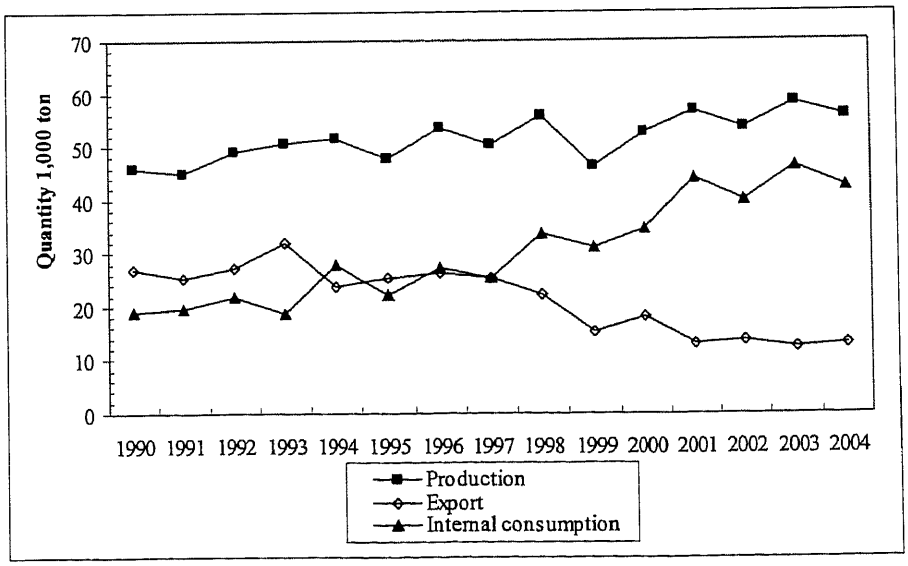

Figure 3.1: Trends in production, export and internal consumption

The sharp growth of market of the domestic tea industry in Bangladesh may draw foreign countries to take hold of the growing market with their products. Moreover, if this situation persists for a long time, Bangladesh may have to import tea from other tea producing countries.

3.2.2 Trend in Internal Consumption and Price

It can be observed from Figure 3.2 that the domestic consumption has sharp upward trend. Although the price of the tea in the Chittagong auction market is quite sluggish, the consumption of tea in monetary value has a positive upward trend. The internal sale through auction market is 34 million US dollar in 1990. This figure increases to 53 million US dollar in 2004[24]. This local demand shows an upward trend due to the competition among the blending companies who offer quality blends, superior packaging and introduce various types of improved tea bags which ease tea preparation process. It seems that all these initiatives attract the middle and lower middle income groups to have quality tea spending less time than usual[25].

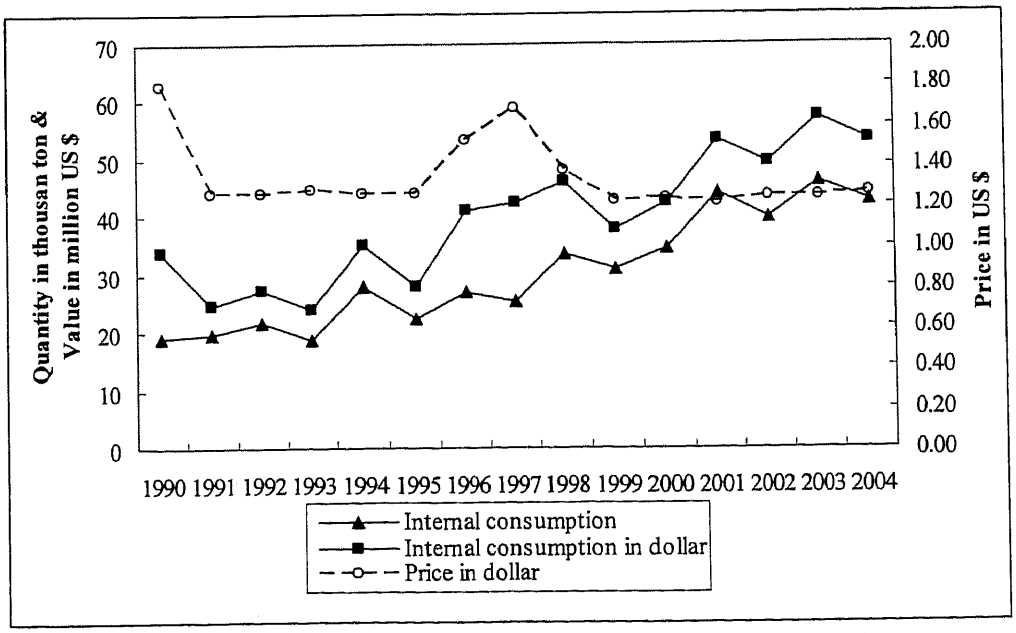

Figure 3.2: Trends in internal consumption and price

3.2.3 Trend in Export and Price

The tea export market of Bangladesh passes through hard time both for low production and mounting local demand. Figure 3.3 depicts that there exist a gradual decreasing trend in tea export. The decrease in the export of tea is due the strong local demand. The local buyers have to compete strongly with foreign buyers in the Chittagong auction market[26]. The volume of export and auction price fluctuates with the presence of these importers. Due to the strong internal demand of value added products, tea market of Bangladesh has become very competitive, which on the other hand encourage the local blenders to offer good quality tea[27].

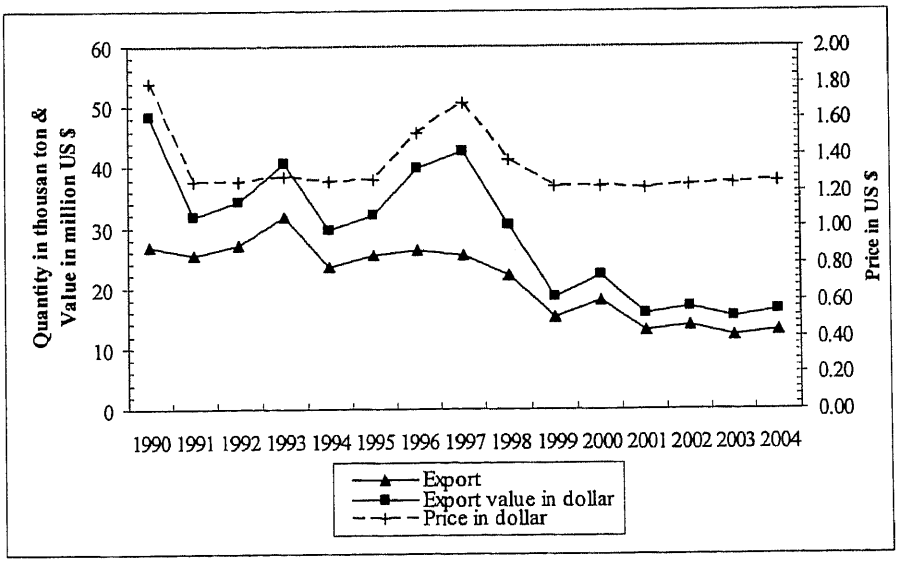

Figure 3.3: Trends in export and price

3.2.4 Countries Importing Tea from Bangladesh

The countries which import the tea from Bangladesh are Pakistan, Afghanistan, Kazakhstan, United Kingdom (UK), Russia, United Arab Emirates (UAE), India and few other Arabian countries. Among these countries, Pakistan imports a significant quantity of tea from Bangladesh, which is about 75% of total export of Bangladesh[28]

(Figure 3.4). The export to Pakistan has increased significantly due to a trade agreement between Bangladesh and Pakistan. Pakistan has given duty free access up to 10 thousand tons of black tea from Bangladesh[29]. This has increased the export of tea to that country. Besides, Afghanistan is also a significant importer of tea form Bangladesh. Bangladesh exports 10% of its tea to Afghanistan[30]. Afghan people usually prefer cuppage[31] of tea. They drink small quantity of tea each time and for this reason the quality of tea is considered very important. The export of tea from Bangladesh to Afghanistan is not very significant. Due to war and associated economic turmoil and conflicts, small quantity of tea is exported from Bangladesh to Afghanistan.

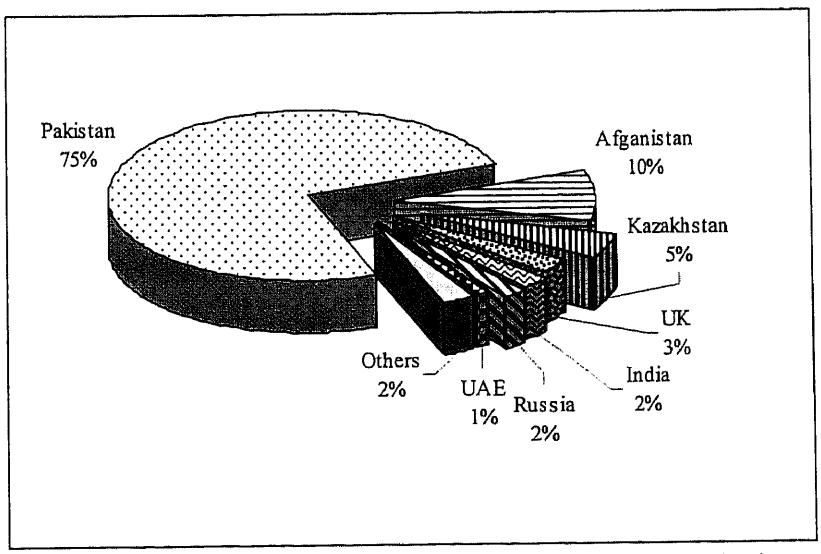

Figure 3.4: Countries importing tea from Bangladesh

3.3 SWOT Analysis of Tea Industry in Bangladesh

The tea industries of Bangladesh are passing through a difficult time due to high domestic demand of tea and a stagnant growth in tea production. A SWOT (strength, weakness, opportunity and threat) analysis is done in this respect to analyze the tea industry in Bangladesh (Figure 3.5). It is understood that the tea industry of Bangladesh

has a long history of cultivation and expertise. Many producers play significant role which make the market competitive rather changing the market structure into oligopoly market. There is more strength in this type of industry. Land is allocated to the tea planters by the government on a long-term leasing system. This type of leasing system helps the planters to invest less capital for initiating the business. This industry also encounters disadvantages which hinder the growth of this industry. Poor management of land is one of the prime weaknesses. Besides, lack of adequate fund for land and bush management affect this industry adversely and reduce production of tea. There is around 10% tea area suitable for expansion. But this land is left unutilized due to the lack of fund and poor management. Managers of the tea estates are reluctant to adopt effective measure to uproot and replant the old bushes. The old bushes produce meager quantity of tea and poor quality of green leaf and these have significant effect on the price of the processed tea. If the tea industry can overcome these weaknesses, there will be a huge expansion in the domestic tea market. Otherwise, the huge local market might be captured by foreign entrants who can supply much better quality and variety of tea. This in effect will not only destroy the tea industry but the country will also loose huge amount of foreign currency. Besides, a large number of workers will also be unemployed.

STRENGTH	WEAKNESSES
▪ Long history of producing good quality of tea since 1857. ▪ Expertise in the cultivation of tea ▪ Many producers (162 tea estates). ▪ Land is allocated for cultivation of tea by the government in a long term leasing system (35 years).	▪ Poor management leads to granted area (10%) unutilized (Bangladesh Tea Board, 2004). ▪ Tea industry comprises 42% of the tea area with old (Above 41 years) bushes (Bangladesh Tea Board, 2004). ▪ Lack of huge expansion in Bangladesh due unavailability of soil structure suitable for cultivation of tea. ▪ Low quality comparing to competitors. ▪ Improper utilization of bank loan.
▪ Local demand increases at the rate of 3.5% each year[32]. ▪ High competition among the blending companies to secure position in the local market with different blends.	▪ Decrease in export lowers foreign exchange earnings. ▪ Threats of foreign entrants due to high local demand. ▪ Threats of unemployment of tea workers.
OPPORTUNITY	THREATS

Figure 3.5: SWOT analysis of the tea industry in Bangladesh

3.4 Factors Affecting the Production of Tea

3.4.1 Impact of Environmental Factors on Production

It can be understood from the literature review that the environmental factors such as, rainfall and temperature have significant influence on the production of tea. It is needed to understand the impact of these factors on the production of tea in Bangladesh. Regression analysis is administered to determine the influence of these factors in this respect. The model is given below:

$$\hat{Y} = a + \hat{b}\, x + \varepsilon$$

Here,

$\hat{Y}$ = Production of the industry in thousand ton (PDN)

x = Rainfall in millimeter (RAIN_MM)

The result of the regression analysis depicts that environmental factors (rainfall) has significant influence on production (Table 3.6). Though the r^2 value (0.222) is not very high, moderate relationship exists between rainfall and production. It seems that other factors have influence on low r^2 value. It is understood from the previous discussion provided in this chapter that tea estates in Bangladesh are not managed properly and 42% of the tea plantation area are comprised of old bushes. Plantation area with old bushes may have influence on tea production. It has also been observed in the literature review that the fluctuation of temperature in Bangladesh does not vary widely and it usually ranges from 25^0C to 35^0 centigrade. It seems that due to this reason the level of temperature does not have significant influence on the production of tea. It is also observed from the regression analysis that the level of temperature does not have significant control on tea production. For this reason, the rainfall parameter is taken as the sole environmental variable for assessing the production of tea. The regression model is mentioned below:

$\hat{Y} = 13.426 + 5449E\text{-}03x$

Table 3.6: Regression analysis: Environmental factor and production of tea

Model	r	r^2	Adjusted r^2	Std. Error of the Estimate
1	0.487	0.237	0.222	9.2267

Coefficients

		Unstandardized Coefficients	t	Sig.
Model		Beta		
	(Constant)	13.426	2.512	0.015
	RAIN_MM	5.449E-03	3.904	0.000

Dependent Variable: PDN

3.4.2 Relationship between Production and Age of Bush

Graphical Analysis

Aging of tea bushes in Bangladesh affect the production of tea and this is a big threat to the healthy growth of the tea industry. Figure 3.6 depicts the situation of tea bushes depending on various age groups. There are 82% of the tea area of Bangladesh comprise mature and old bushes. The old bush area comprises 42% of total area. Moreover, a large portion of the cultivated land is left with late mature stage plants. Due to this, the smooth development of this industry may be at stake. However, this situation is better in case of the well-managed tea estates. The well-managed tea estates possess less number of old bushes in comparison to the poorly-managed tea estates. Besides they adopt effective replanting measures and gradually remove old bushes. As a result, the well managed tea estates have more plantation areas with immature and young bushes when compared with poorly-managed tea estates (Figure 3.7).

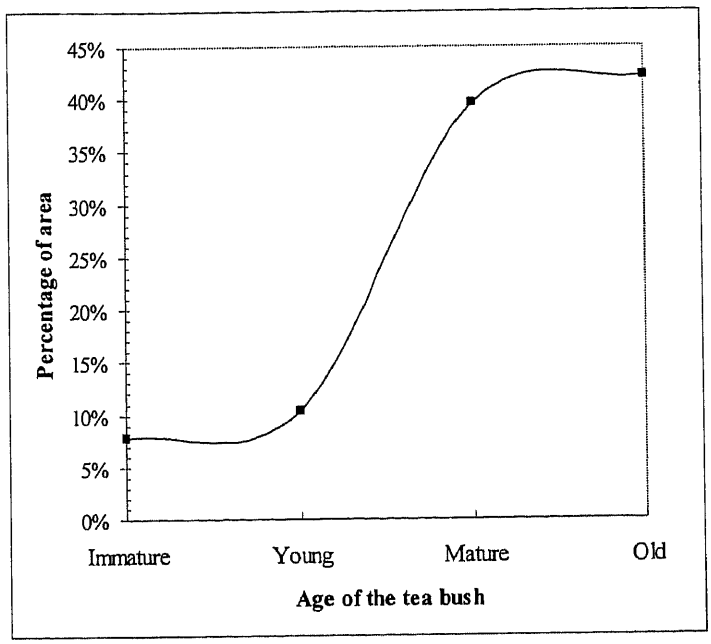

Figure 3.6: Tea area in Bangladesh depending on the bush age

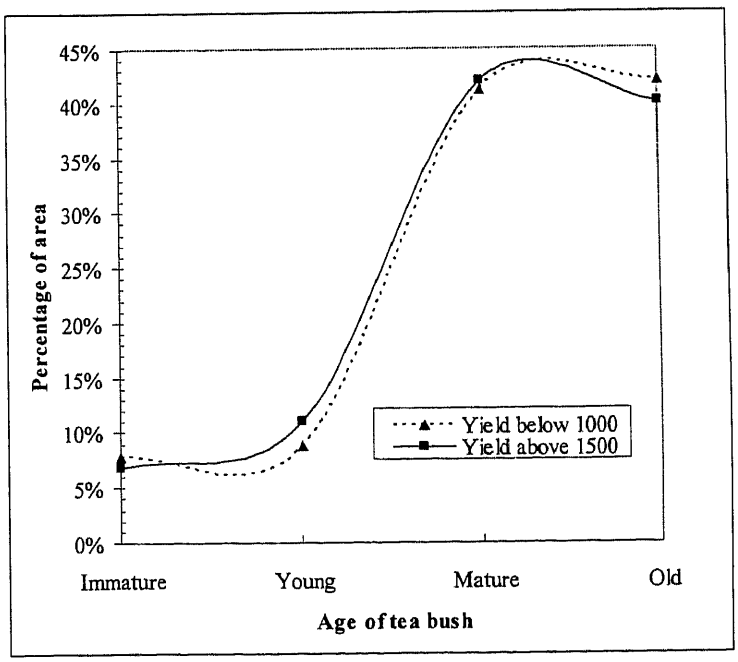

Figure 3.7: Comparison between the areas under high and low yielding tea estates

Table 3.7 depicts that the tea industry in Bangladesh consists of 62 tea estates with yield below 1,000 kilogram per hectare. These low yielding tea estates as a whole have severe adverse affect on the tea industry. However, among these 62 tea estates there are 28 tea estates with yield below 600 kilogram per hectare. These poor performing gardens can not make much contribution to the industry. They can not provide sustainable profit as well. It is observed from the analysis that the yield of the least developed tea estates (sick gardens[33]) is below 600 kilogram per hectare. Bangladesh Tea Association observed a yield above 600 kilograms of tea per hectare is a must to function a tea estate[34]. Otherwise it will become inoperative. In addition to the lowest yield tea estates, there are 34 tea estates operating with a yield ranging from 601~1,000 kilograms of tea per hectare. The low yield of these poor performing tea estates are due to the poor management of the tea bushes. A large section of the old bush areas become vacant due to the loss of the plants and lack of further initiatives in replanting the tea plants (Figure 3.8). A strategic initiative may be taken for these low performing tea estates which have tea areas suitable for extension.

Table 3.7: Comparison between the low yielding tea estates[35]

	Yield below 1,000 kilogram/hectare (62 tea estates)			
	Yield below 600 kilogram per hectare		Yield 601~1000 kilogram per hectare	
Number of tea estates	28 tea estates		34 tea estates	
	Small gardens	Large gardens	Small gardens	Large gardens
Tea area in hectare	Below 200	Above 200	Below 200	Above 200
Number of tea estates	21	7	13	21
Suitable extension area in hectare	3~360	16~400	15~400	3~375

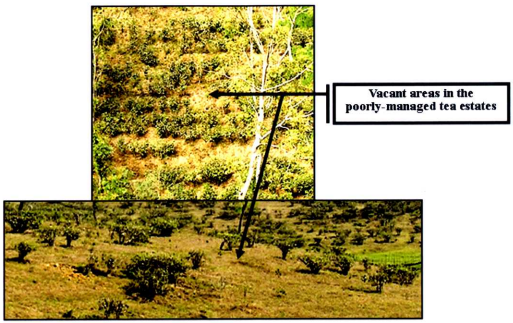

Figure 3.8: Vacant area in the poorly-managed tea estates

Regression Analysis (All Tea Estates)

The graphical representation of the tea area in Bangladesh is shown in Figure 3.6 and Figure 3.7. This section concentrates on area under tea depending on different age groups of tea bushes and their relationship with the production of tea. A regression model is developed for this purpose. The model is given below:

$$\hat{Y} = a + \hat{b}_1 x_1 + \hat{b}_2 x_2 + \hat{b}_3 x_3 + \varepsilon$$

Here,

$\hat{Y}$ = Yearly production of the tea estates (PDN)

x_1 = Young bush (YOUNG) [4-10 years]

x_2 = Mature bush (MATURE) [11-40 years]

x_3 = Old bush (OLD_BUSH) [Above 41 years]

Table 3.8: Regression analysis of area under tea and level of production

Model	r	r^2	Adjusted r^2	Std. Error of the Estimate
1	0.898	0.806	0.802	206161.4252

Coefficients

		Unstandardized Coefficients	t	Sig.
Model		Beta		
1	(Constant)	-80805.240	-2.928	0.004
	YOUNG	3817.495	6.189	0.000
	MATURE	1941.185	9.025	0.000
	OLD	656.394	4.993	0.000

Dependent Variable: PDN

The result of the regression analysis demonstrates that the independent variables significantly influence the production of tea (Table: 3.8). The high adjusted r^2 value (0.802) reflects the significance of these variables in the model. The beta coefficients of independent variables reflect that young bush (YOUNG) area which notably influences the level of production (highest beta coefficient, 3817.50). This further indicates that a change in the young bush area by one unit will change the level of production by 3817.50 kilogram. In addition, mature bush area (MATURE) also have some considerable bearing on production (1941.19 beta value). On the other hand, old (OLD) bush areas provide very low level of production (656.39 beta value). The average yield of the tea gardens in Bangladesh is around 1,255 kilogram per hectare. The result of the above analysis suggests that the tea industries need to transform their old tea bushes into young tea and mature tea bushes and this may significantly increase the yield of the two types of bushes up to 3817.50 kilogram or 1941.19 kilogram respectively.

The regression model is given below:

$$\hat{Y} = -80805.240 + 3817.495x_1 + 1941.185x_2 + 656.394x_3$$

Regression Analysis (Well-Managed Tea Estates)

The above mentioned regression analysis explains the situation of the whole tea industry in Bangladesh (Table 3.8). This part focuses on the well-managed tea estates and a regression model is developed in this respect. The model is given below:

$$\hat{Y}=a+\hat{b}_1x_1+\hat{b}_2x_2+\hat{b}_3x_3+\varepsilon$$

Here,

$\hat{Y}$ = Yearly production level of well-managed tea estates (PDN_WELL)

x_1 = Young bush (YOUNG) [4-10 years]

x_2 = Mature bush (MATURE) [11-40 years]

x_3 = Old bush (OLD_BUSH) [Above 41 years]

Table 3.9: Regression analysis of area under tea and the production level of well-managed tea estates

Model	r	r^2	Adjusted r^2	Std. Error of the Estimate
1	0.987	0.973	0.970	104304.9281

Coefficients

		Unstandardized Coefficients	t	Sig.
Model		Beta		
1	(Constant)	36508.549	0.762	0.453
	YOUNG	2082.206	3.049	0.006
	MATURE	1690.886	5.828	0.000
	OLD	1654.128	9.288	0.000

Dependent Variable: PDN_WELL

The outcome of the regression analysis demonstrates that the stated independent variables have significant influence on the production of tea (Table: 3.9). The high adjusted r^2 value (0.970) echoes this significance. The beta coefficient of the independent variables demonstrates that young bush area (YOUNG) significantly

affects the level of production (highest beta coefficient, 2082.20). This means that a change in the young bush area by one unit will alter the level of production by 2082.20 kilograms. In addition, mature bush area (MATURE) also have very significant bearing on the production of tea (1690.89 beta value). The old (OLD) bush areas have low level of production (1654.13 beta value) while compared with mature tea bushes. The findings of the regression analysis indicate that the well-managed tea estates in Bangladesh secure a leading position by producing huge quantity of good tea. The regression model is mentioned below:

$$\hat{Y} = 36508.549 + 2082.206x_1 + 1690.886x_2 + 1654.128x_3$$

Regression Analysis (Poorly-Managed Tea Estates)

This section attempts to compare the area under tea bushes and the level of production of the poorly-managed tea estates with well-managed tea estates. A regression model is developed to elucidate the situation. The model is given below:

$$\hat{Y} = a + \hat{b}_1 x_1 + \hat{b}_2 x_2 + \hat{b}_3 x_3 + \varepsilon$$

Here,

$\hat{Y}$ = Yearly production level of poorly-managed tea estates (PDN_POOR)

x_1 = Young bush (YOUNG) [4-10 years]

x_2 = Mature bush (MATURE) [11-40 years]

x_3 = Old bush (OLD_BUSH) [Above 41 years]

Table 3.10: Regression analysis of area under tea and the production level of poorly-managed tea estates

Model	r	r^2	Adjusted r^2	Std. Error of the Estimate
1	0.958	0.917	0.892	13739.9016

Coefficients

		Unstandardized Coefficients	t	Sig.
Model		Beta		
1	(Constant)	-3501.437	-0.373	0.717
	YOUNG	1063.529	4.920	0.001
	MATURE	907.741	9.062	0.000
	OLD	642.303	4.764	0.001

Dependent Variable: PDN_POOR (Yield 601~1,000 kilogram per hectare)

The result of the regression analysis shows that the independent variables significantly influence the production of tea (Table 3.10). The high adjusted r^2 value (0.892) depicts the significance. The beta coefficients of independent variables also state that young bush (YOUNG) areas significantly influence the level of production (highest beta coefficient, 1063.53). This further indicates that a change in the young bush area by one unit will change the level of tea production by 1063.53 kilograms in the poorly-managed tea estates. In addition, mature bush areas (MATURE) also have significant affect on the level of production (907.741 beta value). It can further be observed that in comparison to the mature tea bush areas, old (OLD) bush areas have quite low level of tea production (642.303 beta value). The regression model is given below:

$$\hat{Y} = -3501.437 + 1063.529x_1 + 907.741x_2 + 642.303x_3$$

The above regression analyses illustrate the fact that the positions of the well-managed tea estates are far better comparing to the poorly-managed tea estates. The beta coefficient of the young bushes under the well-managed tea estates is 2082.206. This

further indicates that a change in the young bush area under the well-managed tea estates by one unit will change the level of production by 2082.206 kilograms (Table 3.9). This level of production is almost two times when compared with the poorly-managed tea estates. Besides, tea production from the mature and old bushes in the well-managed tea estates is much higher in comparison to the poorly-managed tea estates (Table 3.9 and Table 3.10).

3.4.3 Relationship between Yield per Hectare and Price

From the above regression analysis it is clear that for a efficient production of tea, young and mature tea areas are essential. High yielding tea gardens have better bush management comparing to poorly-managed gardens. This may have a positive linkage with the price of tea. In Bangladesh, black tea is sold through auction market by open bidding. In the auction market, on behalf of the bidders, tea tasters judge the quality of tea from each lot by tasting samples and the price is determined accordingly. Due to the above mechanism of the auction market, good quality tea gets higher price than to the inferior quality tea. The demand side of Chittagong auction market is stronger than the supply side. The augmented domestic demand may have significant impact on the level of price of tea.

A model is developed to reveal the relationship between management quality of tea estates and price offered to them. The model is given below:

$$P_{a,b,c,.....i} = function(MQ_{a,b,c,.....i})$$

Here,

P = Price of tea offered to the tea estate *a, b, c, ……i*

MQ = Management quality of tea estate *a, b, c,……i*

It is assumed in the model, management quality of the tea estates may affect the price offered to the tea estates. The model is derived based on the assumption that superior management of the tea estates may have link to high production or yield. The model tries to examine whether there exists any relationship between management quality and price. On the basis of the elements of the generic model mentioned above, a regression model is formulated. This is done to examine the possible relationship between the yield of tea gardens and the price offered to the tea estates. The model is shown below:

$$\hat{Y}=a+\hat{b}x+\varepsilon$$

Here,

$\hat{Y}$ = Price in kilogram offered to the tea estate in taka[36] (PRICE)

x = Yield per hectare in kilogram (YIELD_HA)

The result of the regression analysis shows that yield has significant influence on price (Table 3.11). Though the r2 value (0.268) is not very high, moderate relationship exists between yield and price. It seems that other confounding factors influence the value of r^2. The beta coefficient indicates that if yield per hectare (YIELD_HA) increases by one unit, price will increase by 8.998E-03 unit. It can be concluded from this analysis that good land management has a direct link with the production of good quality tea and tea

produced by well-managed gardens fetch higher price. The model is given below:

$\hat{Y}$= 50.786 + 8.998E-03 x

Table 3.11: Regression analysis of yield of all tea estates and price

Model	r	r^2	Adjusted r^2	Std. Error of the Estimate
1	0.517	0.268	0.261	7.0283

Coefficients

		Unstandardized Coefficients	t	Sig.
Model		Beta		
1	(Constant)	50.786	28.111	0.000
	YIELD_HA	8.998E-03	6.396	0.000

Dependent variable: PRICE

3.5 Cost of Production of Tea in Bangladesh

3.5.1 Cost Analysis of the Sample Tea Estates

This section focuses on cost analysis of nineteen tea estates in Bangladesh. It is understood that an idea about the cost structure of the tea estates in Bangladesh would be gathered. Table 3.12 illustrates the average cost structure of the sample tea estates. It can be observed that overhead cost comprises a largest segment of the tea manufacturing process, and it occupies 67% of total cost of production. On the other hand, variable cost (direct material and direct labor) comprises 33% of total cost of production. Within the total variable cost, cost of direct material and direct labor comprises 64% and 36% respectively. These figures actually indicate that the tea estates in Bangladesh need to focus on controlling overhead cost to reduce the cost of production of tea. Table 3.12 also portrays that leaf processing stage incurs more cost comparing to leaf growing stage. The leaf growing stage incurs 5.23 taka as variable cost for the production of each kilogram of green leaf. In addition, growing stage incurs 3,519,070 taka as fixed cost per year. If the total growing cost is divided with average

Table 3.12: Cost analysis of the sample tea estates in Bangladesh

		Leaf growing				Leaf processing					Total cost (Growing & processing)	
		Plucking	Maintenance	Others	Sub total (Growing)	Withering and other processing	Manufacturing	Packaging and distribution	Others	Sub total (Leaf processing)		
Direct material	Withering and other processing					495,778				495,778	495,778	2%
	Gas and fuel						2,330,834			2,330,834	2,330,834	12%
	Packaging and delivery							1,319,201		1,319,201	1,319,201	7%
Direct labor	Wage for tea manufacturing						233,231			233,231	233,231	1%
	Plucking of green leaf	2,112,110			2,112,110						2,112,110	11%
Overhead	Fertilizer		933,071		933,071						933,071	5%
	Insecticide		496,508		496,508						496,508	2%
	Maintenance of tea bush		1,375,754		1,375,754						1,375,754	7%
	Other wages								1,580,337	1,580,337	1,580,337	8%
	Labor welfare								3,121,998	3,121,998	3,121,998	16%
	Managers and staff benefit								2,386,345	2,386,345	2,386,345	12%
	Maintenance factory and building								1,274,285	1,274,285	1,274,285	6%
	Transportation								590,628	590,628	590,628	3%
	Rent and land tax			713,737	713,737						713,737	4%
	Misc. expenses								979,102	979,102	979,102	5%
	Sub total	2,112,110	2,805,333	713,737	**5,631,180**	495,778	2,564,065	1,319,201	9,932,695	**14,311,739**	**19,942,919**	

Average production	403,974 kilogram (404 ton)
Average price	65.06 taka per kilogram

(Values represent in taka)

production, the unit cost of growing tea will be 13.94 taka per kilogram. On the other hand, variable cost of processing each kilogram of green leaf to black tea is 10.84 taka per kilogram and on an average total fixed cost of processing green leaf is 9,932,695 taka per year. The unit cost of processing tea is 35.43 taka per kilogram. This can be calculated by dividing total cost of processing with average cost of the production of made tea. Surprisingly, labor welfare cost comprises 16% of total cost of production. In addition, gas and fuel head and benefit to managers' head comprise 12% of total cost of production. The tea estates on an average incur 20% of total cost for the wage of labor. Wage for plucking and processing of green leaf solely comprise 12% of total cost of production. The detail cost structure is shown in Table 3.12, which is the three years average of the sample tea estates.

3.5.2 Cost Analysis of Well-Managed and Poorly-Managed Tea Estates

This part focuses on the cost comparison of well-managed and poorly-managed tea estates. Table 3.13 depicts that unit production cost of well-managed tea estates is 41.40 taka per kilogram. In case of poorly managed tea estates unit production cost is 62.69 taka per kilogram. Besides, average auction price of tea in the well-managed and poorly-managed tea estates are 66.91 taka and 62.70 taka per kilogram respectively. It may be observed from the analysis that the well-managed tea estates are cost efficient in both leaf growing and leaf processing stages when compared with the poorly managed tea estates. In well-managed tea estates, unit cost of growing and processing tea is 10.46 taka and 30.93 taka per kilogram respectively. In the poorly-managed tea estates, on the other hand, unit cost of growing and processing is 14.21 taka and 48.48 taka per kilogram respectively. Moreover, unit variable cost of producing tea in the well-managed tea estates is 15.17 taka per kilogram. This cost in the poorly-managed

tea estates, on the contrary, is 18.88 taka per kilogram. The total fixed cost is also low in well-managed tea estates. It is high in the poorly managed tea estates. The well-managed tea estates are cost efficient as they possess highly motivated management and staffs and have efficient workforce and workforce management. Besides, they also have low maintenance cost of machineries and adopt appropriate management of withering of green leaves. The efficient maintenance of tea bushes and application of proper quantity of insecticides provide high and good quality production. Table 3.13 shows that variable cost of well-managed tea estates is higher than poorly managed tea estates. This is due to the use of good quality fertilizers and good quality packaging of processed tea. Besides, wage structure of well-managed tea estates is also different from poorly managed tea estates. The wage structure of tea estates is set by Bangladesh Tea Board after consultation and negotiation with

Table 3.13: Cost comparison between well-managed and poorly-managed tea estates

Avg. price	Total cost			*Unit cost*	Leaf growing		*Unit cost*	Leaf processing		*Unit cost*
66.91 Tk.	Variable cost (37%)	Direct material	66%	41.40 Tk.	Variable cost	5.10 Tk.	10.46 Tk.	Variable cost	10.08 Tk.	30.93 Tk.
		Direct labor	34%		Fixed cost	2,112,542 Tk.		Fixed cost	8,205,910 Tk.	
	Fixed cost (63%)	10,318,452 Tk.								
62.70 Tk.	Variable cost (30%)	Direct material	66%	62.69 Tk.	Variable cost	5.30 Tk.	14.21 Tk.	Variable cost	13.58 Tk.	48.48 Tk.
		Direct labor	34%		Fixed cost	2,350,302 Tk.		Fixed cost	9,205,602 Tk.	
	Fixed cost (70%)	11,555,904 Tk.								

(All monetary values represent in taka[37] and unit is kilogram)

Table 3.14: Cost analysis of the well-managed tea estates

		Leaf growing				Leaf processing					Total cost (Growing & processing)	
		Plucking	Maintenance	Others	Sub total (Growing)	Withering and other processing	Manufacturing	Packaging and distribution	Others	Sub total (Leaf processing)		
Direct material	Withering and other processing					386,987				386,987	386,987	2%
	Gas and fuel						2,113,884			2,113,884	2,113,884	13%
	Packaging and delivery							1,421,468		1,421,468	1,421,468	9%
Direct labor	Wage for tea manufacturing						43,150			43,150	43,150	0.3%
	Plucking green leaf	2,004,903			2,004,903						2,004,903	12%
Overhead	Fertilizer		787,275		787,275						787,275	5%
	Insecticide		324,848		324,848						324,848	2%
	Maintenance of tea bush		586,748		586,748						586,748	4%
	Other wages								690,053	690,053	690,053	4%
	Labor welfare								2,004,100	2,004,100	2,004,100	12%
	Managers and staff benefit								2,373,929	2,373,929	2,373,929	15%
	Maintenance factory and building								1,332,156	1,332,156	1,332,156	8%
	Transportation								462,133	462,133	462,133	3%
	Rent and land tax			413,671	413,671					0	413,671	3%
	Misc. expenses								1,343,539	1,343,539	1,343,539	8%
	Sub total	2,004,903	1,698,871	413,671	**4,117,445**	386,987	2,157,034	1,421,468	8,205,910	**12,171,400**	**16,288,845**	
										TOTAL SALES	**26,326,082**	
										TOTAL PROFIT	**10,037,238**	

Average price	66.91 taka per kilogram
Average production	393,455 kilogram (393 ton)

(All monetary values represent in taka)

Table 3.15: Cost analysis of the poorly-managed tea estates

		Leaf growing				Leaf processing					Total cost (Growing & processing)	
		Plucking	Maintenance	Others	Sub total	Withering and other processing	Manufacturing	Packaging and distribution	Others	Sub total		
Direct material	Withering and other processing					528,346				528,346	528,346	3%
	Gas and fuel						1,950,982			1,950,982	1,950,982	12%
	Packaging and delivery							798,483		798,483	798,483	5%
Direct labor	Wage for tea manufacturing						305,261			305,261	305,261	2%
	Plucking green leaf	1,397,722			1,397,722						1,397,722	8%
Overhead	Fertilizer		522,298		522,298						522,298	3%
	Insecticide		288,069		288,069						288,069	2%
	Maintenance of tea bush		1,231,258		1,231,258						1,231,258	7%
	Other wages								1,979,205	1,979,205	1,979,205	12%
	Labor welfare								2,556,534	2,556,534	2,556,534	15%
	Managers and staff benefit								2,056,207	2,056,207	2,056,207	12%
	Maintenance factory and building								1,066,520	1,066,520	1,066,520	6%
	Transportation								457,834	457,834	457,834	3%
	Rent and land tax			308,677	308,677						308,677	2%
	Misc. expenses								1,089,302	1,089,302	1,089,302	7%
	Sub total	1,397,722	2,041,625	308,677	**3,748,024**	528,346	2,256,243	798,483	9,205,602	**12,788,674**	**16,536,698**	
	Average price	62.70 taka per kilogram							**TOTAL SALES**		**16,540,044**	
	Average production	263,786 kilogram (264 ton)							**TOTAL PROFIT**		**3,347**	

(All monetary values represent in taka)

the Bangladesh Cha Sangsad[38] and Bangladesh Cha Sramik Union[39] at two years intervals. The wage of the labor is negotiated based on the categories[40] of the tea estates[41]. The daily wage structure of women in 'A' category gardens is 28 taka per day. Where as these figures in 'B' and 'C' category gardens in greater Sylhet region are 27.80 taka and 27.60 taka per day respectively[42]. The well-managed tea estates belong to 'A' category tea estates and which is why the wage cost is high in those tea estates than to the poorly-managed tea estates (Table 3.14 and Table 3.15). In addition, well-managed tea estates are successful in reducing the overhead cost which occupies higher fraction of the total cost of processing tea. The poorly-managed tea estates incur 70% of their total cost as fixed cost. In case of well managed tea estates it is 63%. They give much more benefit to the managers than to the poorly managed tea estates. This actually motivates the managers to constantly monitor the performances of the workers during plucking and processing of green leaf. A regression model is developed to clarify the influence of wage and benefit to managers on production. The model is given below:

$$\hat{Y}=a+\hat{b}_1x_1+\hat{b}_2x_2+\varepsilon$$

Here,

$\hat{Y}$ = Yearly production level of the tea estates

x_1 = Plucking wage of labor

x_2 = Benefit to managers and staffs

Table 3.16: Regression analysis of production, wage and benefit to managers and staffs

Model	R	r^2	Adjusted r^2	Std. Error of the Estimate
1	0.963	0.928	0.925	69816.9729

Coefficients

		Unstandardized Coefficients	t	Sig.
Model		Beta		
1	(Constant)	9752.111	.523	0.603
	WAGE	0.165	17.653	0.000
	BEN_MGR_STAFF	1.943E-02	2.210	0.031

Dependent Variable: PDN

Table 3.16 depicts the relationship among production, wage and benefit to managers. The beta coefficients of the independent variables reflect that wage (WAGE) significantly influences the level of production (highest beta coefficient, 0.165). This means that a change in wage by one unit (1 taka) will change the level of production by 0.165 kilogram. In addition, benefit to manager and staffs (BEN_MGR_STAFF) also have high significant bearing on production (1.943E-02 beta value).

The regression model is given below:

$$\hat{Y} = 9752.111 + 0.165x_1 + 1.943\text{E-}02x_2$$

It is also observed from the field survey that the performance of highly paid tea estates is much better than low paid tea estates. The managers in the highly paid tea estates usually employ and manage laborers efficiently to maintain the tea bushes. The managers of the poorly-managed tea estates, on the other hand, are somewhat less serious in managing the workforce efficiently. Table 3.14 and 3.15 depicts that the performance of the well-managed tea estates are better than the poorly-managed tea estates. The yearly average production of well-managed tea estates is 393,455 kilogram

(393 tons) per year. Average production of poorly-managed tea estate, on the other hand, is 263,786 kilogram (264 ton) per year. Furthermore, a well-managed tea estate enjoys profit of around 10,037,238 taka per year. A poorly-managed tea estate, on the other hand, obtains significantly low profit which is about 3,347 taka per year (Table 3.14 and Table 3.15). It may be concluded from the analysis that the poorly managed tea estates operate their gardens just positioning on the bottom line with a profit margin of about 0.02% per year. The profit margin of the well-managed tea estates, on the other hand, is 38% per year. It may be concluded that the well managed tea estates operate under much better condition and in an efficient manner when cost of production, price and profit aspects are considered.

Notes

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[37] 1US dollar =57.88 Taka (International Tea Committee, 2003, p. 49)

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[40] *Category 'A' tea estates:* Producing an average of 180 thousand tons or above per year. *Category 'B' tea estates:* Producing an average of 108 thousand tons or more but less than 180 tons per year. *Category 'C' tea estates:* Producing an average of 27 thousand ton or more but less than 108 tons per year.

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Chapter IV

Strategic Cost Management: An Application on the Tea Industry in Bangladesh

This chapter focuses on the development of a strategy for the tea industry of Bangladesh with an emphasis on the value chain and cost analysis of the tea estates using some tools of the strategic cost management. At the outset, this chapter focuses on the theoretical aspects of the strategic cost management and value chain analysis. An attempt is also made to relate the generic concept of value chain with the model of the tea industry in Bangladesh. In addition, this chapter focuses on the value chain model of the tea industry in Japan and examines the applicability of the Japanese model as a strategic tool for the development of the low performing tea estates in Bangladesh. A simulation analysis is administered to reveal the situation of the poorly-managed tea estates after the implementation of strategic decision. The simulation analysis mainly focuses on cost analysis of the poorly-managed tea estates and explains the structure of profitability after executing strategic decisions. While doing simulation analysis, some rigorous cost analyses are done to simulate the performance of these tea estates.

4.1 Strategic Cost Management: A Focus on Value Chain Analysis

4.1.1 Concepts and Review

Strategic cost management results from an amalgamation of value chain analysis, strategic positioning analysis and cost driver analysis[1]. Among these three core concepts, value chain analysis plays an important role in strategic cost management. A study introduces the concept of value chain for the strategic improvement of firm or industry[2]. This concept is further developed[3]. It is observed that the core idea of the value chain is linked to the set of value creating activities all the way from basic raw material sources to component supplier through the ultimate end-use product delivered to the final consumers' hands[4]. If the value chain can be expressive, strategic decision can be made more easily depending on the understanding of the firm's competitive advantage[5]. In strategic cost management, the role of cost analysis differs when the question of how the firm chooses to compete is addressed. A recent study maintains that the basic choice of a business is to compete either by having lower cost (cost leadership) or by offering superior products (product differentiation)[6] and these two approaches seek very different conceptual frameworks[7].

The introduction of cost leadership or differentiation strategy depends on the managerial decision making and the nature of the business. An introduction of cost leadership strategy in the commodity business during the mature stage seeks careful analysis to attain the target cost[8]. In this situation, proper setting of target cost can help the firm to secure a position in the industry. In strategic cost management it is acknowledged that cost is caused, or driven, by many factors that are interrelated in a complex manner. An understanding of cost behavior actually means a realization of the complex interplay of

the set of cost drivers at work in any given situation[9].

In management accounting, cost is a function of only one cost driver, output volume. In strategic cost management, output volume is seen to capture very little of the richness of cost behavior[10]. Management accounting, in this regard, tends to draw upon the simple models of basic microeconomics. Strategic cost management, on the other hand, predisposes to draw upon the richer models of the economics of industrial organization[11]. Basing on the structural and executional drivers, cost drivers may be categorized[12]. A study introduced the concept of structural cost drivers[13] (scale, scope, experience, technology and complexity). Another study explained the concept of executional cost drivers[14] (participation, total quality management, capacity utilization, product configuration, exploiting linkages with suppliers and customers). Complexity, as a structural variable, has received the attention of the accountants recently. The potential importance of complexity as a cost determinant are shown in the studies on the activity based costing[15]. Several studies focus on strategic cost management especially in the area of value chain analysis and target costing in the manufacturing and service industries.

A study on Japanese subsidiaries in United States attempts to find out the practice of accounting system in those subsidiaries[16]. It is concluded that Japanese firms in the Unites States practice similar management accounting methods like target costing, value engineering, and direct costing. They also use traditional methods like standard costing and budgeting for the adoption of strategies. Moreover, these firms employ the concept of activity based costing and internal rate of return to evaluate the circumstances of the

firms. This study also concludes that Japanese firms in the United States are also influenced by the firms in the United States to adopt the concept of activity based costing and internal rate of return to evaluate the capital investment projects.

A recent study focuses on conventional net present value (NPV) framework and relates this concept to strategic cost management for the purpose of decision making[17]. By an in-depth study on the firms in United States and the study provides suggestion basing on the issues of strategic cost management like value chain analysis, cost driver analysis and competitive advantage analysis. With a motive of cost reduction target costing approach in Japanese companies are also examined[18]. It is also observed that information system is necessary for the adoption of the idea of target costing. Studies are also done on telecommunication industry's deconstruction and reconsolidation from the point of transaction cost perspective and suggestions are also made about the management aspect[19]. The value creation study is also done on the European market for mobile data[20]. In addition, some studies are also done on manufacturing and service industry in the Unites States and Hong Kong and these studies focus on cost analysis in the value chain[21].

4.1.2 Generic Value Chain and Value Chain of the Tea Estate in Bangladesh: A Comparison

Generic Value Chain of a Firm

The concept of value chain is introduced by Porter and this concept elucidates that value chain disaggregates a firm into its strategically relevant activities in order to understand the behavior of costs and existing and potential sources of differentiation[22]. The value chain of each firm is composed of nine generic categories of activities which are

associated together in typical ways. These nine activities can be divided into two broad categories like primary activities and support activities[23]. The generic value chain of a firm is shown in Figure 4.1. The primary activities (inbound logistics, operations, outbound logistics, marketing and sales, services) are related with physical creation of the product, sale and transfer the product to the buyer as well as after sales services. Support activities, on the other hand, assist the primary activities for the smooth completion of the whole process. Support activities assist the primary activities by purchasing inputs, providing superior technologies, human resources and other firm wide functions. The dotted lines in the support activities in Figure 4.1 indicate that procurement, technology development, and human resource management can be related with specific primary activities and at the same time support the entire value chain[24]. A brief explanation of primary and support activities is provided below.

Primary Activities[25]

a. *Inbound logistics:* Activities associated with receiving, storing, and distributing inputs to the product. Such as material handling, warehousing, inventory control etc.
b. *Operations:* Activities associated with transforming inputs into the final product. Such as machining, packaging, tasting and printing etc.
c. *Outbound logistics:* Activities associated with collecting, storing and physically distributing the product to buyers.
d. *Marketing and sales:* Activities associated with inducing the products. Such as advertising, promotion and sales force, channel selection, pricing etc.

e. *Service:* Activities related to after sales service to the buyers. Such as installation, repair, training etc.

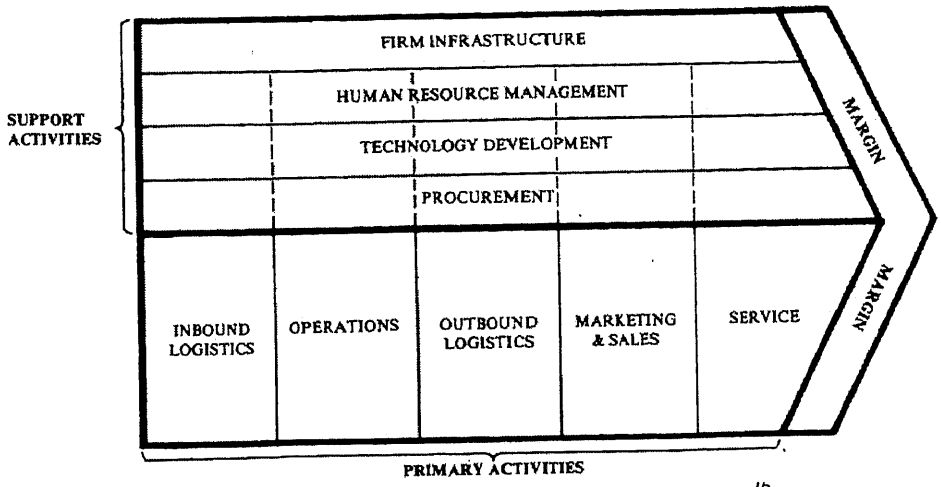

Figure 4.1: Generic value chain of a firm[26]

Support Activities[27]

a. *Procurement:* Procurement is the functions related to purchasing of inputs which will be used in the value chain of the firm. Such as purchasing of raw materials, supplies, machineries, office equipments etc.

b. *Technological development:* The activities related to the technology of the firm. Such as technology know-how, procedures etc.

c. *Human resource management:* The activities related to recruiting, training, development and compensation of all types of personnel in the firm.

d. *Firm infrastructure:* The activities which are associated with general management, planning, finance, accounting, legal, quality management etc.

Value chain of Tea Estates in Bangladesh

The total activities of value chain in tea industry in Bangladesh are also divided into primary and support activities. The generic value chain model of the tea estates in

Bangladesh is given in Figure 4.2.

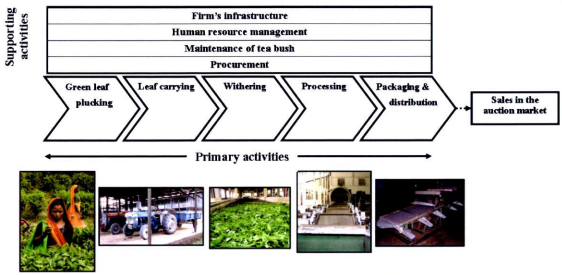

Figure 4.2: Value chain of the tea estate in Bangladesh

The primary and supporting activities of the tea estates in Bangladesh are mentioned in the following:

Primary Activities

a. *Green leaf plucking:* Green leaf is the primary raw material for the production of black tea. The plucking of the green leaf is mainly done manually by female workers.

b. *Leaf carrying:* The activities related to carry green leaf usually depend on the distance from the field to factory. This activity of carrying leaf has significant influence on other activities in the value chain as the quality of green leaf deteriorates very quickly. The lack of giving importance on this activity may affect the quality of black tea.

c. *Withering:* Tea leaf contains around 74 ~77% moisture and 23~26% of solid matter[28]. This withering procedure helps to take out moisture from the tea leaf. The quality of black tea depends on proper withering of green leaf.

d. *Processing:* The activity involves in this stage of value chain is cutting, fermenting, drying of the green leaves. Black tea is available for packaging and delivery at the end of this stage.

e. *Packaging and distribution:* The activities involve at this stage are bulk packaging of black tea and distributing them to the auction market for selling.

Support Activities

a. *Firm's infrastructure:* The activities involve in this stage are general management, planning, crisis management, finance, accounting and decision related to maintenance of factory and buildings etc.

b. *Human resource management:* Tea industry is labor intensive industry and human resource management occupies a major part of this industry. The activities related to this stage are labor welfare, benefit to managers and staffs, work distribution to the labor etc.

c. *Maintenance of tea bush:* This is the prime activity for the existence of the tea estate. The effective life cycle of the tea bush is until 40 years, which is the mature stage of the tree. After this stage of the life cycle quality of green leaf deteriorate and quantity of green leaf turns low. Besides, tea bush need yearly maintenance (pruning, sickling, mulching etc.) for maintaining production level to optimum level.

d. *Procurement:* The activities consist at this stage are buying inputs for the operation of a firm.

4.2 Value chain Analysis of Japanese and Bangladeshi Tea Industry

4.2.1 Tea Manufacturing Process: Comparison between Japanese Green Tea and Bangladeshi Black Tea

There are two major types of tea such as, green tea and black tea. The process of production of the green tea is quite disparate from black tea. Steaming of green leaves is required after the withering phase of green leaves. The process of production of green tea should pass over the fermentation stage just to prevent oxidization. The oxidization process transforms the color of tea leaves into brown. For this reason, the color of processed green tea is green. On the other hand, black tea possesses nice flavor and light brown color due to the effect of oxidants, which makes tea leaves brown[29]. Besides, to prevent oxidization, special type of processing, handling and storage are needed for green tea. The general steps of manufacturing process of green tea and black tea are depicted in Figure 4.3.

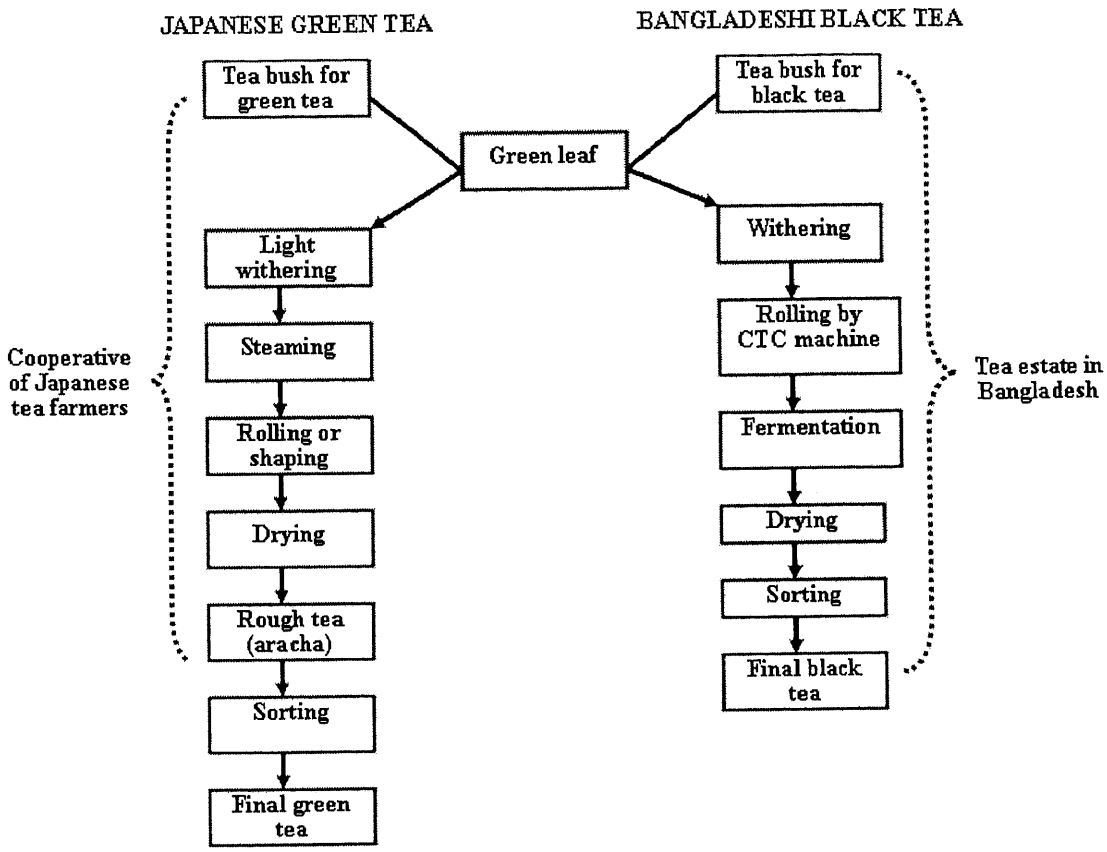

Figure 4.3: Steps of the manufacturing process of green tea and black tea[30]

Manufacturing process of black tea in Bangladesh

Plucking

In an ideal situation a shoot of a tea plant have two leaves and a bud. The quality of processed tea depends on the standard of plucking. There are chances of adding up of fiber materials in the dried substances, if pluckers do not maintain a required standard. In Bangladesh, green leaves are plucked by hands and tea estates usually pluck 30 times in one year. Figure 4.4 represents the hand plucking process of green leaf in Bangladesh. The green leaves are either carried by the tea pluckers manually, or by tractors depending on the distance from the plucking area. The vehicles used for carrying green

leaf in Bangladesh are shown in Figure 4.5.

Figure 4.4: Hand plucking of green leaf in Bangladesh[31]

Figure 4.5: Vehicle for carrying green leaves[32]

Withering

Withering means to lose freshness. A shoot contains 74~80% moisture and 20~26% of solid matter[33]. The moisture content of green leaf is taken out at this stage using withering trough and fan. In the withering trough fresh air is blown by fan from the bottom of the withering trough (Figure 4.6). It is observed by the scientist that many

biochemical changes are done in the withering process which directly or indirectly affects the quality of processed tea. It is observed that best tea can be made with normal temperature of 32^0 centigrade and withering time requires from 10 to 12 hours[34].

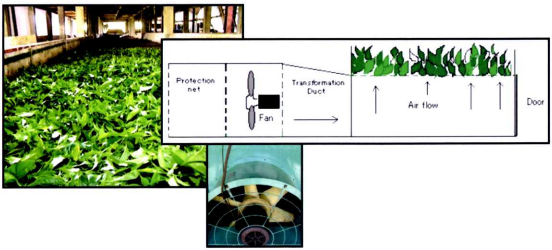

Figure 4.6: Withering process of green leaves in Bangladesh[35]

Processing of Green Leaf

This stage includes the stages of rolling, fermentation, drying and sorting of green leaves. The processing stage starts from crushing the green leaves. In Bangladesh, CTC (Crush, Tear, Curl) machine are used for crushing, tearing and curling of green leaf. The CTC machine crushes the green leaves at first and at the end of the process curled leaf comes out from the machine. The color of the leaf at the end of the stage stays green. The crushed and curled leaf is called Dhool. They are moved to the fermentation stage from the CTC machine. Fermentation is basically the oxidization of the green leaves. In the fermentation stage, Dhool are spread either manually on the wide surface in thin layer or spreading of Dhool can be done by fermentation machine. Leaf color turns into brown after fermentation. This stage requires 3~6 hours with a room temperature of 28^0~ 34^0 centigrade[36]. The fermented Dhool are transferred to the dryers from

fermentation floor or machine. The temperature of the dryer is set around 49^0~50^0 centigrade. The usual moisture level in the processed dried tea ranges from 3 to 4%[37]. The dried tea is sorted depending on different grades (from large size to small size). There is another function of sorting which is cooling down the temperature of processed tea. Otherwise the smell of the processed tea becomes bad. The manufacturing process of black tea is given in Figure 4.7.

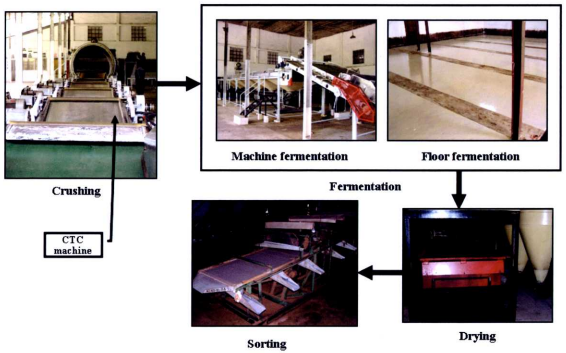

Figure 4.7: Manufacturing process of black tea in Bangladesh[38]

Manufacturing process of green tea in Japan

Plucking

Tea leaves are plucked, generally, four times in a year starting from April to October. Tea flushes are plucked either by hand or using machine in Japan. The hand plucking of tea flushes is usually done in the very early stage of the first crop. The first crop comes between April and mid May. There are various types of machines for plucking green

leaf. Portable machine is suitable for one or two persons. Besides, there are rail tracking machines and riding type plucking machine[39]. Green leaves are carried to the cooperative farmers' manufacturing plant just after plucking. Carrying green leaf does not require long time due to the proximity of the factory from field. The procedure of plucking and carrying of green leaves is shown in Figure 4.8.

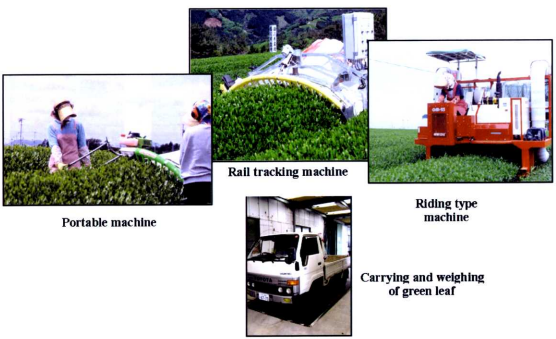

Figure 4.8: Plucking and carrying of green leaf in Japan[40]

Processing of Green Leaf

This stage contains the steps of light withering, steaming, rolling or shaping, crumpling and drying of green leaves. The stage starts with cleaning the dust from the green leaves and after that green leaves are transferred to the withering room for light withering. The green leaves are moved from withering room for steaming. Steaming stage is most vital part for green tea, though it takes only 30~60 seconds. If green leaf is over steamed, the astringency and refreshing aroma of the Sencha[41] may disappear. On the other hand, the

taste of green tea may not be good if tea leaves are under steamed[42]. After steaming the leaves are shifted to drying, crumpling and shaping stages. At the end of the shaping stage, the processed tea is called rough tea *(aracha)*[43]. This tea is sold from cooperative manufacturing plants to the final processors or distributors through brokers. The manufacturing process of rough tea *(aracha)* is shown in Figure 4.9.

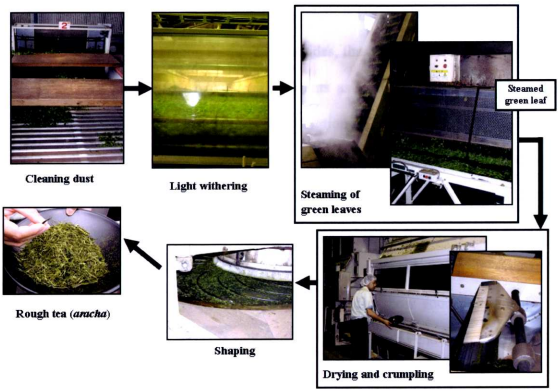

Figure 4.9: Manufacturing process of green tea in Japan[44]

4.2.2 Value Chain Structure of the Tea Industry: A Comparison between Japan and Bangladesh

Value chain Structure of Japanese Tea Industry

The value chain of Japanese tea industry starts from tea farmer and tea processing plant. It belongs to a group of farmers who runs the business with cooperative farming system. The farmers pluck green leaves depending on the capacity of the processing plants. Managers actually decide how much a farmer should pluck and this decision is taken on

the basis of the capacity of production of the manufacturing plant on a specific day. The manufacturing plants process the green leaves up to *aracha* and agents keep in touch with the processing plant to fix the price and rank the quality of *aracha.* The agents keep contact with the processing companies/distributors and also with the cooperative farming associations who sell *aracha.* The distributors process *aracha* into final green tea, then grade them and finally sell them to retailers (Figure 4.10). It is observed in the field survey that tea farmers within the cooperative association exchange information and shares instruments among themselves. Besides, the farmers who have knowledge of manufacturing tea help the manufacturing plants as temporary workers. This type of total involvement mechanism increases motivation of the farmers to produce good quality green leaf and at the same time ensures superior quality of green tea. In Japan, the smallholding farmers' cooperative associations have their own manufacturing system and they have the capacity to meet the demand of the peak season. In addition to this, Japanese smallholding farmers' cooperatives get fund from the cooperative association for replanting tea bushes. Farmers who can show good performances get extra monetary incentive after the selling of the *aracha* at the end of the year. Brokers have deep attachment with cooperative association. They exchange information prevailing in the market especially related to quality and price. This kind of mechanism helps the cooperative association to set the average price of green leaf by doing backward calculation. In case of Japanese cooperative mechanism, before buying the green leaves from each tea farmer, quality assessing section of each manufacturing plant grades the quality of green leaves adopting a sampling method. The sample from each lot is put into quality measuring machine. They have different sets of prices on the basis of quality. The price of that lot is fixed on the basis of quality of each sample. This type

of quality measurement mechanism motivates the expert and good farmers to produce good quality green leaf.

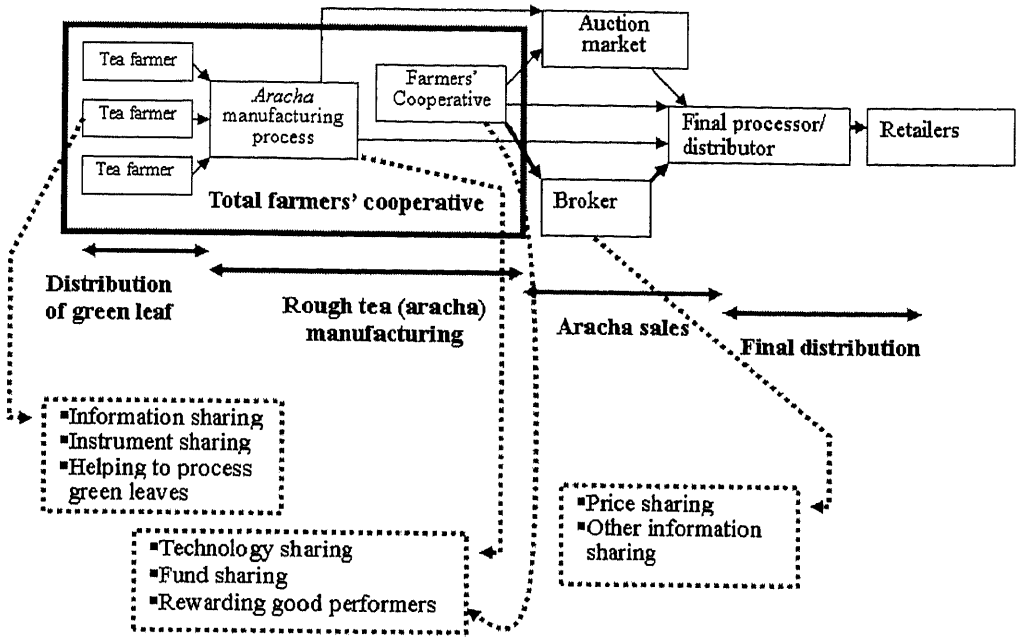

Figure 4.10: Value chain of tea market in the Shizuoka prefecture[45]
(Figure is translated and modified)

Value chain Structure of Bangladeshi Tea Industry

The value chain of the tea industry in Bangladesh concentrates on tea estates rather than on farmers' cooperative mechanism. The quantity of production largely relies on large and small tea estates, which is quite opposite to Japan. Most of the tea estates in Bangladesh have tea manufacturing plants. Each tea estate is involved in the process of plucking tea leaves up to the delivery of black tea to the broker's premises. Most of the tea estates do not manage the land under tea cultivation as it should be, and for this reason the quality of tea leaves becomes inferior. Besides, lack of proper handling practice and suitable withering of green leaves downgrade the quality of processed tea. In case of Japanese cooperative mechanism, before buying the green leaves from each

tea farmer, quality measuring section of the each manufacturing plant grades the quality of green leaves adopting a sampling method. The price of the lot is fixed on the basis of quality. This type of rigorous procedure does not exist in Bangladesh. It is felt that each tea estate of Bangladesh should undergo through the specified process mentioned in Figure 4.11. After the bulk packaging on premises of the tea estate, the processed black tea is sent to the broker's warehouse. The delivery and partial storage cost of the broker's warehouse is carried by the individual tea estate. The total value chain process is shown in Figure 4.11. There is no cooperative farming system in Bangladesh which is quite opposite to Japanese industry. Cooperative manufacturing system helps to share the leaf production risk among farmers. In Bangladesh, tea gardens are owned by companies. Companies take all risks. In Japan, on the other hand, the smallholding farmers' cooperative associations have their own manufacturing system and they have the capacity to meet the demand of the peak season. On the other hand, Bangladeshi owners do not have enough manufacturing capacity which can meet the demand of the peak season. In addition to this, Japanese smallholding farmers' cooperatives get fund from the cooperative association for replanting tea bushes. The farmers who can demonstrate good performances get extra monetary incentive after the selling of the *aracha* at the end of the year. This system can not be seen in Bangladesh.

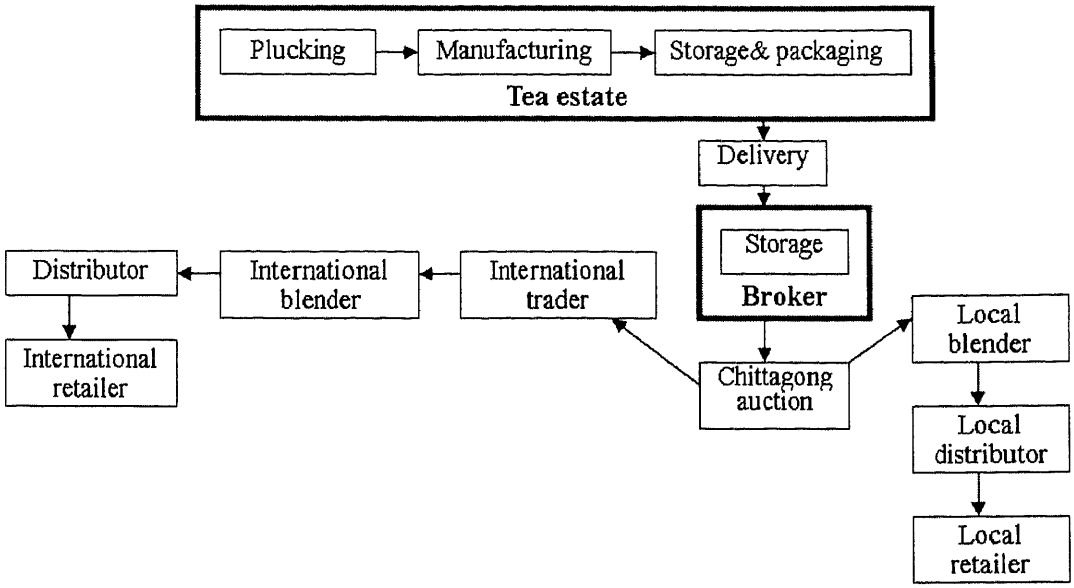

Figure 4.11: Value chain of the tea industry in Bangladesh[46]

In Bangladesh, black tea is sold through auction market by open bidding. Both local and foreign buyers participate in the bidding process. In the auction market, on behalf of the bidders, tea tasters judge the quality of tea from each lot by tasting samples and the price is determined accordingly. Due to the above mechanism that exists in the auction market, good quality tea receives higher price in comparison to inferior quality tea.

4.2.3 Value Chain and Bottlenecks of the Tea Industry in Bangladesh: Comparison between Well and Poorly Managed Tea Estates

This section compares situation of the bottlenecks of the well-managed and poorly-managed tea estates with an analysis of value chain. It was observed in the field survey that the well-managed tea estates operated very efficiently and there did not exist any bottleneck in the process of production. In addition, these tea estates had enough capacity to deal with the crisis situation. Poorly-managed tea estates, on the other hand, suffered severely especially in the area of carrying, processing and also in the stage of

withering during the peak season (Figure 4.12).

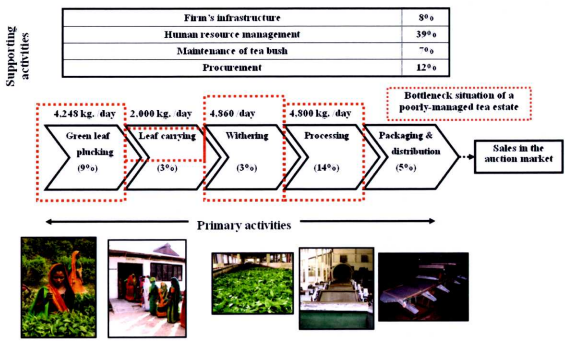

Figure 4.12: Bottleneck and value chain of poorly-managed tea estates

The average carrying capacity of poorly-managed tea estates was 2,000 kilogram of green leaves, but they had average production of about 4,248 kilogram of green leaf per day. In the poorly-managed tea estates, in most cases green leaves were carried manually by the pluckers from gardens to the factories. If the carrying process required longer time, due to the distance from the field to the factory, the quality of green leaf deteriorated significantly. Besides, poorly-managed estates encountered severe problem in the stage of withering during peak time. The stage of withering is very much related with the quality of processed tea. In addition, poorly managed tea estates could not manage the situation associated with sudden disorder of machine as the average production of green leaves and capacity of processing of the CTC machine was almost same (Figure 4.12). It was found from the field survey that the leaf processing was

discontinued until the CTC machine was repaired. Sometimes the semi- processed green leaves were thrown away, as the quality of the leaves sharply deteriorated for taking long repairing time. On the other hand, well-managed tea estates never faced this sort of problem as they had enough capacity to tackle this type of crisis situation (Figure 4.13).

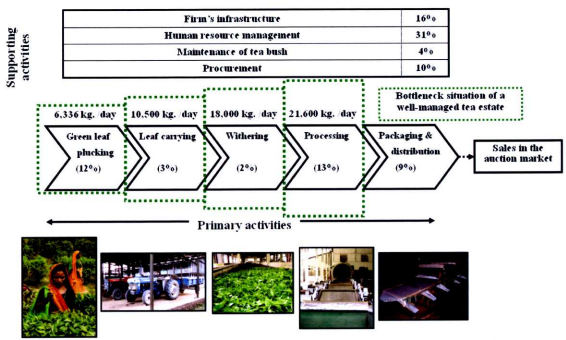

Figure 4.13: Bottleneck and value chain of well-managed tea estates

4.3 Strategic Restructuring of the Tea Estates in Bangladesh

4.3.1 Modification of Value Chain: A Strategic Alliance Approach

Strategic decisions are needed to improve the performance of poorly-managed tea estates. The strategic alliance of the low performing tea estates could be an option in this respect. This initiative may substantially increase the production of the poorly-managed tea estates and the strategic alliance gardens may also produce good quality tea. It is understood that the cost of production would be low in the gardens which adopt the strategic alliance technique.

The cooperative farming model is widely practiced among the tea farmers in Japan. This Japanese model may be used for the tea industry of Bangladesh with slight modifications. It is realized that this adjustment is necessary to make the model more suitable for the tea estates of Bangladesh. It is due the fact that in comparison to Japan, the size of the tea estates of Bangladesh is very large. For this reason the farmers' cooperative approach may not be appropriate in Bangladesh. In that case strategic alliance among the low performing tea estates would be a suitable option[47]. A research focused on the possibility of alliance among the closely sited tea gardens located in the south-eastern part of Bangladesh. In this situation, small gardens operate as leaf growers and there exists a central leaf buying unit operated by the government. The responsibility of the central leaf buying unit is to buy leaves from the growers and sell them to the central leaf processing unit[48]. The two stage handling of green leaves actually reduces the quality of black tea and which in turn reduces the price of tea in the auction market.

The proposed model of strategic cooperative alliance[49] (SCA) is a combination of Japanese model and the model of strategic alliance for the tea industry in Bangladesh[50]. In the SCA model, central leaf manufacturing facility may have a buying place equipped with quality measurement device. The leaf producing firms will directly carry the green leaves to the central leaf processing plant. Quality measuring machine measures the quality of green leaves before buying from the strategic growers and set the price accordingly depending on the grades of the leaves[51]. As the quality of green leaves deteriorate very fast, proper handling is necessary for maintaining their quality. The SCA model, if adopted, would improve the situation which may maintain the quality of

green leaves due to one level handling and at the same time encourage the high performing tea gardens to elevate the price of tea. This model uses a common leaf processing facility established by the strategic cooperative alliance firms. This model, if adopted, can reduce fixed cost related to the establishment of multiple factories. Tea estates either can use their existing machineries for the establishment of a manufacturing unit or can share their common fund for this purpose. Besides, cooperative alliances model can use their common fund for land development and maintenance of tea bush which may solve scarcity of resources[52]. Figure 4.14 shows the composition of the new value chain for the low performing tea estates in Bangladesh.

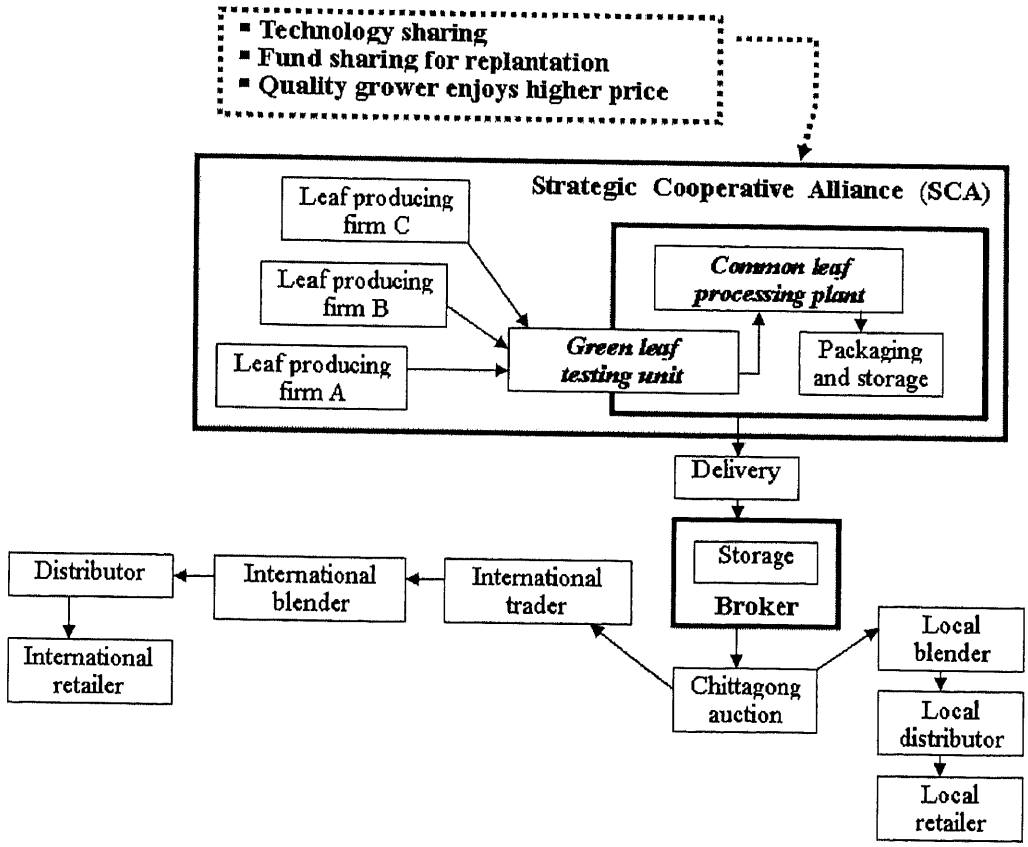

Figure 4.14: Strategic cooperative alliance (SCA) model[53]

In contemporary value chain system which can be observed in Bangladesh, each tea estate is responsible from the stages of plucking of tea leaves to the delivery of product to the brokers (Figure 4.11). In the SCA model, plucking and leaf carrying type of primary activities are shifted to leaf producing company. This may help the strategic alliance firms to concentrate more on production and producing better quality leaves by nurturing and maintaining the tea bushes. Currently, tea estates are reluctant to uproot their old tea plants due to the risk of lowering the production of tea. The proposed model would reduce this type of risk as few gardens would supply green leaves without hampering production. The SCA model can keep the production level of firm to an optimum level. The profit sharing system, depending on the performance of the gardens, of the Japanese cooperative association is very widespread among the farmers. Replication of this type of incentive system may enhance the strength of the strategic alliance tea gardens. The Bangladesh Tea Board may monitor the implementation process of the SCA model. They have the supreme authority in appraising the performance of the gardens and leasing land to the tea estates. Besides they also provide performance report of each tea estate to the banks, which are used later on for sanctioning loans. The Bangladesh Tea Board, who has the administrative and financial authority, may encourage the low performing tea estates to form a strategic alliance among them to significantly improve their level of performance.

The above model on strategic cooperative alliances is applicable to both large and small gardens that have target in increasing production and making good quality tea with low cost and little risk. As this alliance uses a common production facility, overall manufacturing cost would be low. This model stresses that one should identify small tea

gardens (below 200 hectare) situated in the proximity with low yield per hectare. This will help to uproot and maintain tea bushes. These types of gardens also have fewer complications in the structure of management. It is understood that after the successful implementation of this approach, large tea gardens may be inspired to follow this model.

4.3.2 Cost Implications of Strategic Cooperative Alliance (SCA) Model

Structure of Tea Area and SCA model: A Simulation Analysis

A recent study proposes the strategic cooperative alliance (SCA) model as a strategic tool for the low performing tea estates in Bangladesh[54]. The study does not focus on financial feasibility of the model. Another study focuses on applicability of strategic cost management in the SCA gardens of tea industry in Bangladesh. The study focuses on general applicability of strategic cost management in the SCA gardens[55], but does not concentrate on cost driver analysis for the financial feasibility of the model. It is important to understand detail cost and profit aspect using the tool of cost driver analysis for a successful implementation of the model. This model assumes that the poorly-managed tea estates would operate efficiently, just like the well-managed tea estates, after a successful application of it. A simulation analysis is administered to compare the situation of the SCA gardens and poorly-managed tea estates. The small (less than 200 hectare) and low performing tea estates (yield 601~1000 kilogram) are selected for the simulation analysis. Large and very low performing tea estates are not taken into consideration. The young bush areas have very high and significant bearing on the production of tea. The objective of the SCA model is to minimize old bush area by replanting and increasing the young bush area of the leaf growing tea gardens. Figure

4.15 shows the simulation model of poorly-managed tea estates and SCA gardens. After the successful application of the SCA model, young bush area may be expanded to 763 hectares in the SCA gardens. On the other hand, young bush area in the poorly-managed tea estates turns to 369 hectares if no strategic initiatives are taken. Furthermore, up to 170 hectare of the old bush area would be reduced in the leaf growing gardens. In the poorly managed gardens on the other hand, the area may be increased to 607 hectares, which is due to large portion of mature bushes will become old. As a result, the area contains old bushes will be increased. If this model is adopted, production level of the strategic alliance gardens will increase considerably. The young bush area will not only provide high production, but also be a constant source of high quality green leaf. In addition, SCA gardens, if they are maintained properly, may produce good quality green leaf till the mature stage of the plants. Furthermore, the SCA model also emphasizes to minimize the cost of production and improve the level of performance. This is why this model is formulated on a common processing unit, which might minimize the fixed cost of production.

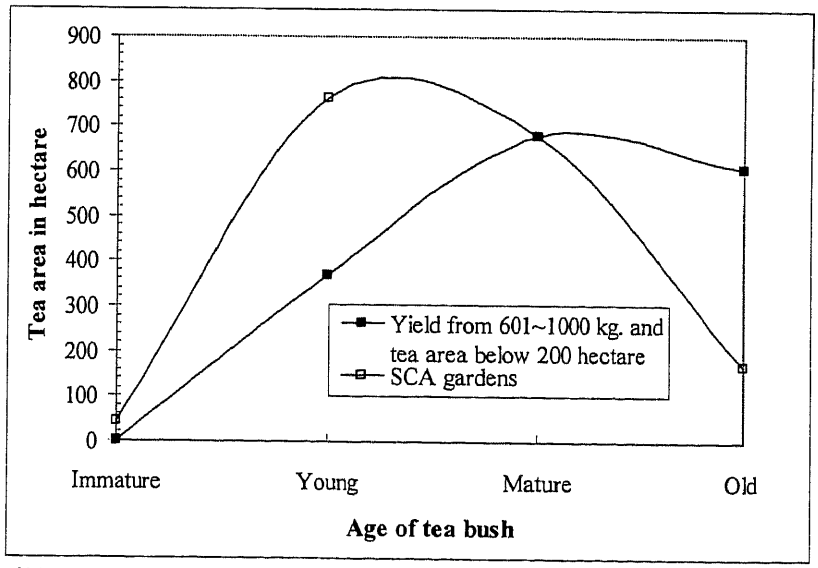

Figure 4.15: Simulation of tea area in the SCA gardens and poorly-managed tea estates

The SCA model emphasizes that the poorly-managed tea estates would operate as efficient as well-managed tea estates after the implementation of the model. Table 4.1 depicts the concise format of the regression analysis in the well-managed and poorly-managed tea estates, which is discussed in detail in chapter 3. The beta coefficients of the regression analysis conclude that well-managed tea estates operate much better than poorly-managed tea estates in case of production of tea. Production from young bush area in well-managed tea estates is highest (2082.21). The production level is quite low in the poorly-managed tea estates (1063.53). Moreover, production from mature and old bush area is also very significant in well-managed tea estates than the poorly-managed tea estates.

Table 4.1: Comparisons between production and tea area in the well and poorly-managed tea estates

		Well-managed Tea estates	Poorly-managed tea estates
	Yield per hectare	Above 1500	From 601~1000
	Tea area	-	Below 200 hectare
	r^2	0.973	0.917
	Adjusted r^2	0.970	0.892
	F value	292.583	36.95
Unstandardized beta coefficient**	Young	2082.21 (0.006)*	1063.53 (0.001)*
	Mature	1690.89 (0.000)*	907.74 (0.000)*
	Old	1654.13 (0.000)*	642.30 (0.001)

Dependent variable: Production in kilogram
*Parentheses represent the significance level
** Immature bush area has been omitted due to insignificant value and high multicollinerity

SCA Model and Cost Implication: Simulation Analysis Using Cost Drivers

This section discusses on improving the condition of poorly-managed tea estates by adopting SCA model. Table 4.2 portrays the simulation of production of a poorly-managed tea estate. The production of a poorly-managed tea estate is derived by

Table 4.2: Simulation of production and available facilities in a poorly-managed tea estate

	Average tea area In hectare	Production of tea is taken from regression analysis (in kg.)	Production in kg.
Young bush	26.36	1063.53	28,037
Mature bush	48.54	907.74	44,066
Old bush	43.37	642.30	27,860
Total area	**118.28 hectare**		
Total production of processed tea			**99,962 kg. (100 ton)**
Total production of green leaf (1,000 gm. green leaf = 230 gm. processed tea)			**434,619 kg. (435 ton)**
Total labors (in average)	681		
Total managers and staffs (in average)	26		
Housing area (in average)	60 hectare		

multiplying the average tea area of a poorly-managed tea estate and associated production from that area. The data related to production from the tea area are taken from Table 4.1. The simulation model also predicts that the total production of a poorly-managed tea estate would be 99,962 kilogram (100 ton) per year. It is observed from the field survey that the recovery rate of the processed tea from green leaf is around 23%. It is further assumed that about 434,619 kilogram (435 ton) of green leaf would be produced per year in a poorly-managed tea estate if no strategic initiative is adopted for them. The cost of production of processed tea in a poorly-managed tea estate is shown Table 4.3. The cost drivers used to calculate the cost of production are taken from the cost analysis of the poorly managed tea estates. It is observed from Table 4.3 that the unit cost of growing leaf in a poorly-managed tea estate would be 15.92 taka and unit cost of black tea, on the other hand, would be 91.09 taka per kilogram. It is further observed from the field survey the average sales price of the poorly-managed tea estates is 62.70 taka per kilogram. As a result, poorly-managed tea estates, undoubtedly, would operate with huge loss. It seems that low production is the main cause of the loss

Table 4.3: Cost[56] of production of a poorly-managed tea estate
(Considering simulation of production of tea) (Yield 601~1000kilogram)

		Cost in taka
LEAF GROWING		
DIRECT COST		
Labor cost		
Wage cost for plucking	@1.22 Tk./kg. green leaf	529,670
OVERHEAD COST		
Material cost for production		
Fertilizer	@1,351 Tk./hectare	159,814
Insecticide	@745 Tk./hectare	88,144
Carrying cost		
Transportation cost	@0.40 Tk./kg. green leaf	173,497
Maintenance cost		
Maintenance cost of tea bush	@3,185 Tk./hectare	376,743
Maintenance cost of manager and staff building	@14,197 Tk./area in hectare	851,832
Benefit to staff and worker		
Management and staff benefit	@80,242 Tk./person	2,086,298
Labor welfare cost	@3,754 Tk./person	2,556,534
Others		
Rent and Tax	@799 Tk./hectare	94,450
Total cost of leaf growing	@15.92 Tk./kg. green leaf	6,916,982
LEAF PROCESSING		
DIRECT COST		
Withering	@0.46 Tk./kg. green leaf	200,218
Manufacturing	@1.70 Tk./kg. green leaf	739,329
Packaging	@3.03 Tk./kg. processed tea	302,587
DIRECT LABOR		
Labor	@1.16 Tk./kg. processed tea	115,679
OVERHEAD		
Maintenance cost of factory	@0.19 Tk./kg. green leaf	80,832
Other wages	@1.73 Tk./kg. green leaf	750,024
Total cost of leaf processing		2,188,670
TOTAL COST	@91.09 Tk./kg.	**9,105,652**
TOTAL SALES	@62.70 Tk./kg.	**6,267,890**
TOTAL LOSS		**-2,837,762**

that would be incurred. It is opined that a strategic initiative, such as the adoption of SCA model, could improve the situation of these low performing tea estates.

The situation of the poorly-managed tea estates after the adoption of SCA model is stated in Figure 4.15. It is assumed in the model that the SCA gardens would operate efficiently as well-managed tea estates and for this reason the data on production and cost drivers for the analysis of SCA gardens are derived from the well-managed tea estates. Three poorly-managed tea estates are selected to build strategic alliance among them. These gardens will act like leaf growers and they will sell green leaves to a common leaf processing plant owned by the alliance. The common leaf processing plant will also operate like a profit center with a separate entity. This form of structure prevails in the cooperative association of the Japanese tea industry.

Table 4.4: Simulation of production and available facilities in the strategic cooperative alliance (SCA) gardens

	Average tea area in hectare	**Production of tea is taken from regression analysis (in kg.)**	**Production in kg.**
Young bush	54.48	2082.21	113,432
Mature bush	48.54	1690.87	82,083
Old bush	12.14	1654.13	20,075
Immature	3.12	Not applicable	Not applicable
Total area	118.28		
Total production of processed tea (single tea estate)			215,590 kg. (216 ton)
Total production of green leaf (single tea estate) (1000gm. green leaf = 230 gm processed tea)			937,346 kg.(937 ton)
Total production of processed tea of SCA gardens (Strategic alliance of three tea estates)			646,769 kg. (647 ton)
Total production of green leaf of SCA gardens (Strategic alliance of three tea estates)			2,812,038 (2,812 ton)
Total labor of a leaf growing garden (on average)			681 persons
Total managers and staffs of a leaf growing garden (on average)			22 persons
Total manager and staffs of leaf processing unit of SCA gardens (on average)			7 persons
Housing area			60 hectare

Table 4.5: Cost[57] of production of green leaf of a leaf growing garden in the SCA model
(Considering simulation of production of tea)

		Cost in taka
COST OF A LEAF GROWING GARDEN IN THE SCA MODEL		
DIRECT COST		
Wage cost for plucking	@1.17 Tk./kg. green leaf	1,098,566
OVERHEAD COST		
Material cost for production		
Fertilizer	@2,890 Tk./hectare	341,857
Insecticide	@1,193 Tk./hectare	141,058
Irrigation cost using sprinkler[58]		
Disel cost	@19 Tk./hour	18,240
Labor cost	@3.5 Tk./hour	10,080
Carrying cost		
Transportation cost	@0.27 Tk./kg. green leaf	253,221
Maintenance cost		
Maintenance cost of tea bush	@2,154 Tk./hectare	254,783
Maintenance cost of managers and staff building	@16,652 Tk./area in hectare	432,951
Depreciation cost of replantation[58]	@3,362 Tk./hectare	105,032
Depreciation cost of sprinkler[58]	@115 Tk./hour	110,000
Benefit to staff and worker		
Management and staff benefit	@106,295 Tk./person	2,444,793
Labor welfare cost	@2,975 Tk./person	2,025,916
Others		
Rent and Tax	@1,519 Tk./hectare	179,628
TOTAL COST OF LEAF GROWER		7,416,123
PROFIT (15% is the industry average)		1,112,418
TOTAL SALES OF A GROWER		8,528,541
UNIT PRICE OF GREEN LEAF	937,346 kg. (937 ton)	9.10

The production of a strategic leaf grower is given in Table 4.4. The production of a leaf grower is derived by multiplying the average tea area of a strategic grower and associated production from that area in the well-managed tea estates. The data related to production from the tea area is taken from Table 4.1. The simulation model states that total production of processed tea of a strategic grower would be around 215,590

kilogram (216 ton) per year, which is notably higher than the poorly-managed tea estates. It was gathered from the field survey that rate of recovery of processed tea from green leaf was around 23%. This rate of recovery would enhance the production of green leaves up to 937,346 kilogram (937 ton) per year in a leaf producing garden (Table 4.4). However, the cost drivers used in Table 4.5 and Table 4.6 are taken from the cost analysis of the well-managed tea estates.

Table 4.6: Cost[59] of black tea of leaf processing plant in the SCA model
(Considering simulation of three gardens SCA model)

		Cost in taka
TOTAL COST OF LEAF PROCESSING PLANT IN SCA MODEL		
DIRECT MATERIAL COST		
Green leaf	@9.10 Tk./kg. green leaf	25,585,623
Withering	@0.23 Tk./kg. green leaf	636,137
Manufacturing	@1.24 Tk./kg. green leaf	3,474,842
Packaging	@3.61 Tk./kg. processed tea	2,336,636
DIRECT LABOR COST		
Labor	@0.11 Tk./kg. processed tea	70,931
OVERHEAD COST		
Maintenance cost of factory	@0.16 Tk./kg. green leaf	437,965
Depreciation cost of new CTC machine[60]	@0.03 Tk./kg. green leaf	79,559
Depreciation cost of new withering troughs[60]	@0.01 Tk./kg. green leaf	36,163
Depreciation cost of leaf testing machine[60]	@35.97 Tk./test	67,440
Benefit to staff and managers	@106,295 Tk./person	744,067
Other wages	@0.40 Tk./kg. green leaf	378,107
TOTAL COST OF MADE TEA	@52.33 Tk./kg	33,847,469
TOTAL SALES IN AUCTION	@66.91 Tk./kg.	43,275,295
TOTAL PROFIT		9,427,826

It is depicted in the SCA model that a strategic grower should invest for further plantation of tea plants in the old bush area, and for this purpose, a strategic grower needs extra money. In addition, the model stresses on the proper irrigation in the tea gardens. This is needed during the dry season in Bangladesh. The leaf growing gardens

incur additional cost for mechanized irrigation. In the SCA model, the selling price of the green leaf of a strategic grower is derived by dividing the total sales with the total production of green leaf. The cost of each unit (kilogram) of green leaf is 9.10 (Table 4.5). The selling price includes profit margin of a leaf grower. This price of green leaf reflects the average price of a tea grower which may swing depending on the market price of the processed tea. The leaf processing plant as depicted in the SCA model set the price range of green leaf depending on the quality of tea. The SCA model stresses on the bottleneck management of leaf processing plant. For this reason, the leaf processing center is equipped with new CTC machine, withering trough and leaf testing devices. These machines have enough capacity to handle a crisis situation. The processing plants keep their old CTC machine for use during the maintenance of CTC machine and thus cope with the situation. At present, this kind of crisis management system does not exist in Bangladesh.

It is observed from the calculations provided in Table 4.4 and Table 4.5 that the total production of SCA gardens would reach 647 tons per year and unit cost of the processed tea would be 52.33 taka per kilogram which is certainly much less when compared with the poorly-managed tea estates. The average selling price of processed tea, which is the average price of well-managed tea estates, is about 66.91 taka per kilogram which would be considered as the expected selling price of SCA gardens. The simulation model depicts that central leaf processing center in the SCA model may obtain the profit of 9,427,826 taka per year if the model is adopted for their firms. The poorly-managed tea estates, in contrast, operate with a loss of 2,837,762 taka per year if no strategic initiative is adopted. The overall situation of the poorly-managed tea estates may be

changed. They may shift from loss making tea estates to profitable tea estates after the adoption of the SCA model in this respect. As a result, the production of green leaf would increase substantially, and the quality of made tea would improve as well after successful implementation of the model. In the model, each strategic grower can enjoy their own profit and at the same time profit of the leaf processing center can be shared by the strategic growers on the basis of leaf produced and the fund generated in this respect may be utilized for the maintenance of the tea plant. This fund will also help to meet the crisis situation. The profit of the leaf processing center can either be used for the improvement of the facilities of the strategic growers or for improvement of facilities of the leaf processing plant. Moreover, strategic alliance gardens can secure brand image in the tea industry after the adoption of the SCA model which would not be possible otherwise. The SCA gardens also can sell black tea in the auction market with a brand name and this may further help to create a brand image for superior quality of tea.

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[57] 1US dollar =57.88 Taka (International Tea Committee, 2003, p. 49).

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[59] 1US dollar =57.88 Taka (International Tea Committee, 2003, p. 49).

[60] Detail calculation is given in Appendix B.

Chapter V

Results and Conclusions

Tea is a major cash crop as well as a steady export earner for Bangladesh. Tea industry is an agro-based labor-intensive industry of Bangladesh and it has very significant influence on the economy. The tea industry of Bangladesh occupies about 2% share of the world production and about 1% share of the world export. This industry has depicted a positive trend in growth in production in the recent years. The contribution of export had slowed down due to high domestic consumption of tea in Bangladesh. In 1999, about 22.68 thousand ton of tea was exported to foreign countries. The quantity of export decreased to 11 thousand ton in 2004.

The demand for tea in the domestic market of the country is increasing at the rate of 3.5% and on the contrary, the supply of tea is increasing at the rate of 1% each year. If this trend continues, Bangladesh may have to import tea from foreign countries after 2015. Low productivity is a prime factor, which actually impedes the production of tea. Various other factors such as, age of tea bush, poor management of green leaves after plucking, non-utilization of suitable area in the tea estates especially in the poorly-managed tea estates are major causes of low productivity. About 42% of the tea

plantation area of Bangladesh has old bushes (aged more than 41 years). Due to inefficient management and lack of capital, 11,546 hectare of land suitable for tea plantation is left fallow. In addition, the yield of a large number of poorly-managed gardens (sick gardens) is very low and overall cost of production of these tea estates is also very high.

It has been observed by the study that the tea estates in Bangladesh do not have strict cost management regulations. The managements often do not know the actual cost of the product at the various steps of production. Unfortunately, cost of production in general is managed by curtailing jobs, reducing the salaries of the mangers and staffs and wages of the laborers. This very approach of cost reduction, which is often adopted by the managements of the tea estates of the country, actually restricts the development of the estates. These ad-hoc measures actually hinder the sound growth of the tea industry of the country. These measures actually demoralize both staffs and workers and adversely affect the level of motivation of the people associated with this industry.

This study has observed that old bushes actually drop the level of tea production of the tea estates. The tea industry of the country comprises 82% of the total cultivated area with mature and old bushes and old bushes comprise about 42% of the total cultivated area. Moreover, a large part of the cultivated land is left with late mature stage tea plants. The management operation of the bushes is much better in the well-managed tea estates in comparison to the poorly-managed tea gardens. There are 62 tea estates in the country and the average yield of these tea estates is below 1,000 kilogram per hectare. However, among these 62 tea estates, 28 tea estates have yield below 600 kilogram per

hectare. These low performing gardens can neither contribute to the industry nor bring sustainable profit. There are 34 tea estates, which have yield ranging from 601 kilogram to 1,000 kilogram per hectare.

5.1 Results and Conclusions

The results of the regression analyses show that three independent variables (young, mature and old bush area) have high significance on the production of tea both in the well-managed and poorly-managed tea estates. The findings of the regression analysis indicate that the well-managed tea estates in Bangladesh may secure a leading position by producing large quantity of good tea. It is observed in the regression model that the positions of the well-managed tea estates are much better comparing to the poorly-managed tea estates. The beta coefficient of the young bushes under the well-managed tea estates is 2082.21. This further indicates that a change in the young bush area under the well-managed tea estates by one unit (one hectare) will change the level of production by 2082.21 kilogram. The beta coefficient of the young bushes under the poorly-managed tea estate is 1063.53. It could be understood that the level of production in the well-managed tea estates is almost two times when compared with the poorly-managed tea estates. This scenario is almost similar in the mature bush area in well-managed and poorly-managed tea estates. The result of the regression analysis also shows that yield has significant influence on price. It can be concluded from the analysis that good land management has direct link with the production of good quality tea and tea produced by well-managed gardens fetch higher price. The findings of the regression analyses conclude that well-managed tea estates secure a leading position in Bangladesh by producing huge quantity of good tea.

Unit cost of production in well-managed tea estates is about 41.40 taka per kilogram comparing to 62.69 taka per kilogram in the poorly-managed tea estates. Besides, average prices of tea in well-managed and poorly-managed tea estates are 66.91 taka and 62.70 taka per kilogram respectively. The well-managed tea estates are cost efficient both in leaf growing and in leaf processing stages when compared with the poorly-managed tea estates. In well-managed tea estates, unit cost of growing and processing tea is 10.46 taka and 30.93 taka per kilogram respectively. In the poorly-managed tea estates, on the other hand, unit cost of growing and processing is 14.21 taka and 48.48 taka per kilogram respectively. Moreover, unit variable cost of producing tea in the well-managed tea estates is 15.17 taka per kilogram. This cost in the poorly-managed tea estates, on the other hand, is 18.88 taka per kilogram. The total fixed cost is also low in the well-managed tea estates in comparison to the poorly managed tea estates. In addition, a well-managed tea estate makes profit of around 10,037,238 taka per year. On the other hand, a poorly-managed tea estate makes negligible profit of about 3,347 taka per year. The analysis of profit indicates that the poorly-managed tea estates run their operation with bare minimum profit margin, which is around 0.02% per year. The profit margin of the well-managed tea estates, on the other hand, is 38% per year.

The well-managed tea estates are cost efficient for having highly motivated management and staffs, efficient workforce and appropriate management of workforce, low maintenance cost of the machineries and apposite management of withering of green leaves. In addition, efficient maintenance of tea bushes and the application of

suitable quantity of insecticides enhance tea production in the well-managed tea estates. It was found from the field survey that the well-managed tea estates operated very efficiently and bottleneck managements of these estates were very efficient and they did not encounter any bottlenecks in the line of the production process. They also possessed abilities to mitigate any crisis evolved in the process. The poorly-managed tea estates, on the other hand, had many bottlenecks in the production process, especially in carrying, processing of tea leaves and also in the stage of withering during the peak season.

The SWOT analysis done in this study provides useful information about the strengths, weaknesses, opportunity and threats of the tea industry of Bangladesh, which is helpful to know the condition of the competitive environment in which the tea industry of the country operates. It is observed that competitions among the companies are also very strong and there exist threats of foreign entrants in the local market. This study has observed that the poor performance of the tea estates is associated directly with the poor management of the gardens. A large section of the plantation area is left fallow by the management and a very few gardens actually take appropriate initiatives to clear the old bushes and replant fresh batch of tea plants. It is understood from the analysis that an appropriate strategic initiatives may help to overcome these problems and flourish the tea industries of the country.

In order to better understand the structure of strategic cost management in the tea industry, this study used generic value chain and then identified the relevant firm-specific activities of an organization. The process flows of the value chain were

mapped in this study. These flows were used to isolate the individual value-creating activities of the tea industry in Bangladesh. The value chain structure of the Japanese and Bangladeshi tea estates were compared in this study and the Japanese model was examined. It was gathered that the Japanese model is more suitable for a country like Bangladesh with some modifications

It is understood that strategic decisions are needed to improve the performance of the poorly-managed tea estates of the country. The strategic alliance of the low performing tea estates could be an option in this respect. This initiative may increase production capacity of poorly-managed tea estates by forming strategic alliance among them and strategic alliance gardens also help to produce good quality tea.

In Japan, cooperative farming model is widely practiced among the tea farmers. The proposed model of strategic cooperative alliance[1] (SCA) is a combination of Japanese model and the proposed model of strategic alliance for the tea industry of Bangladesh[2]. A recent study on tea industry of Bangladesh proposes two stages handling of green leaves. This study recommends building a central leaf buying center in the close proximity of leaf producing gardens. The green leaves are transported to a central leaf processing plant after buying[3]. In the SCA model, on the other hand, central leaf-manufacturing facility will have a buying place of its own, equipped with quality measuring device. The leaf producing firms will transport green leaves directly to the central leaf processing plant in this respect.

The quality measuring machine measures the quality of green leaf before buying from the strategic growers and price is fixed accordingly depending on the grades of the leaves. As the quality of green leaves deteriorate very fast, proper handling is necessary for maintaining their quality. The SCA model adopted by this study would improve the situation which may maintain the quality of green leaves due to one level handling and at the same time encourage the high performing tea gardens to seek elevated price of tea. This model uses a common leaf processing facility established by strategic cooperative alliance firms. This model, if adopted, can reduce fixed cost related to the establishment of multiple factories. Tea estates either can use their existing machineries for the establishment of a manufacturing unit or can share their common fund for this purpose. Besides, cooperative alliances model can use their common fund for land development and maintenance of tea bush, which may resolve scarcity of resources[4].

A simulation analysis was administered to portray the situation of the strategic alliance gardens and poorly-managed tea estates. The poorly-managed tea estates are selected in the SCA model to construct the strategic alliance among them. Small (less than 200 hectare) and low performing tea estates (yield 601~1000 kilogram) on the other hand, are selected for the simulation analysis. Large and very low performing tea estates are not considered in this respect. It is assumed that the area with young bush has high significant bearing on the production of tea. The objective of the SCA model is to minimize old bush area by replanting. This initiative would increase the young bush area in the leaf growing tea gardens. Three poorly-managed tea estates are chosen to construct the strategic alliance among them and these three gardens would operate like leaf growers and these strategic growers would sell green leaf to their common leaf

processing plant. The leaf growing gardens would put mark up on cost of production while selling green leaves to the leaf processing center. The leaf testing unit will judge the quality of green leaf using quality measuring device by taking sample from each lot and set the price accordingly depending on the current market price of processed tea. The common leaf processing plant of these tea gardens may function like a profit center and operate like a separate entity. This type of cooperative farming structure prevails in the cooperative association of the tea industry in Japan. In the SCA model, a strategic grower invests for replanting in the old bush area. This model emphasizes on the appropriate irrigation system, which is badly needed in the dry season (which usually last four months in Bangladesh). For this reason, strategic growers should include additional cost for mechanized irrigation. The SCA model stresses on the management of the bottlenecks of the leaf processing plant. For this reason, the leaf processing center may equipped with a new CTC machine, withering troughs and leaf testing device. These machines have enough capacity to handle a crisis such as, machine break down or machine maintenance etc. It is assumed in the model that the poorly-managed tea estates would operate efficiently like well-managed tea estates after the successful adoption of SCA model.

The simulation model predicts that total production of a poorly-managed tea estate would be 99,962 kilogram (100 ton) per year if no strategic initiative is taken. The simulation model further predicts that unit cost of black tea of the poorly-managed tea estates would be 91.09 taka per kilogram. The average selling price of poorly-managed tea estates is 62.70 taka per kilogram. The model predicts that a poorly managed tea estate would operate with a loss of 2,837,762 taka per year. A strategic grower in the

SCA model, on the other hand, could sell yearly 937 ton of green leaf to the central leaf processing center with a price of 9.10 taka per kilogram. The total production of black tea of the SCA gardens would be 647 ton per year. The cost per unit of black tea in the SCA model would be 52.33 taka per kilogram, which would be significantly lower than the poorly-managed tea estates. The average selling price of black tea of the well-managed tea estates is 66.91 taka per kilogram, which would be considered as the expected selling price of SCA gardens. The simulation model depicts that central leaf processing center in the SCA model could obtain profit margin of 9,427,826 taka per year. The profit of leaf processing center can be shared by the strategic leaf growers depending on their share of production of green leaf or can be used for bush management. This fund can be used for the improvement of the facilities of the strategic growers and leaf processing plant. The simulation model depicts that the SCA model may help the low performing tea estates to transform their situation from loss making tea estates to profitable one. Moreover, gardens under the strategic alliance can secure brand image in the tea industry after adopting the SCA model. The SCA gardens can sell black tea to the auction market using a brand name, which would help them to secure a strategic position in the tea market of Bangladesh.

5.2 Recommendations and Scope of Implementation

The present study attempted to fill the gaps in research identified by the study in the field of strategic cost management and management accounting. The study used the methods of value chain analysis, cost driver analysis to analyze the situation of the tea estates. These types of methods were not used in the past studies done on tea industry of Bangladesh. The research also suggests that adopting the proposed analytical

framework would provide additional insight and value into strategic planning and execution processes. The simulation results show the applicability of the model in the tea industry of Bangladesh. The real data were used in the simulation analysis. That is why the strength of applicability of the model becomes very high in the tea industry of Bangladesh as well as in the other tea producing countries in the world. It is believed that the outcome of the study would help to strengthen the performances of the tea industry and tea businesses in Bangladesh. The model, which is proposed by the study, may be implemented in the sugarcane, tobacco, dairy and poultry industries of Bangladesh and other parts of the world.

Notes

[1] Sheikh Mohammed Rafiul Huque, "Value Chain and Strategic Decisions: The Case Study of Asian Tea Industry," in *Impact of Globalization on Agribusiness: Trends and Policies: Proceedings of the Brno International Conference on Applied Business Research 2006*, Brno, 25 September to 01 October 2006_b (Brno, Czech Republic: Faculty of Business and Economics, Mendel University of Agriculture and Forestry), 600-602.

[2] Sheikh Mohammed Rafiul Huque, "Cost Factors Leading to Strategy Formation of Bangladesh Tea Industry," *Yokohama Journal of Social Sciences* 10, no. 6 (2006_a): 52.

[3] Huque, "Cost Factors Leading to Strategy Formation of Bangladesh Tea Industry," 52

[4] Sheikh Mohammed Rafiul Huque, "Value Chain and Strategic Decisions: The Case Study of Asian Tea Industry," in *Impact of Globalization on Agribusiness: Trends and Policies: Proceedings of the Brno International Conference on Applied Business Research 2006*, Brno, 25 September to 01 October 2006_b (Brno, Czech Republic: Faculty of Business and Economics, Mendel University of Agriculture and Forestry), 600-602.

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BTB. *See* Bangladesh Tea Board.

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Appendices

QUESTIONNAIR FOR COST INFORMATION

NAME OF THE TEA ESTATE:

LOCATION:

	COST ELEMENTS INCURRING IN THE TEA ESTATES	COST (IN TAKA)		
SL. No.		YEAR		
1	**ESTABLISHMENT :**			
	I. MANAGERIAL AND STAFF			
	II. TRAVELLING ALLOWANCES			
	III. LEAVE ALLOWANCES			
	IV. PROVIDENT FUND			
	V. HEAD OFFICE EXPENSES			
2	**LABOUR WELFARE :**			
	I. LABOUR SUNDRIES AND PROVIDENT FUND			
	II. SUBSIDY			
	III. MEDICAL			
3	**LABOUR WAGE :**			
	a) UPKEEP OF MATURE TEA			
	I. HAND WEEDING			
	II. SICKLING			
	III. MULCHING			
	IV. PRUNING			
	V. INFILLING			
	VI. APPLICATION OF MANURING			
	VII. APPLICATION OF PESTICIDES			
	VIII. MAINTENANCE OF ROADS AND BRIDGES			
	IX. IRRIGATION AND DRAINAGE			
	X. FENCING			
	b) PLUCKING			
	c) OTHERS (CARRYING LEAF)			
4	**FERTILIZERS AND MANURES**			
5	**INSECTICIDES AND PESTICIDES**			
6	**TEA MANUFACTURING**			
	I. WITHERING, PROCESSING, FERMENTING DRYING& SORTING			
	II. GAS			
	III. LABOR WAGE FOR MANUFACTURING			
7	**TEA PACAGING AND DISTRIBUTION :**			
	I. MAKING BOXES			
	II. PACKING AND MARKING OF TEA			
	III. FREIGHT OF TEA			
	IV. BROKERAGE			
	V. WAREHOUSE			

(Please see next page)

SL. No.	COST ELEMENTS INCURRING IN THE TEA ESTATES	COST (IN TAKA) YEAR		
8	**MAINTENANCE AND REPAIRS OF BUILDING,**			
	MACHINARY AND FACTORY:			
	I. STAFF QUARTER			
	II. TIMBER			
	III. BRICKFIELD			
	IV. CARPENTERS			
	V. REPAIRING TEA HOUSE MACHINERY			
	VI. SPARE PARTS			
	VII. BUNGLOWS & OTHER HOUSES			
	VIII. HOSPITAL & OFFICES			
	IX. ELECTRICIAN			
	X. REPAIRING & OVERHAULING			
	XI. ROADS AND BRIDGES			
9	**TRANSPORT :**			
	I. FUEL & OIL			
	II. MAINTENANCE			
10	**RENT AND TAXES :**			
	I. LAND RENT AND TAXES			
	II. INSURANCE			
	III. IMPORT DUTY			
	IV. LEVY AND SAMPLING			
11	**MISCELLAENEOUS EXPENSES :**			
	I. BANK CHARGES			
	II. POSTAGE, TELEGRAM & TELEPHONE			
	III. STATIONARY AND PRINTING			
	IV. SUBSCRIPTION FEE			
	V. LICENSE FEE			
	VI. VISITING EXPENSES			
	VII. MESSANGERS			
	VIII. AUDITORS FEE			
	IX. VISITORS TRAVELLING EXPENSES			
	X. PERIODICAL JOURNAL AND PAPER			
	XI. RENT ON TELEPHONE			
	XII. LEGAL EXPENSES			

QUESTIONNAIRE FOR GENERAL COST INFORMATION AND COST RELATED TO VALUE CHAIN

(All information will be kept secret. Researcher will use the information only for research purpose without disclosing the name of the tea estate)

NAME OF THE TEA ESTATE:

LOCATION:

GENERAL INFORMATION:

1. Area under tea in hectare:
2. Average percentage of vacant area in the cultivated area
3. Reasons behind vacancy
4. Total available area for extension
5. Total number of registered labor
6. Total number of staff
7. Number of manager

PRODUCTION OF GREEN LEAF AND MADE TEA:

8. Annual production of green leaf
9. Production of green leaf during peak, semi peak and off peak season
10. Annual production of made tea
11. Total production cost of made tea

(Please see next page)

COST OF MAINTENANCE:

12. Area used for building factory

13. Maintenance cost of factory and factory building

14. Area for managers and staff quarters

15. Annual cost of maintenance of building

16. Area for labor housing

17. Annual cost of maintenance of labor house

CAPACITY OF MACHINERIES:

18. Capacity of a withering trough

19. Number of withering trough in the tea estate

20. Electricity cost of withering (per hour)

21. Average hours of operation each day during peak, semi peak and off time

22. Capacity of CTC machine per hour or day

23. Hourly operation of CTC machine during peak, semi peak and off period

24. Use of generator during peak, semi peak and off period

25. Hourly cost of operating a generator

COST INCURRED IN THE VALUE CHAIN PROCESS

PLUCKING:

26. Average wage cost of plucking

27. Total number of man days involve in plucking

CARRYING:

28. Total number of man days involve in carrying

29. Gasoline cost for carrying green leaves

(Please see next page)

WITHERING:
30. Average withering hours of green leaf

31. Average withering cost per hour

32. Total number of withering trough

MANUFACTURING OF TEA:
33. Total labor wage for manufacturing

34. Total cost of cutting and drying green leaf

PACKAGING:
35. Total cost of packaging

DELIVERY COST OF MADE TEA:
36. Transportation cost of delivering tea to the auction market

MATERIAL COST OF MAINTAINING TEA BUSH:
37. Chemical cost

38. Fertilizer cost

39. Average wage for maintaining tea bush

DEVELOPMENT COST FOR MACHINERY:
40. Purchasing of new machinery

LABOR WELFARE:
41. Annual cost incurrence of subsidizing food

42. Medical cost

(Thank you very much for providing information)

Replantation cost	
Area of replantation in each tea estate	31.24 hectare
Number of plants required per hectare	13,449 bushes
Replantation cost per plant	10 taka
Total cost of replantation	4,201,275 taka
Depreciation cost in each year (40 years life span)	105,032 taka
Depreciation cost per hectare in each year	3,362.25 taka

Yearly operation cost of sprinkler			
Cost of diesel	38 taka per liter	*Dry season*	*120days*
Hourly cost of diesel	19 taka		
Daily operation	8 hours		
Yearly operation	960 hours		
Yearly cost of diesel (19 taka*969 hours)	**18,240 taka**		
Labor cost in each day	28 taka		
Hourly cost of labor	3.5 taka		
Number of labors needed for operation in each day	3 labors		
Yearly labor hours (960 hours*3 labors)	2,880 hours		
Yearly cost of labor (3.5 taka*2,880 hours)	**10,080 taka**		

Irrigation cost to the plant	
Cost of sprinkler	2,200,000 taka
Yearly depreciation cost of sprinkler (considering 20 years of operation)	110,000 taka
Depreciation cost per hour (110,000 taka/960 hours)	114.58 taka

Depreciation cost of a CTC machine			
Capacity of CTC machine per hour	1,800 kilogram.	*Daily operation*	*12 hours*
Total capacity of CTC machine in each year	5,832,000 kilogram	*Yearly operation of tea estate*	*270 days*
Cost of a CTC machine	3,300,000 taka		
Depreciation cost in each year	165,000 taka		
Depreciation cost each kilogram	0.028 taka		

Capacity of withering trough			
Capacity of a withering trough	2,000 kilogram	*Rotation rate*	*10 hours*
Capacity of a trough in each hour	200 kilogram	*Daily operation*	*18 hours*
Capacity of a trough in each day	3,600 kilogram	*Yearly operation of tea estate*	*270 days*
Yearly capacity of each trough	972,000 kilogram	*Installation cost of each trough*	*250,000 taka*
Total trough needed considering demand of peak season and crisis management	5 toughs		
Yearly capacity of processing center	4,860,000 kilogram		
Total installation cost of new troughs	1,250,000 taka		
Yearly depreciation cost (considering 20 years of operation)	62,500 taka		
Depreciation cost per kg	0.013 taka		

Leaf testing device (金赤外線分析機械)			
Yearly leaf capacity of strategic growers	2,812,038 kilogram	*Yearly operation of tea estate*	*270days*
Leaf capacity in each day	10,415 kilogram		
Capacity of each truck	1,500 kilogram		
Number of trucks operate in each day	7 trucks		
Number of tests in each year	1,875 times		
Total tests in the life time (considering 25 years of operation)	46,867 times		
Cost of testing machine	3,000,000 yen		
Cost of testing machine	1,686,000 taka[1]		
Cost of each test (1,686,000 taka/46,867 times)	35.97 taka		
Depreciation cost in each year (35.97 taka*1,875 times)	67,440 taka		

[1] 1 yen=0.562 taka
Source: http://www.oanda.com/convert/classic
Retrieved on November 24, 2006

Regression (Production and rainfall)

Variables Entered/Removed[b]

Model	Variables Entered	Variables Removed	Method
1	RAIN_MM[a]	.	Enter

a. All requested variables entered.

b. Dependent Variable: PDN

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.487[a]	.237	.222	9.2267

a. Predictors: (Constant), RAIN_MM

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1297.227	1	1297.227	15.238	.000[a]
	Residual	4171.510	49	85.133		
	Total	5468.737	50			

a. Predictors: (Constant), RAIN_MM

b. Dependent Variable: PDN

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	13.426	5.346		2.512	.015
	RAIN_MM	5.449E-03	.001	.487	3.904	.000

a. Dependent Variable: PDN

Regression (All tea estates)

Variables Entered/Removed[b]

Model	Variables Entered	Variables Removed	Method
1	OLD, MATURE, YOUNG[a]	.	Enter

a. All requested variables entered.

b. Dependent Variable: PDN

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.898[a]	.806	.802	206161.4

a. Predictors: (Constant), OLD, MATURE, YOUNG

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	2.5E+13	3	8.3E+12	195.565	.000[a]
	Residual	6.0E+12	141	4.3E+10		
	Total	3.1E+13	144			

a. Predictors: (Constant), OLD, MATURE, YOUNG

b. Dependent Variable: PDN

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-80805.2	27595.000		-2.928	.004
	YOUNG	3817.495	616.797	.335	6.189	.000
	MATURE	1941.185	215.079	.467	9.025	.000
	OLD	656.394	131.470	.235	4.993	.000

a. Dependent Variable: PDN

Correlations (All tea estates)

Correlations

		YOUNG	MATURE
YOUNG	Pearson Correlation	1.000	.677**
	Sig. (2-tailed)	.	.000
	N	145	145
MATURE	Pearson Correlation	.677**	1.000
	Sig. (2-tailed)	.000	.
	N	145	145

**. Correlation is significant at the 0.01 level (2-tailed).

Correlations

		YOUNG	OLD
YOUNG	Pearson Correlation	1.000	.588**
	Sig. (2-tailed)	.	.000
	N	145	145
OLD	Pearson Correlation	.588**	1.000
	Sig. (2-tailed)	.000	.
	N	145	145

**. Correlation is significant at the 0.01 level (2-tailed).

Correlations

		MATURE	OLD
MATURE	Pearson Correlation	1.000	.533**
	Sig. (2-tailed)	.	.000
	N	145	145
OLD	Pearson Correlation	.533**	1.000
	Sig. (2-tailed)	.000	.
	N	145	145

**. Correlation is significant at the 0.01 level (2-tailed).

Regression (Well-managed tea estates)

Variables Entered/Removed[b]

Model	Variables Entered	Variables Removed	Method
1	OLD, MATURE, YOUNG[a]	.	Enter

a. All requested variables entered.

b. Dependent Variable: PDN_WELL

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.987[a]	.973	.970	104304.9

a. Predictors: (Constant), OLD, MATURE, YOUNG

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	9.5E+12	3	3.2E+12	292.583	.000[a]
	Residual	2.6E+11	24	1.1E+10		
	Total	9.8E+12	27			

a. Predictors: (Constant), OLD, MATURE, YOUNG

b. Dependent Variable: PDN_WELL

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	36508.549	47906.562		.762	.453
	YOUNG	2082.206	683.025	.189	3.049	.006
	MATURE	1690.886	290.127	.324	5.828	.000
	OLD	1654.128	178.094	.551	9.288	.000

a. Dependent Variable: PDN_WELL

Correlations (Well-managed tea estates)

Correlations

		YOUNG	MATURE
YOUNG	Pearson Correlation	1.000	.772**
	Sig. (2-tailed)	.	.000
	N	28	28
MATURE	Pearson Correlation	.772**	1.000
	Sig. (2-tailed)	.000	.
	N	28	28

**. Correlation is significant at the 0.01 level (2-tailed).

Correlations

		YOUNG	NEW_OLD
YOUNG	Pearson Correlation	1.000	.803**
	Sig. (2-tailed)	.	.000
	N	28	28
OLD	Pearson Correlation	.803**	1.000
	Sig. (2-tailed)	.000	.
	N	28	28

**. Correlation is significant at the 0.01 level (2-tailed).

Correlations

		MATURE	NEW_OLD
MATURE	Pearson Correlation	1.000	.747**
	Sig. (2-tailed)	.	.000
	N	28	28
OLD	Pearson Correlation	.747**	1.000
	Sig. (2-tailed)	.000	.
	N	28	28

**. Correlation is significant at the 0.01 level (2-tailed).

Regression (Poorly-managed tea estates)

Variables Entered/Removed[b]

Model	Variables Entered	Variables Removed	Method
1	OLD, YOUNG, MATURE[a]	.	Enter

a. All requested variables entered.

b. Dependent Variable: PDN_POOR

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.958[a]	.917	.892	13739.90

a. Predictors: (Constant), OLD, YOUNG, MATURE

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	2.1E+10	3	7.0E+09	36.950	.000[a]
	Residual	1.9E+09	10	1.9E+08		
	Total	2.3E+10	13			

a. Predictors: (Constant), OLD, YOUNG, MATURE

b. Dependent Variable: PDN_POOR

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-3501.437	9380.476		-.373	.717
	YOUNG	1063.529	216.180	.452	4.920	.001
	MATURE	907.741	100.173	.840	9.062	.000
	OLD	642.303	134.820	.446	4.764	.001

a. Dependent Variable: PDN_POOR

Correlations (Poorly-managed tea estates)

Correlations

		YOUNG	MATURE
YOUNG	Pearson Correlation	1.000	.013
	Sig. (2-tailed)	.	.964
	N	14	14
MATURE	Pearson Correlation	.013	1.000
	Sig. (2-tailed)	.964	.
	N	14	14

Correlations

		YOUNG	OLD
YOUNG	Pearson Correlation	1.000	-.144
	Sig. (2-tailed)	.	.622
	N	14	14
OLD	Pearson Correlation	-.144	1.000
	Sig. (2-tailed)	.622	.
	N	14	14

Correlations

		MATURE	OLD
MATURE	Pearson Correlation	1.000	-.192
	Sig. (2-tailed)	.	.511
	N	14	14
OLD	Pearson Correlation	-.192	1.000
	Sig. (2-tailed)	.511	.
	N	14	14

Regression (Price-Yield or Quality-management)

Variables Entered/Removed[b]

Model	Variables Entered	Variables Removed	Method
1	YIELD[a]	.	Enter

a. All requested variables entered.

b. Dependent Variable: PRICE

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.517[a]	.268	.261	7.0283

a. Predictors: (Constant), YIELD

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	2020.965	1	2020.965	40.913	.000[a]
	Residual	5532.388	112	49.396		
	Total	7553.353	113			

a. Predictors: (Constant), YIELD

b. Dependent Variable: PRICE

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	50.786	1.807		28.111	.000
	YIELD	8.998E-03	.001	.517	6.396	.000

a. Dependent Variable: PRICE

Regression (Production, wage and benefit to managers and staffs)

Variables Entered/Removed[b]

Model	Variables Entered	Variables Removed	Method
1	BEN_MGR_STAFF, WAGE[a]	.	Enter

a. All requested variables entered.

b. Dependent Variable: PDN

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.963[a]	.928	.925	69816.97

a. Predictors: (Constant), BEN_MGR_STAFF, WAGE

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	3.4E+12	2	1.7E+12	348.203	.000[a]
	Residual	2.6E+11	54	4.9E+09		
	Total	3.7E+12	56			

a. Predictors: (Constant), BEN_MGR_STAFF, WAGE

b. Dependent Variable: PDN

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	9752.111	18651.309		.523	.603
	WAGE	.165	.009	.884	17.653	.000
	BEN_MGR_STAFF	1.943E-02	.009	.111	2.210	.031

a. Dependent Variable: PDN

Correlations (Wage and benefit to managers and staffs)

Correlations

		BEN_MGR _STAFF	WAGE
ESTB_SAL	Pearson Correlation	1.000	.685**
	Sig. (2-tailed)	.	.000
	N	57	57
WAGE	Pearson Correlation	.685**	1.000
	Sig. (2-tailed)	.000	.
	N	57	57

**. Correlation is significant at the 0.01 level (2-tailed).