

# **Demand Analysis of Domestic Tea Market in Bangladesh: An Empirical Investigation**



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## ABSTRACT

*Higher population pressure and efficient input-output marketing along with less farmland availability create severe environmental degradation in the rural and urban areas in Bangladesh. Satisfying continuous demand of consumers with proper flow of supply becomes a challenge for marketers. Therefore, demand analysis is one of the significant issues in consumption economics, where individual consumption responsiveness largely determines the economical development of a country.*

*Emergence of new entrants, tariff and trade barriers, unfavorable price trend and globalization has made Bangladesh tea industry very competitive. Knowledge about future demand and production of tea facilitate marketers to achieve a competitive position in the market. This study attempts to design a justified tea demand response model considering both the price and non-price variables using econometric representations. It has been assumed that when price is less sensitive with the changes of demand, then non-price factors as income, population size, advertisement and price of substitute products may affect the elasticities of demand.*

*A mixed-methods approach has been applied in this study. Both qualitative and quantitative data is collected to make a comprehensive understanding of the research problem. The qualitative data is collected with the in-depth interviewing method and analyzed with content analysis. On the basis of the findings of qualitative data, a tea demand model is designed to explore the relationship between dependent and independent variables.*

*Quantitative data is collected from the secondary authentic and reliable sources. For empirical analysis, time-series data is one of the important data. In this study, the aggregated time-series data from 1972-2017 of the concerned variables were collected. To measure the short-run and long-run tea demand elasticities, dynamic Error-Correction model (ECM), has been used. Along with, for forecasting possible tea consumption and production, Autoregressive Integrated Moving Average (ARIMA) model is applied in this study.*

*Results reveal that population growth significantly affects tea demand elasticity rather than price and income elasticities. Lagged consumption behavior form habit and has a positive influence on tea demand elasticity. A difference between short-run and long-run elasticities is reflected in this paper.*

*The ARIMA model selection criteria (AIC and BIC) reveals that ARIMA (1,1,0) and (0,1,0) explain a growing tendency of local demand and production of tea. The projected data confirm that the expected internal consumption increment (36%) is much higher than the increment of tea production (27%) by 2025, comparing the base period of 2017. Therefore, tea marketers and decision makers should concentrate more on increasing production to meet the growing internal consumption. This study signifies by providing concrete information about the future required amount of tea need to produce domestically. Some substantial guidelines and actions have been proposed to initiate in this paper.*

*Key words: Demand Elasticity, Domestic market, Error-Correction Model, ARIMA Model.*

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## STATEMENT OF AUTHORSHIP

This is to declare that:

- This PhD thesis titled ‘**Demand Analysis of Domestic Tea Market in Bangladesh: An Empirical Investigation**’ is my own work.
- I am responsible for the research work submitted in this thesis.
- No other person’s work has been used without due acknowledgement in the main text of the thesis.
- Except where reference is made in the text of the thesis, this thesis contains no material published elsewhere or extracted in whole or in part from a thesis submitted for the award of any other degree or diploma.

Upon acceptance of this thesis, I give my consent for its availability within the inter-university library loans; and that, its title and abstracts are made available to other organizations upon formal requests.

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## Declaration of Supervisor

Certify that Razia Sultana Sumi, a candidate for the degree of PhD in Marketing has completed her thesis entitled, '**Demand Analysis of Domestic Tea Market in Bangladesh: An Empirical Investigation**' under my supervision.

To the best of my knowledge and belief, the research is an original one and it has not been submitted to any other University or Institution for the award of any degree or diploma.

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## ABBREBIATIONS

BTB= Bangladesh Tea Board

BBS= Bangladesh Statistics Bureau

TTAB= Tea Traders Association of Bangladesh

BTRI= Bangladesh Tea Research Institute

BTA= Bangladesh Tea Association

ECM=Error-Correction Model

VECM= Vector Error-Correction Model

ARIMA=Autoregressive Integrated Moving Average

GDP= Gross Domestic Product

MRL= Maximum Residue Level

ILO= International Labor Organization

SMTC= Small Holding Tea Cultivation

ECT= Error-Correction Term

ACF= Auto Correlation Function

PACF= Partial Auto Correlation Function

AIC= Akaike's Information Criterion

BIC= Schwarz Information Criterion

ADF= Augmented Dickey-Fuller test

PP= Phillips-Perron test

## CHAPTER 1

### INTRODUCTION

#### 1.1 The Research Context

The demand of consumers is dynamic in nature not only responsive to the changes in commodity prices and income. Rather, the demand for a commodity may be more attributed to changes in taste and habit along with the other traditional variables. From the introduction, Bangladesh tea industry was reputed as export-oriented in the past. But recently, due to the abrupt increase of internal consumption and low level of production shrinks exportable surplus of tea. Therefore, retail prices of tea have been increasing which negatively influence consumer's worth of money. Changing taste, different convenient packs, availability of wide ranges of value-added teas, instant tea powder and out-of-home tea shops surprisingly increases consumer's acceptance of tea worldwide. Traditionally, green tea was found to be as a healthy drink but now it has become a common beverage for guest entertainment and gossip. Because of globalization consumer's preference also changing around the world as products of different countries increasingly exposed to consumers. Therefore, Bangladeshi tea marketers are facing a strong challenge to hold on their position in the local and international market.

Tea is originated from the younger pieces of the shoots of *Camellia Sinensis*, a small-sized long-lived perennial tree (Hilal and Engelhardt, 2007; Rahman, 2007) which is characterized for its unique cultivation and harvesting process. Tea has also become a necessary item in

social and formal gathering in many parts of the world, and is the basis on which social and business networks are developed. Drinking tea become popular particularly in Europe and Western countries where extreme cold prevails most of the time. Mainly three types of tea are available in the world market as black tea, green tea and oolong tea. As a refreshing, stimulant and anti-sedative drink, tea is the best and oldest beverage in the world next to water (Choudhury, 1989). Tea leaves have several chemical compounds containing medicinal properties, as catechin (polyphenol), caffeine, and alkaloid. Generally taste of black tea is stronger in flavor and more oxidized than other types of tea. Along the unique flavor and taste, drinking tea became widespread due to its health beneficial effect. It is already proven that as a functional food, green tea plays bio-defense function by preventing cancer, aging-suppressing function by providing antioxidants in the body (McKay & Blumberg, 2002). Other epidemiological studies suggest that consumption of green tea may have a protective effect against the development of several cancers, some oral diseases and solar radiations (Cabrera, 2013). Oolong tea is semi-fermented while processing is especially good for digestion and useful for diabetic patients. Black tea is consumed principally in Europe, North America and North Africa while green tea is drunk throughout Asia (McKay & Blumberg, 2002). From its introduction, tea is principally used as a medicine which has a positive stimulant against weakness, drowsiness and refreshes body and mind.

Regular consumption of tea over time converts to habit formation, a routine or a familiarization. In ancient China, tea was recognized as a healthy drink with its amazing aroma and taste at that time tea was a costly drink, consumed by the wealthy and royalty. Gradually tea became a trade-good and spread around the world. In this subcontinent, tea culture was popularized by the English people considered as an upper class and fashion drink

(Huque, 2007). Initially, people of this continent remained ignorant about the process of consumption and healthy effect of tea. But when the British government started tea cultivation concurrently in northeast India and Bangladesh in the 19<sup>th</sup> century, from then gradually tea has turned as a national beverage to the Bangladeshi people. First commercial tea cultivation in Bangladesh was established at Malnicherra Tea Estate near Sylhet town in 1854. During the partition in 1947, Bangladesh owned 103 tea estates, covering 28,734 hectares area of tea cultivation with 18.36 million kg annual tea production. To meet the home consumption in West Pakistan, Government imposed 3% mandatory extension of tea area every year in 1960. This resulted tea area has extended to 42,685 hectares with the increased production of 31.38 million kg. During the liberation war in 1971, the tea industry has undergone massive colossal damages. But with big support from the government as the allocation of development program (BTRP-1980-92) along with financial and technical assistance from the British ODA and EEC, domestic production increased 53.41 million kg with per hectare yield size of 1019 kg in 2006.

Now tea becomes an eminent non-alcoholic drink to the people and two-third Bangladeshi inhabitant regularly consuming tea. No function and social gathering are completed without an offering of tea. Many foreign and national investors are continuously investing in this industry to maximize their profit. And the success of tea companies had brought a change in the socio-cultural life of Bangladeshis. In Bangladesh tea mainly cultivated in the three fairly divergent ecological zones, namely Surma valley in greater Sylhet, Halda valley in Chittagong and Karatoa valley in Panchagarh district (Mamun, 2011). These particular areas are suitable for tea zone due to seasonal variation of climatic element. Recently, Bangladesh Government has taken initiative to make popular of smallholding tea cultivation among



farmers. Along with, the beauty of tea garden also creates an opportunity for attracting tourists enriches our tourism sector.

As an agricultural country, the economy of Bangladesh highly depends on the performance of the growth of some principal crops ex. Rice, Jute, Potato, Sugarcane, Pulse, Wheat, Tea, and Tobacco. Among all these crops, tea has been planted in less than 0.40% area of total cultivated land in 2014-2015. Historically, tea was commercially cultivated and had a better share in export. Tea industry acts as the most dynamic agro-export industrial products and plays a vital role in its economy (Islam et al., 2005). Through value addition, domestically produced tea has become a competitive item in the global market. This industry was a leading source of foreign currency earnings as an import substitute commodity (Islam, et al., 2005) and a minor portion of the total production of tea was retained for local consumption. But recently export of tea from Bangladesh has declined very sharply due to the rapid increase in internal consumption. At earlier most of the people of Bangladesh were remain ignorant about the use, preparation and health benefit of tea but gradually, tea has become a popular drink to the people of Bangladesh in the 20<sup>th</sup> century. At present, Bangladesh has become one of the largest consumers by consuming nearly 100% of its total production.

**Table 1.1: Economic contribution of tea industry in the economy of Bangladesh**

Sector-wise contribution of tea	Value of tea production (billion taka)		Total volume (Million Kg.)	
	2016	2015	2016	2015
Total Annual Turnover	158.40	126.06	82.50 Mkg	67.38
Export	1.20	1.22	0.50 Mkg	0.48
Import Substitute	134.40	125.16	70.00 Mkg	66.90
Government Income as value added tax	21.06	18.77	-----	-----
Contribution of tea industry in GDP	179.76	145.16	-----	-----

(Source: Bangladesh Tea Association)

Apart from the foreign exchange earnings through exports, tea industry also generates employment (Kamal and Bhuiyan, 2004) in particular for marginalized women and socially backward or weaker section of the society. The tea is a labor-intensive industry where labor productivity is a major determinant of yield and cost of production. Labor costs accounted around half of the unit cost of production and about 75% of that labor cost is on plucking (Asian Development Bank). Tea industry is providing direct employment to about 0.15 million ethnic minority people (3.3 percent of the country's total employment) who live in very remote areas (Shah & Pate, 2016), more than 75% are women responsible for plucking leaves as their principle duty (Majumder & Roy, 2012). Around 0.60 million people directly and indirectly involved with the tea industry and among them, a large portion is dependants of the workers who are being taken care of by the industry. This industry has created an immense opportunity of women empowerment in rural communities and built them independently. As a third tea zone, Bangladesh Government has launched the north-eastern part of Bangladesh for Small-scale tea plantation which creates a greater opportunity for the rural farmers.

Tea remains an exportable commodity for Bangladesh from the beginning, but now an uncertainty has arisen in the export market due to the rapid increase of internal consumption. At present Bangladesh is one of the major producer and consumer of tea in the world, whether measured in total, quantity, value or in per capita terms. As a big industry, the total turnover of Bangladesh tea industry accounted about Rs.15, 840 million, where internal substitutes were about 70 million kg and account for about Rs.13, 440 million and export of tea accounted 0.50 million kg and valued Rs. 120 million in 2016. In 2016, the total contribution of the tea industry in the GDP of Bangladesh has valued Rs. 17, 976 million

which explained 23.84% higher than the previous year. Bangladesh Government earned Rs. 2,106 million as value added tax in 2016. Therefore, the tea industry significantly contributes to the national economy on a global as well local level. To achieve food security and protection against supply deficiency, future demand of tea and its responsiveness with the price and non-price factors may supplement the knowledge of the policymakers. Findings of the study would be useful for policy formulation and strategy development regarding production expansion, import substitution and new agricultural technique initiation to increase per hectare yield size.

Worldwide, producers sell tea in a unique system by auction mechanism where producers and consumers have no control over tea prices. At first the tea brokers taste the tea and set the prices according to previous auction price of similar tea, quality of tea, demand condition and production in the international market etc. Though there is some controversy against the auction system through auctioning the true value of tea can be determined based on grades and tea quality available in a particular time (Alam, K. 1993). Therefore, the bargaining power of both buyer and supplier are limited in this industry (Alam, et al. 2010). In Bangladesh, tea auction is regularly held in Chittagong and Moulovibazar once a week where local and foreign buyers took part to buy their required bulk amount. A large difference between the auction price and retail price of tea is being observed due to higher marketing cost. Blenders and retailers' return on investment is higher than the manufacturer's margin (Sabur, et al., 2000). Therefore, tea planters in some cases are not interested to invest for expanding tea production, rather focused on producing other agricultural commodities (Alam, 1998).

On the other hand, domestic consumption of tea (77.57 Million kg) of Bangladeshi people is higher than the total production of tea (67.38 Million kg), showed a gap was filled with import, in 2015. Domestic production has been increasing at an average rate of 2.03%, while the demand has been growing at an average rate of 4.10% for the last ten years. But surprisingly, in 2016 tea production has achieved a milestone with the amount of 85.05 million kg due to increased investment, favorable climatic condition and impeccable effort by the tea gardeners and labors.

For the last few years export of tea from Bangladesh has been incessantly decreasing due to the abrupt increase in domestic consumption. According to BBS, 2016 current population growth rate is 1.16 percent which also explains a significant growth of tea demand in future. Therefore, the possibility of conversion to importing country from exporting one is observed due to lack of exportable surplus. Along with, downward trend of world price of tea increases the chance of import from other low-priced countries. Earlier, many researchers tried to explore the reasons affecting the demand for tea in the context of different markets. But with this study, the researcher tried to identify the significance of those observed variables with their short-run and long-run elasticities.

Consumers are always tried to adjust their consumption on the basis of the price of the products. To realize consumer behavior, researchers are continuously striving for a clear understanding of the price mechanism. But if the price is less sensitive with the demand, then it justifies using non-price factors. An effort to estimate tea demand elasticity using co-integration and Error-correction model (ECM) indicate that the growth of tea demand can be attributed to rising income level, rising price and increasing population size during the

specified time period. Along with the other factors, the lagged consumption behavior which formed habit has considered as one of the important explanatory variable included in the demand function to measure its inclusive elasticity. In addition, to visualize a comparative scenario of future domestic demand and production of tea, the researcher also attempted to use ARIMA model for forecasting. In this study, the researcher used ARIMA model for forecasting both tea production and consumption so a comparative scenario can be visualized to take further necessary steps. The possible results of the dynamic effect of variables on internal tea demand may suggest how an uninterrupted supply is possible when future demand and production can be forecasted properly. As consumer demand is dynamic in nature, updated data-set has been used to get reliable and latest findings for the worth of studying especially for the policymakers, tea producers, and marketers, consumers and for investors.

## **1.2 Background and Concept Development**

Changing the demand pattern of consumers significantly influence the production and distribution process. Consumer demand theory is the basic concept explains the relationship between price and quantity demanded of a product. But consumer responsiveness may also vary with other non-price determinants along the price. At the time of formulation of public policy, supply and demand analysis brings extensive consideration for the policymakers. As a natural beverage, tea has become an important part of the socio-cultural society of Bangladesh. Due to its medicinal value and unique taste, tea has a positive impact on the wellbeing of human health. Nowadays, people are interested to drink different value-added tea for health consciousness and environmental concern.

From the introduction of its journey, the Bangladesh tea industry was reputed as an export-oriented sector. But since 2006-07 the tea traders of Bangladesh has started import of low-priced tea to fulfill the deficit internal supply and demand. The trend of internal consumption of tea is much higher than the production rate. There are obviously some reasons which cause an abrupt increase of internal demand. As a result price of tea also increasing which pressure consumers to sacrifice more money. Through this study, a modest attempt has done to investigate the effect of the significance of the factors which really changes the consumption pattern of tea consumers of Bangladesh. Along with, to understand a comparative scenario of future demand and production of tea has considered estimating with this effort.

### **1.3 Justifications of the study**

Tea is cultivated in such land where no other foodstuff can be grown as the commercial basis. In a study, a significant relationship has identified among yield volume, total production and tea cultivation by Islam et al., (2008). After liberation in 1971, the tea industry had a major contribution in the national economy of Bangladesh. This industry is utilizing the hilly land at its maximum level and generating a huge number of employments for the rural marginalized people. Furthermore, as an import substitute, industry this sector is playing an important role in raising income level. The climate and weather of the Hill tracts area of Bangladesh is favorable for tea cultivation and color of Bangladeshi tea is unique. At recent time, our tea industry is facing a break-even situation, losing our exportable position in the international market due to insufficient exportable surplus.

Therefore, this study justifies exploring the significance of the variables that explicitly influence consumer's demand for tea. As consumer demand is dynamic in nature, hence the

findings of the study will be helpful for key decision makers of this industry. Through this study, a justified tea demand response model has been designed considering both the price and non-price variables using econometric representations. The demand model is one of the significant issues in consumption economics, where individual consumption responsiveness largely determines economic development. Information related consumer's response toward changes in prices, income level, and population growth may help marketers to take appropriate business decisions.

#### **1.4 Research Objectives**

Researchers aimed to explore some objectives highly related to the potential industry of Bangladesh are as follows:

##### **a. Broad objective:**

The objective of this study is to illustrate how the production and domestic demand (consumption) pattern of tea is determined with price and non-price factors in a country like Bangladesh.

##### **b. Specific objectives:**

1. Estimating the trend of tea consumption among the inhabitants of Bangladesh.
2. Measuring the effect of price and non-price (economic and demographic) factors on domestic tea demand in Bangladesh,
3. Determining the short-run and long-run elasticities of tea demand in domestic tea industry,
4. Forecasting the future trend of production and consumption of tea in Bangladesh.

## CHAPTER 2

### A BRIEF OVERVIEW OF TEA INDUSTRY: GLOBAL AND DOMESTIC

#### 2.1 Global Scenario of Tea Industry

Tea is a significantly valuable and extensively traded tropical agricultural item for producing and consuming countries. Traditionally as an agricultural commodity, tea cultivation is highly sensitive with the changes in growing conditions and mainly produces tropical and sub-tropical climates. Tea is an exportable item brings a huge amount of foreign currency and contributes highly on the economic development of the developing tea producing countries. In the competitive business environment, major tea producers and exporters become dynamic and competitive to meet the changes in consumer's preferences. Narrowly defined agro-ecological environment is specialized for tea cultivation; hence tea produces in very limited number of countries. Among 51 countries, several countries of Asia and Africa are more expert for tea cultivation (figure- 2.1).

China, India, Sri Lanka Kenya, Vietnam, Indonesia, Malawi, Japan, Myanmar and Bangladesh are the major tea producers in the world market. Apart from these regions, tea is also cultivated in South America (Argentina, Brazil and others), the CIS (Russia and Georgia) and the Near East (Iran and Turkey).



**Fig 2.1: Major and minor tea producing countries worldwide**



**Table 2.1: Major tea producers along their cultivated area and productivity**

Country	Area (hectare)			Yield (kg/ha)		
	2017	2007	1997	2017	2007	1997
China	22,12,750	12,00,850	8,68,950	705	970	1111
India	6,21,610	5,67,020	4,31,000	1809	1716	2131
Sri Lanka	2,33,909	2,12,720	1,90,473	1453	1434	1495
Kenya	2,18,538	1,49,190	1,13,892	1938	2477	2012
Vietnam	1,23,188	1,07,400	63,900	816	1527	2110
Indonesia	1,13,692	1,33,734	1,14,287	1344	1126	1225
Turkey	82,108	76,581	76,755	1817	2692	2849
<b>Bangladesh</b>	<b>53,856</b>	<b>57,580</b>	<b>48,308</b>	<b>1519</b>	<b>1103</b>	<b>1016</b>
Japan	43,245	48,200	51,800	1760	1952	1875
Argentina	39,600	40,000	37,557	1441	1900	2035
Uganda	29,929	22,000	20,500	1028	2042	2126
Malawi	17,849	19,500	18,800	1579	2468	2712
Iran	15,848	26,600	34,650	892	611	634

(Source: FAO IGG/Tes Secrétariat.)

Between 1997 and 2017, China increased their harvested tea areas about 1.34 million hectare (ha), India increased nearly 1,90,000 hectare, Sri Lanka increased nearly 43,500 hectare and Bangladesh increased nearly 5,500 hectare land for tea cultivation shown in the table-2.1. Due to the shortage of cultivable land, Bangladesh couldn't expand tea cultivation area though enormous internal demand for tea is being observed in the domestic market. In 2013, the global market of tea is estimated to be about \$15.4 billion in terms of production value (World Tea News, 2014) and \$ 40.7 billion in terms of retail value (Euromonitor International, 2014).

Top seven countries are producing accounted for 90% of the total tea and top 10 countries are contributing nearly 94% of total world's tea. From table 2.1, an underlying vibrant of tea productivity shows that among the all tea producing countries China, the lowest tea producer in terms of yield average with only 705 kg/ha in 2017, compared to Kenya, the fourth largest producer, where yield averaged of 3 times that of China at 1938 kg/ha. Whereas, per hectare yield average of tea of Bangladesh has increased amazingly from 1016 kg/ha to 1519 kg/ha during 1997 to 2017.

**Table 2.2: Year-wise top 12 tea producing countries worldwide**

Country	2017	2016	2015	2014	2013	2012	2011
	'000 Tons	'000 Tons	'000 Tons	'000 Tons	'000 Tons	'000 Tons	'000 Tons
<b>China</b>	2460	2313	2278	2095.57	1924.5	1789.75	1623
<b>India</b>	1325	1250	1208.66	1207.31	1208.8	1135.07	1095.46
<b>Kenya</b>	439	473	399.21	445.11	432.4	369.4	377.91
<b>Sri Lanka</b>	349.70	349.58	328.96	338.032	340.23	330	327.5
<b>Viet Nam</b>	260.00	240.00	170	228.4	217.7	211.5	206.6
<b>Turkey</b>	234.00	243.00	258.54	226.8	212.4	225	221.6

<b>Indonesia</b>	139.36	144.01	129.29	154.4	145.8	143.4	150.2
<b>Myanmar</b>	104.74	102.40	100.15	98.6	96.3	94.6	92.00
<b>Iran</b>	100.58	132.49		119.39	116.81	95.27	103.89
<b>Bangladesh</b>	<b>81.85</b>	<b>64.50</b>	<b>66.347</b>	<b>63.88</b>	<b>66.26</b>	<b>62.52</b>	<b>59.13</b>
<b>Argentina</b>	80.61	85.01	83	85.40	80.42	82.81	92.89
<b>Japan</b>	81.12	80.2	76.4	81	84.8	85.9	82.1
<b>World</b>		5732	5285	5195	4693	4693	4561

**Source: International Tea Committee (ITC)**

China and India top two tea producing countries of over 2.4 million tons and 1.3 million tons respectively, in 2017 (Table 2.2). Bangladesh earned 10<sup>th</sup> position again with its total production of 81.85 thousand tons in 2017. Data of year-wise tea production with the percentage contribution in the total global production is presented in the Appendix-1. From the Table- 2.2, an upward trend of tea production of all countries is being observed; as marketers found a great opportunity to invest in this sector. Along the production, global demand for tea is also rising but at a slower pace than the growth rate of production. Table- 2.3 and Figure- 2.2 explain that a significant gap between production and consumption has widening due to the rapid growth of production of tea around the world.

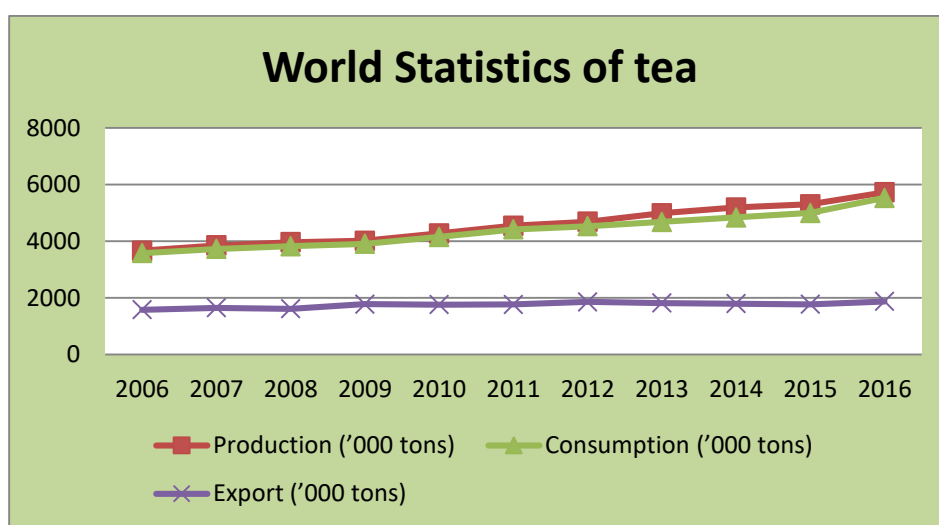
**Table 2.3: World Statistics of Tea (Production, Consumption and Export)**

<b>Year</b>	<b>Production (‘000 tons)</b>	<b>Consumption (‘000 tons)</b>	<b>Difference (‘000 tons)</b>	<b>Export (‘000 tons)</b>
2008	3965	3826	139	1615
2009	4019	3909	110	1780
2010	4281	4154	127	1762
2011	4551	4421	130	1772
2012	4691	4531	160	1858
2013	4991	4684	307	1823
2014	5196	4845	351	1796

2015	5305	4999	306	1774
2016	5732	5534	198	1876

Source: International Tea Committee

Fig-2.2 : Graphical presentation of world statistics of tea



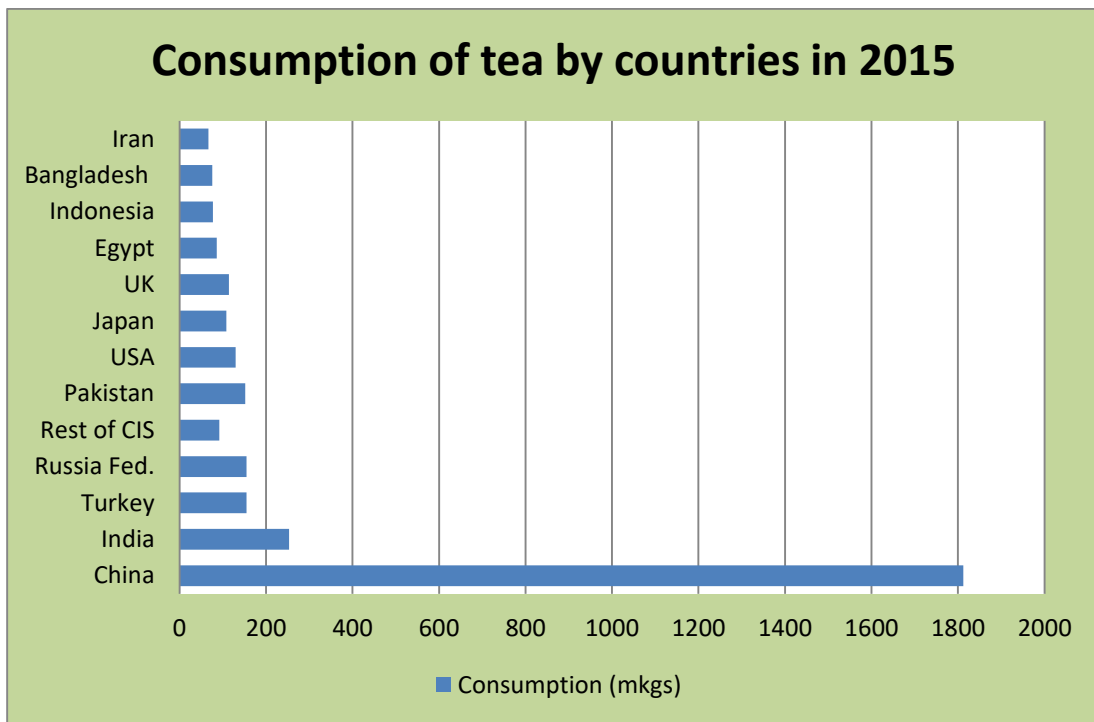
Source: International Tea Committee

In 2015, worldwide total production of tea was estimated 5,306 thousand tons with the estimated consumption at 4,999 thousand tons resulting 306 thousand tons surpluses. Whereas, in 2016, world production of tea increased by 4.4% annually and reached 5,732 thousand tons and consumption increased by 4.5% and reached 5,534 thousand tons. China is the major tea producer and consumer, consumes its 85% of total production amount. After China, India, Pakistan, Turkey, Russia Federation, United States and Japan are the major tea consuming countries worldwide (figure-2.3). Especially cold-prevailing countries are the big consumers of tea worldwide. Some countries drink tea as a substitute item of water.

Awareness about health benefits of tea consumption and its habitual tendency has driven the global tea market. Developing tea culture in different countries, increase of disposal income,

changes of taste and preference of people are the major factors that energize the growth of tea market. Introduction of new flavors and variety of tea, value-added tea and organic tea opens new opportunities for the market development.

**Fig 2.3: Graphical presentation of country-wise tea consumption in 2015**

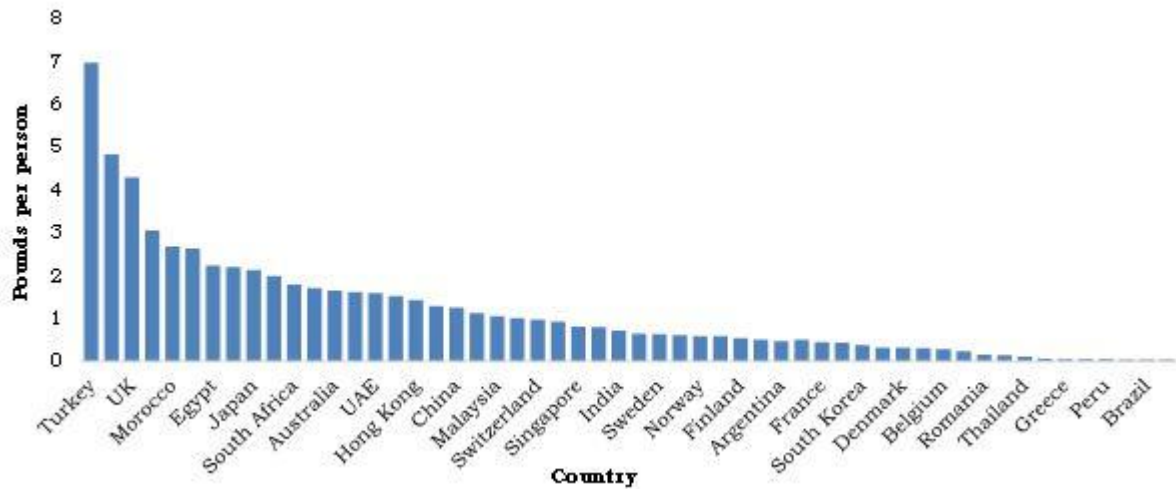


**Source: Publications of FAO.**

Worldwide tea becomes more popular than coffee, due to its positive health benefit effect. Tea has reached in every corner of the world, in many countries there developed tea culture. Turkey was the largest tea-consuming country in the world in 2016, with a per capita tea consumption of approximately 6.96 pounds per year. In contrast, China had an annual consumption of 1.25 pounds and India had 0.72 pounds per person. Figure 2.4 shows that Turkey, Ireland, the UK, Russia, and Morocco are top five countries of the world with largest

per capita tea consumption. Most of the top countries consuming tea belong to Europe and LAMEA regions, resulting in growth of the market.

**Fig 2.4: Per capita tea consumption worldwide in 2016**

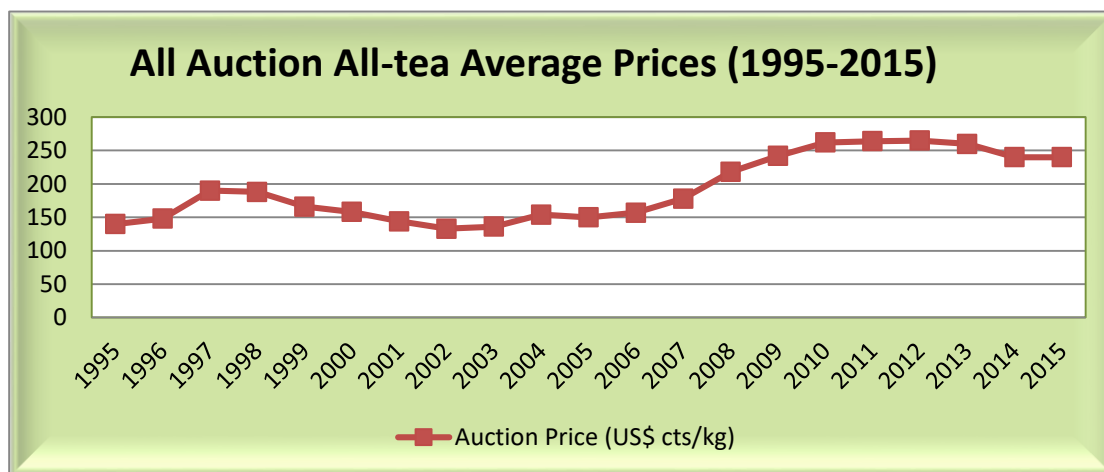


**Source: Wikipedia**

Cost of tea production varies according to countries worldwide which directly affect the auction price of tea. Tea industry is land and labor intensive and these factors are getting more expensive and scarce day by day. Most likely Sri Lanka forgoes the world’s highest cost of production as US\$1.47 to produce a kilogram of tea comparing \$1.09 in India and \$1.15 in Bangladesh. Average all-tea auction price has been shown in the figure-2.5 explains decreasing trend in recent years. Continuing overproduction of tea affects more on falling prices on the global tea market. Emergence of new cultivators of tea like Vietnam, Indonesia and Malawi results oversupply of tea in international market which causes downward trend of auction price of tea worldwide. Therefore, a tough competition has arisen in global market and traditional tea exporting countries are losing their position.

More than half of total world's tea is consumed by the tea produced countries. Global sales from tea exports accounted to US\$7.8 billion in 2017 which appreciated 4.6% from 2016. Therefore, as an agricultural export item, tea contributes to the up gradation of the socio-economic condition by earning foreign currency. In 2015, worldwide total tea export accounted nearly 2 million tons which decreased from previous year.

**Fig- 2.5: Graphical presentation of all-tea average auction price for ten years**



**Source: Publications of FAO.**

In the global market, especially in Europe and USA, people are strongly habituated with coffee drinking. Therefore, tea faces strong competition with coffee and other carbonated beverages in the world market. Table- 2.4 shows top 12 tea exporting countries where Kenya regularly holding a strong position among all countries. Though China and India are the two highest producers in the world market, due to massive internal demand these two countries belongs second and fourth position in the international market, respectively. As a largest producer and exporter, Sri Lanka continues to retain fourth and third position in the market from very early stage.

**Table 2.4: Top 12 tea exporting countries worldwide**

Country	2011		2012		2013		2014		2015	
	'000 Tons	Percent	'000 Tons	Percent	'000 Tons	Percent	'000 Tons	Percent	'000 Tons	Percent
<b>Kenya</b>	388.34	18.08%	380.36	18.65%	448.81	20.30%	458.73	21.60%	410.04	20.52%
<b>China</b>	322.58	15.02%	313.48	15.37%	325.81	14.74%	301.48	14.20%	324.95	16.26%
<b>Sri Lanka</b>	322.55	15.02%	318.40	15.61%	355.25	16.07%	325.14	15.31%	302.84	15.25%
<b>India</b>	321.08	14.95%	225.09	11.04%	254.84	11.53%	212.61	10.01%	235.13	11.77%
<b>Viet Nam</b>	134.53	6.26%	146.90	7.20%	141.02	6.38%	132.25	6.23%	125.19	6.26%
<b>Argentina</b>	86.65	4.03%	78.06	3.83%	77.85	3.50%	76.90	3.62%	76.03	3.80%
<b>Indonesia</b>	75.45	3.51%	70.07	3.44%	70.84	3.20%	66.40	3.13%	61.92	3.10%
<b>UAE</b>	62.32	2.90%								
<b>Uganda</b>	55.26	2.57%	55.21	2.71%	62.09	12.81%	59.69	59.69%	53.31	2.67%
<b>Malawi</b>	46.08	2.14%	42.50	2.08%	43.25	1.96%	48.22	2.27%	38.78	1.94%
<b>UAE</b>			48.55	2.38%	61.78	2.79%	71.34	3.36 %		
<b>Free Zones</b>									39.26	1.96%
<b>World</b>	<b>2148.1</b>	—	<b>2139.6</b>	—	<b>2210.9</b>	—	<b>2123.8</b>	—	<b>1998.4</b>	—
<b>Total</b>	—	84.48%	—	82.30%	—	83.26%	—	82.53%	—	83.54%

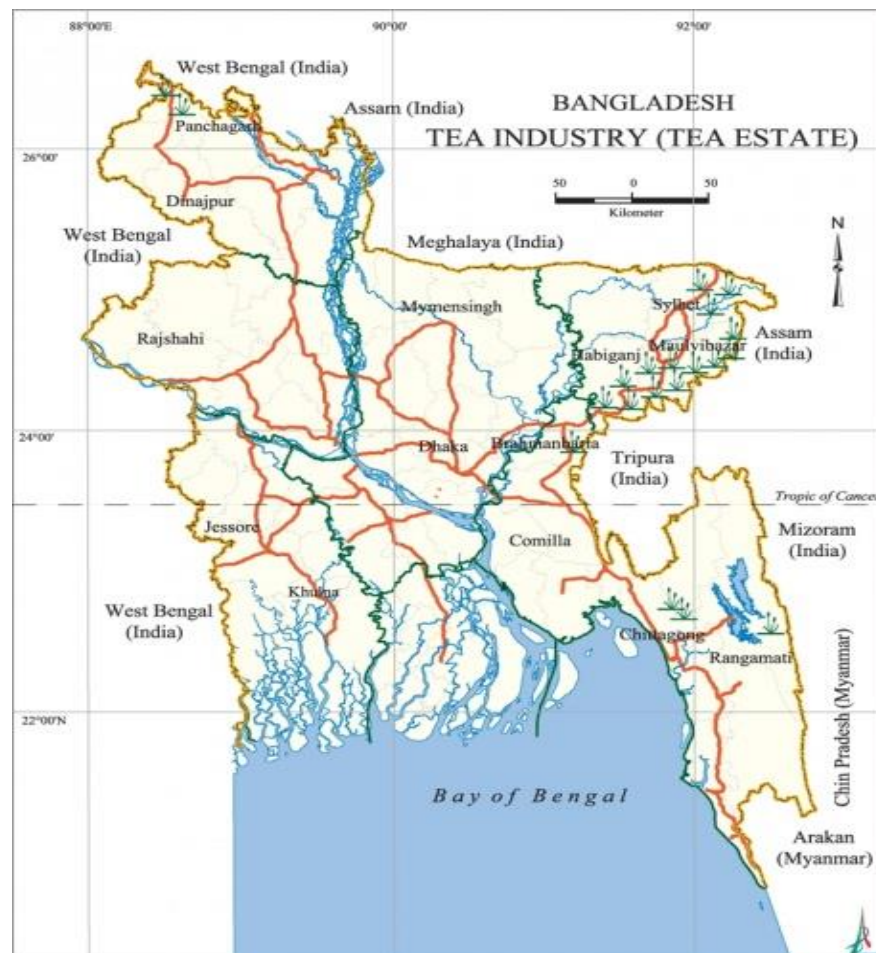
**Source: International Tea Committee**



## 2.2 An Overview of Bangladesh Tea Industry

As a long-lived perennial agricultural crop, tea mainly produces in the high land area. Tea cultivation and harvesting process is unique from other typical crops. Tea is an important cash crop of Bangladesh. The hilly zone area and the weather (humidity, rainfall, temperature) of Bangladesh are suitable for tea cultivation. Bangladesh tea industry has faced a serious setback in 1971 and with the definite help of government, foreigner support and hard work of planters this industry again turned up. After her independence the Bangladesh tea industry started its journey with around 107 thousand acres of total land containing 152 tea gardens (Alam, 1989).

**Fig 2.6: Major tea estate area in Bangladesh**



Now total 166 tea gardens covering 2,79,436 acres land are situated in Greater Sylhet, Chittagong, Panchagarh and Thakurgaon districts. 96% annual production of tea comes from greater Sylhet where only Moulvibazar district contributed 62% shown in figure- 2.6. At the time of introduction period of tea, most of the people of Bangladesh were remain ignorant about the use, preparation and health benefit of tea.

At that time tea was cultivated commercially and had a better share in export. Minor portion of total production of tea were retained for local consumption. But gradually the scenario has been changed and Bangladeshi tea become insignificant in the internal market due to its continuous decline of exportable. Now Bangladesh can export hardly about 1 to 1.5 million kg of tea which is very minor portion of world export. Now tea has become a popular drink to the people of Bangladesh, in the 20<sup>th</sup> century. For this reason, Bangladesh tea industry could not utilize quota facility though the quality of Bangladeshi tea is better than many other counties. At present, Bangladesh is the largest producer and consumer of tea in the world and consumes nearly 100% of its total production.

**Table 2.5: List of tea gardens, cultivated land according to district-wise distribution**

<b>Name of Districts</b>	<b>Total cultivated Land (Acre)</b>	<b>No. of tea gardens</b>
Moulovibazar	1,56,191.94	91
Hobiganj	54,164.16	25
Sylhet	28,936.32	19
Chittagong	34,560.45	21
Panchagarh	4,751.05	07
Rangamati	794.94	02
Thakurgaon	40.77	01
Total	2,79,436	166

**Source: Bangladesh Tea Board**

Though tea cultivation is not a new phenomenon for Bangladesh, recently large corporate groups are feeling interested to invest in tea plantation to meet the local demand. In Bangladesh, for the sustainable environment both for the land and the human being, organic tea production has started at a limited scale. As a producer and exporter of tea, the contribution of this industry in the economic development of Bangladesh is very significant. To mention here, the growth of tea consumption is 3.5% as production is increasing 1% per year along the increasing local prices (Khan and Alam, 2002). In another study Hazarika et al (2009) showed that domestic consumption of tea was increasing at a rate of 5.6 percent, whereas production was rising at a marginal level.

**Table 2.6: Year-wise production, consumption, export, and import statistics of tea**

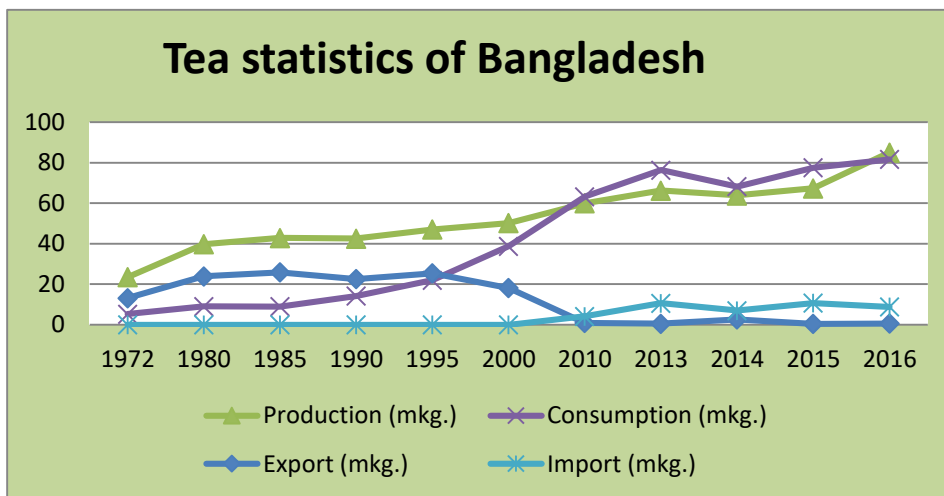
Year	Production (mkg.)	Consumption (mkg)	Export (mkg.)	Exportable income (mtk.)	Import (mkg.)
1972	23.48	5.26	13.19		00
1980	39.81	9.06	23.88		00
1985	42.89	9.00	25.85		00
1990	42.56	14.21	22.57		00
1995	47.04	22.00	25.43		00
2000	50.22	38.79	18.1		00
2010	60.04	63.26	.91	176.68	4.13
2013	66.26	76.34	.54	179.04	10.62
2014	63.88	68.18	2.66	281.72	6.96
2015	67.38	77.57	.48		10.68
2016	85.05	81.64	.62		8.83
2017	78.95	85.93	2.56		

**Source: Bangladesh Tea Board**

As an important source of export earnings, Bangladesh tea industry has earned on average TK. 1065.30 million during 1975-2005 (Islam, et. al., 2008). But gradual shrinkage of exportable surplus of Bangladeshi tea reduces the exportable incomes very sharply. Tea is a

popular drink particularly in the northern and southern hemisphere of the country where extreme cold prevails most of the time.

**Fig 2.7: Graphical presentation of tea production, internal consumption, export and import**



**Source: Bangladesh Tea Board**

In 1972 domestic tea production was 23.48 million kg and major portion (13.19 million kg) of produced tea was exported in other countries. Since 20<sup>th</sup> century, a rapid growth of demand is being observed and internal consumption was accounted at 39 million kg against the total production amount was 50 million kg (Reuters. 2010). In Bangladesh per capita consumption of tea is very low only 0.34 kg compared with other countries as 0.70 in India, 1.01 in Pakistan, 0.52 in Sri Lanka, 3.5 in U.K and 4.17 in Ireland (Wikipedia, 2014). If per capita consumption of tea is increased to 0.50 kg, then there will be no surplus of tea for export purpose from Bangladesh rather import will be required.

**Table- 2.7: All market auction price of tea sold**

<b>Year</b>	<b>All India</b>	<b>Bangladesh</b>	<b>Sri Lanka</b>	<b>Indonesia</b>	<b>Kenya</b>	<b>Malawi</b>
<b>2012</b>	<b>2.28</b>	<b>2.68</b>	<b>3.07</b>	<b>1.97</b>	<b>2.88</b>	<b>1.70</b>
<b>2013</b>	<b>2.20</b>	<b>2.46</b>	<b>3.44</b>	<b>1.98</b>	<b>2.41</b>	<b>1.82</b>
<b>2014</b>	<b>2.08</b>	<b>2.19</b>	<b>3.53</b>	<b>1.66</b>	<b>2.03</b>	<b>1.43</b>
<b>2015</b>	<b>1.94</b>	<b>2.41</b>	<b>2.97</b>	<b>1.56</b>	<b>2.73</b>	<b>1.56</b>
<b>2016</b>	<b>2.00</b>	<b>2.55</b>	<b>3.20</b>	<b>1.64</b>	<b>2.29</b>	<b>1.55</b>

**Source: International Tea Committee**

The rapid increase of domestic consumption of tea pushes up the price level in the local auction and lessens exports (Nasir, Shamsuddoha, 2011). Prices of Bangladeshi tea are relatively high in contrast of India, Indonesia, Kenya and Malawi (Table- 2.7). Therefore, some tea traders were interested to import cheaper and inferior quality tea from low priced countries. In this situation, Bangladesh Tea Board recorded the highest amount of tea import 10.68 million kg of tea in 2015 to meet the local demand (Table-2.6).

Higher auction price, emergence of new entrants in the world market, availability of better quality tea at a lower price, open economy and rapid increase of internal demand are the major causes of losing competitive position in the world market. Decreasing world price become threatened for local marketers of tea as a chance of low-graded tea with the low-priced may hinder the present standard level of tea marketing. Bangladesh tea industry was allowed duty free entry of 10.00 million kg of tea in Pakistan, but due to internal demand Bangladesh could not utilize the quota facility fully.

### 2.2.1 Marketing Structure of tea

The concept of Marketing contains a complex chain of relationship and interface among the different divisions of an organization (Kapoor, & Kansal, P., 2004). The fundamental job of a marketing manager is to design efficiently the marketing mix. The efficiency of marketing manager depends on proper allocation of company resources according to achieve the objectives of sale and profitability (Garavand, Nourayi, & Saeed Arasi, 2010). Hence to attain ultimate customer satisfaction in this competitive age, proper mixing of product, price, place and promotion guarantees the efficiency of an organization. Marketing of tea contains a unique process of selling tea from producers to consumers.

**Table 2.8: Area, production and yield size of sterling and other tea estates of Bangladesh**

	2013			2014		
	Area harvested	Production ('000 kg)	Yield per ha.	Area harvested	Production ('000 kg)	Yield per ha.
Sterling Estates	20,581	26,070	1,267	20,187	27,640	1,369
Other Estates	36,468	37,807	994	36,012	38,618	1,270
Total	57,049	63,877	1,093	56,049	66,259	1,152

**Source: Bangladesh Tea Association**

In Bangladesh, total 166 tea gardens are managed by the five different kinds of managements. Among them 26 tea gardens are managed by the foreign companies and produces 50% of total production from 42% of plantation area (BBS, 2014) where 135 tea gardens are owned by Bangladeshi companies' produces rest of the production. Due to proper plan, modern technology and equipment, sterling companies are also efficient in cost management (Sabur et al., 2000). He showed that original price of tea remained same though

nominal price increased at the study period. The average size of the tea estate of the proprietorship concern 343 acres, and that of Bangladeshi Companies 669 acres, while that of Sterling Companies was 1648 acres.

Tea marketing contains a selling process of the produced tea in bulk from tea estates to the buyers through auction. Throughout the world, the auction has been serving as a basic system of tea price determination ever since the beginning of tea trading. Marketing through auction centers is a regulated marketing system which provides assistance to both buyers and producers (Roy, 1997). With the auctioning system, huge quantity of tea can be sold in the shortest possible time. Auction system also provides several advantages as competition through concentrating on the factors of demand and supply; improvement of packaging; facilitating buyers in finding their required quality and size as their demand and extension of credit against buyers (Halayya, 1972).

**Table 2.9: Selling of tea in local and international market**

<b>Supply of tea in local market</b>	<b>Export of tea in international market</b>
Buying tea from the auction paying 15% VAT on the auction value known as internal account buying,	Selling the tea in the London Auction Market,
Buying tea from the auction for export at nil VAT known as external account buying and subsequently transferring to the internal account	The foreign buyers purchase tea from the Chittagong auction market by their respective bidders,
Tea supplied directly from the tea estates with prior permission of the Tea Board.	Sale by the bilateral transaction contract.

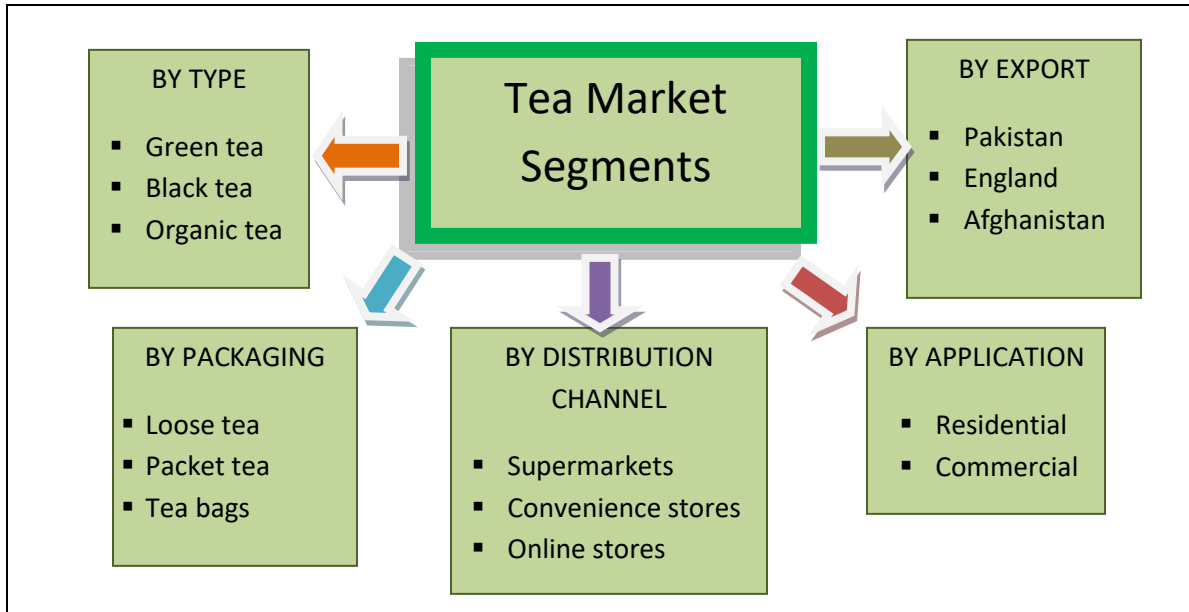
**Source: Sabur et al, (2000) & Alam, K. (1993)**

Buyers buy tea to sell in the local market or export it in bulk or in packets to other countries. The selling process of tea in the local and international market shown is in table-2.8. Tea Traders Association of Bangladesh (TTAB) organizes a weekly tea auction in Chittagong and Sreemangal through the selected tea brokers of Bangladesh Tea Board. The supply chain of tea is vertically and horizontally integrated as small numbers of companies control all functions, from processing to packing and branding (Van der Wal, 2008).

In Bangladesh, six major players (MM Ispahani Ltd, Unilever Bangladesh, HRC Product, Tetley ACI, Abul Khair Consumer Products, the Consolidated Tea & Lands Co Ltd) hold 80 percent share of the country's branded tea market. Tea is a perishable item in nature and due to shortage of storage facility and higher amount of tax the owners of tea estates and traders faces strong challenge at the time of marketing of tea. At each stages of processing of tea, value is added to tea leaves. Branding of packet tea increases marketing cost results a huge difference between auction and retail price of tea. In addition, producers get lower share of consumer's taka due to increasing production and labor cost and less control over auction process (Hazarika, k. 2011). Figure 2.8 shows the way of selling tea through auction for local and international market. Distribution chain of tea industry is shown in **Appendix-2**.



**Fig 2.8: Marketing chain of tea industry**



**Source: Author**

### **2.2.2 Problems of Bangladesh tea industry:**

From the production to branding and marketing, stakeholders of Bangladesh tea industry is suffering many problems. Some problems concern political setback, natural adversity, management problems and labor-wellbeing issues. Political and social unrest are the main problems faced by the tea traders and gardeners. Log stealing, deterioration of law and order, addiction of tea laborers and unhealthy working condition are some significant problems faces tea industry.

Per hectare production of tea is quite low in terms of other tea growing countries. Biswas and Motalib (2012) identified that Imbalanced and inadequate supply of nutrition, soil erosion, improper placement of tea plants and untimely fertilizer are the major problems faced in Bangladesh. As plantation of good quality of tea is largely depends on favorable climate condition. In 1999 and 2016, Bangladesh tea industry has suffered prolonged and severe

drought which badly affected tea production. Another major reason also influence the per hectare yield size is the harvesting season. In this sub-tropic (Bangladesh) tea is harvested about 8-9 months in a year, where in the tropics tea can be harvested around the year. Lack of irrigation in the dry season

Lack of long-term strategic plan for tea industry and low proportional investment compared to national investment hinders the growth of tea industry. Bangladesh tea industry faces proper branding crisis. Old fashioned machinery and technology, poor infrastructure and no measuring instrument to measure MRL value are the major problems faces tea management. .Marketing and branding are become the major challenges for the marketers worldwide. Adequate support for branding Bangladeshi tea in the world market focusing its color and taste can open a new avenue.

Labors are the prime component of tea industry but surprisingly, proportion of the labor's wage is very low in the consumer price of tea. Labor rights are totally depends on the tea garden owners who fulfills their basic needs as housing, education, health care, utilities and access of water. Absence of good relation between tea workers and gardeners create less job satisfaction hampers productivity.

Along the above difficulties, shortage of storage facilities, price instability, high-amount of tax, little influence of tea producers on tea trade shortage of capital, insufficient storage facilities, higher amount of tax and social and political unrest are the major problems faced by the tea gardeners and traders of tea industry (Ibid). A silly complaint arises against some tea garden owners as they are utilizing the govt. loan properly and interested more about

forestation of valuable trees, horticulture and some has give up tea business due to poor return.

### **2.2.3 Challenges faced by Bangladesh tea industry**

In 16<sup>th</sup> and 17<sup>th</sup> century, tea was first initiated in South-East Asia and later by contract between China and Europe tea was spread over Europe and England on a commercial basis which gradually became a fashionable upper-class drink (Huque, 2007; Islam et al., 2005). But now like other agricultural commodities, the tea industry is also facing various challenges as arable land for tea cultivation is decreasing rapidly. Due to the fastest growing rate of population, and their dependency on agriculture, industrialization and urbanization has created uneven pressure on the limited land area. Therefore, land crisis becomes a major challenge for crop production expansion along with the scarcity of skilled labor and climate change which directly affect the profitability and productivity (Gunathilaka & Tularam, 2016). Soil erosion cause due to unscientific use of fertilizer and chemical pesticides, a practice of traditional cultivation method, poor awareness among farmers about sustainable farming process, deforestation, changing the climate, and a crisis of water for proper irrigation in the dry season are the great challenges for the growth of tea industry alike other agricultural commodities.

Historically, Bangladesh tea industry had a strong position in the international export market but due to the presence of new and emergent competitors with high-quality, low-priced tea and the abrupt increase of internal consumption, this industry has lost its valued position. As a producer-consumer country, the export of Bangladesh tea industry is facing a challenge of more inclination towards local market comparing to the international market (Jain, S., 2011),

as local tea price is high than global price. A growing trend in international consumption attracts investors to search for a great opportunity to focus on increasing tea production. Hence, the tea industry of Bangladesh may face a threatened from tea traders of import of low-quality tea with the lower price in terms of local market price. 50% of tea bushes in the tea plantation area are more than 50 years old which is another major challenge for increasing per hectare yield size. Present demand condition also constrained to the rapid conversion toward sustainable production as organic farming method.

Production cost of tea industry mostly incurs the labor cost, therefore pressure on changes labor wages and welfare structure of tea workers is another major challenge. Along with, migration tendency of young labors to urban areas for better employment opportunity may create skilled labor crisis in tea gardens (Van der Wal, 2008). Investment crisis from the both government and private level, high rate of interest on loans, lack of government support for subsidies and insufficient opportunities for higher studies for tea researchers and professionals also affect the growth of Bangladesh tea industry.

#### **2.2.4 Opportunities of Bangladeshi tea industry**

Though Bangladesh tea industry is suffering some critical problems, a great prospect is being observed if the challenging issues can be taken care properly at the right time. Bangladesh tea industry is contributing 17, 976 million taka in the national GDP and generating employment for 6 million people directly and indirectly which really guarantees the consistent growth of sustainable economic development. Bangladesh Tea Board and Ministry of Finance have already initiated various plans to extend about 6,090 hectares of land for tea cultivation and nearly 10,000 hectares of land for revitalization with an estimated cost 350 million taka to

produce extra 15 million kg of tea production. National population growth of Bangladesh reflects promising tea demand in the future market.

**Table 2.10: Year-wise total cultivated area of tea, production and per hectare yield size**

Year	Tea area (ha)	Pluckable Area (ha)	Production (mkg.)	Yield/Ha (kg/ha)	Increase/Decrease over last year (kg)	% Increase (Decrease) over one year previous year
2005	53,276	46,397	59.980	1,291	+72	+5.58
2006	52,820	46,322	53.124	1,146	-145	-12.61
2007	53,717	47,263	58.418	1,236	+90	+7.85
2008	54,106	47,377	58.658	1,238	+2	+0.16
2009	55,832	48,472	59.995	1,238	-	-
2010	56,705	49,170	60.039	1,221	-17	-1.37
2011	56,845	49,248	59.130	1,201	-20	-1.63
2012	58,266	49,970	62.526	1,251	+50	+4.16
2013	58,719	50,203	66.260	1,319	+68	+5.44
2014	59,554	51,933	63.878	1,230	-89	-6.74
2015	60,424		67.38	1,270	+40	+3.25
2016	60,059		85.05	1,587	+317	+24.96

**Source: Bangladesh Tea Board, Bangladesh Tea Association**

Increasing local price of tea also encourages the investors to focus consciously about this industry. Along with these factors, urbanization, growth of income level of people, better marketing strategies adopted by tea marketers, improvement of socio-economic condition of rural people positively influence the growth of domestic tea demand.

Bangladesh Tea Research Institute (BTRI) an autonomous organization under the Bangladesh Tea Board (BTB) significantly contributing in developing and standardizing the quality of tea by introducing high yielding tea variety. This institution is providing a continuous effort for improving tea processing techniques, higher productivity and introducing an integrated pest and diseases management scheme to protect tea plants.

Bangladesh Tea Board has initiated to host 'Bangladesh Tea Expo' from 2017 for the first time in Bangladesh to create a national platform to display and uphold the tea industry amongst the tea specialists of the country and beyond. The basic aspects of Tea Expo were to platform Bangladesh tea industry, encourage diversification of tea and tea products, and explore the culture of tea gardens, blenders and stakeholders gather and portrait eco-tourism. Secondary objectives were to create awareness among people about health benefits of tea, educate people about healthy preparation of tea and to search a new competitive avenue for the tea marketers relating with the packaging of tea products.

The market scenario shows an immense gap between tea demand and supply which has been fulfilled by importing tea from other countries since 2010. Therefore, to achieve food security, possible difficulties relating food production, processing and accessibility should be removed immediately. Significant economic gains can be obtained with the maximum utilization of limited resources and minimum cost of production. Gradual improvement of infrastructure development directly influences the effectiveness of the distribution system of tea industry. Better distribution intensity creates ease of availability of tea has a positive effect on purchasing behavior. Introduction of different taste and value-added tea in the market and opening of tea cafés make popular the tea drinking habit to the young urban consumers integrated into their lifestyle. Consumer awareness about its health benefits and medicinal value (Gramza-Michalowska, 2014; Tounekti et al., 2013), tea has gained popularity to a new section of people worldwide. Production of organic tea introduced by Kazi and Kazi Company in 2000, gained popularity among Japanese and a firm from Japan has already bought the whole lot of tea in advance (Shabbir, 2010). Proper attention and support from Government can help to find niche market globally in near future.

Tea gardeners and different NGOs have paying attention on wage structure of tea labors and developing good relation between tea garden managers and workers. Tea garden owners has become conscious about health facilities, education, training, suitable working hour and environment which directly influences the productivity of tea laborers. Bangladesh Tea Board (BTB) with the support of Ministry of Finance has initiated some projects for the extension of tea cultivation and production to meet internal demand and encourage export. To promote small-holding tea cultivation in Northern Bangladesh, Lalmonirhat and Chittagong Hill Tracts, Bangladesh government has allocated nearly tk. 200 million for extension of tea cultivation in three projects.

## CHAPTER 3

### LITERATURE REVIEW

#### 3.1 Introduction

In economics, supply and demand are two important determinants estimate the impact of price and non-price factors on the decision making choices of customers. This study tries to design a demand function to measure the variation in demand elasticity of tea due to the change of price and non-price issues. Many researchers viewed tea drinking as habitual and addictive behavior and therefore conventional economic analysis is not suitable with tea products. They believed that the demand for tea (and other addictive substances) did not follow the basic laws of economics, perhaps the most fundamental law, which included the downward-sloping demand curve (Winston, 1980; Schelling, 1984). Bangladesh Tea industry is well-established and has a significant role in the socio-economic development of the country. Therefore the aggregated demand for tea highly depends on its own-price elasticity, cross-price elasticity, income elasticity and other demographic characteristics of consumer market behavior (Cheng & Capps, 1988). Consumer demand is a function of multiple factors in addition to prices, including product quality, advertising (Huang et al., 2012), taste and preferences, and other demand shifting variables.



### **3.2 Concept of Demand and Role of Demand**

Demand is a significant function of consumer psychology, the purchasing power of the consumer in connection with own price, cross-price elasticity, availability, advertisement and promotion, prices of complementary goods, the income of individual and significant growth of population size. Theory of demand was evolved by Alfred Marshall whose “Law of Demand” may be stated that for the individual consumer, one may draw up a demand schedule which shows that the amount of a commodity purchased during a given period of time as price varies but other conditions remain unchanged. Different degree of satisfaction and utility expresses different demand function expressing the association between the quantities demanded the commodity (dependent variable) and the price of the stated commodity (independent variable). The price acts as a signal, incentive, and rationing device to bring about equilibrium through the adjustment of demand and supply of the product in the market.

### **3.3 Demand Elasticity**

However, it was defined first time by Dr. Marshall as: “Elasticity of Demand may be defined as the percentage change in the quantity demanded divided by the percentage in the price.” It is the price elasticity of demand which is usually referred to as elasticity of demand. But, besides price elasticity of demand, there are various concepts of demand elasticity. That the demand for a commodity will also be determined by population growth, the income of the people, prices of complementary goods or related goods, advertisement etc. Quantity demanded of a product will change as a result of a change in the size of any of these

determinants of demand. The concept of elasticity of demand therefore, refers to the degree of responsiveness of quantity demanded of a good to a change in its price, income or prices of related goods. Accordingly, there are three kinds of demand elasticity: price elasticity. Income elasticity and cross elasticity. Dahl and Sterner, (1990) have found that income and price are the major the explanatory variables in determining demand.

The extent to which demand for tea products reacts to changes in the price is an experiential question, the answer to which can be determined by calculating the trends in consumption as prices and additional relevant factors change.

### **3.4 Price Elasticity of Demand**

Traditionally, the price is an important mechanism influence consumers' consumption behavior and producers' supply behavior. In this relation, marketers are always concern about price incentives to get a positive reaction from the respondents. According to demand theory, an increase in the price of a commodity force consumers to decrease their purchases of that particular product due to lessening of real purchasing power. Therefore, a negative relationship between price and quantity demanded is being observed. Individual consumer behavior is unpredictable and highly affected by the unit price of a commodity. It is assumed that to maximize utility satisfaction, consumers always make choices among the commodity bundles.

Many researchers have tried to explore the effect of changing the price on the changing demand pattern of food and beverage items in their studies. Andreyeva, T (2010) reviewed 160 literatures to explore the effect of price elasticity of demand for key food categories and

found that mean elasticities for foods and nonalcoholic beverages were ranged from 0.27 to 0.81. A study on Norwegians Edgerton et al. (1996) estimated that own-price elasticities of  $-0.59$  for beef,  $-0.25$  for milk,  $-0.69$  for soft drinks, and  $-0.55$  for vegetables, fruits, and berries. Another study on Norwegian, Rickertsen (1998) estimated own-price elasticities of  $-0.72$  for meats,  $-0.27$  for milk and cream,  $-0.71$  for soft drinks, and  $-0.60$  for fresh vegetables. Under the recommendation of FAO secretariat, Klonaris, S. (2011) conducted a study on the price elasticity of tea demand identified that price elasticities for black tea ranged between  $-0.32$  and  $-0.80$  and for green tea varied between  $-0.69$  and  $-0.98$ . Price elasticity of tea demand is  $-0.4720$  for Canada,  $-0.1556$  for the United Kingdom and  $-0.1237$  for United States (Weerahewa j., 2003). Therefore, all the results are similar with customary considerations of the demand reaction to food and beverage prices are inelastic. From the very early period, the consumption of tea is not being elastic with tea prices. A study by Sharma, P. C., (1969) during 1950-51 to 1967-68 revealed that tea consumption was not responsive to tea prices during that time. To understand the consumption patterns in South Africa, Mmakola et al, (1997) identified that consumers emphasized more on quality over price as an important consideration for consumer food and beverage purchases.

Price is a very important constituent of other product, but in the case of tea, price plays a minimum role in consumer's buying decision while purchasing tea. As consumer's expenditure for tea is very low, estimating about 1 percent of total monthly household income; therefore, consumers are ignorant or less conscious about the price of tea rather consider other factors at the time of buying tea products. Demographic factors such as age, education, occupation, and cultural background influence more the demand for tea along with the traditional price and income variables (Klonaris, S., 2011). Income of people and nativity

of consumers also influence tea demand as low-income countries tend to have higher price elasticities for all foods than high-income countries, because food represents a large share of total income in these countries, hence price changes have a larger impact on budget allocation (Green, et al, 2013). In addition, consumers give more emphasis on taste, color, and brand (Hazarika, 2012). On the other hand, the supply of tea is elastic with the price of tea which is (1.10) signifying quantity supplied for tea varies much higher than its price changes in the context of Bangladesh (Rahman, 2007).

In conclusion, price incentive has a temporary effect; generally, limited effect to generate revenue toward an attempt to balance the increased cost. Sometimes price has used to achieve competitive retaliation but in most cases it affects negatively in the consumer's mind. Rather consumers are primarily spurred by increasing emphasis on premiumization, health, and quality. Widespread awareness of health benefits associated with tea continues to drive the beverage to new heights of popularity.

### **3.5 Effect of Non-price factors on demand elasticity:**

Consumers are always tried to adjust their consumption on the basis of the price of the products. To realize consumer behavior, researchers are continuously striving for a clear understanding of the price mechanism. But if the price is less sensitive with the demand, then it justifies using non-price factors as income level, the population size of the country, advertisement and promotional campaigns, taste and habitual pattern of consumers which may affect the sensitivity of demand along with the price.

To comprehend the nature of demand function for tea in the domestic market, the impact of non-price factors need to consider significantly along the price factor of tea. Both price and non-price factors have a great influence on the competitiveness of a firm and industry which is reflected by market share and profit (Toming, 2006). In addition to price, domestic demands for tea may be influenced by substitution effect of coffee price (Kloraris, 2012), per capita income (Hazarika, 2012), population size (Hossain & Abdulla, 2015; Hazarika, 2012), taste and preference (Indira, 1988) and past consumption behavior of consumers (Dhindsa, 1983). Many empirical investigations suggested that as a habitual drink; demand for tea and coffee are highly influenced by non-price and demographical factors (Venkatram & Deodhar, 2005; Ahammed, 2012) rather than price. In a study of coffee in the Indian market, Dhond, (2012) identified that non-price factors (improving the quality standard and communicating through promotional campaigns and brand advertising) affect coffee demand higher than the price of coffee. In another study, lagged consumption pattern (habit formation) considered as another influential factor to determine coffee demand (Hanspal, S., 2010). In an analysis on the tea market of United States, the Secretariat found that demographic factors impact more on consumption than income and price (Klonaris, S. (2011).

Therefore, from the above discussion consumer's demand not only characterized by the prices of the product (especially food items), rather non-price factors influence more on changing demand pattern of consumers.

### 3.5.1 Income Elasticity of Demand

Income elasticity of demand termed as the change in demand of a commodity or service stimulated by the change in income of the individual. Therefore, any increase or decrease in price correspondingly decreases or increases consumers' discretionary *income* which, in turn, causes a lower or higher demand for the same or some other good or service (Varian, 2014). As a socio-economic and demographic characteristic individual's per capita income is highly associated with the consumer's consumption and expenditure pattern of the food commodity. According to **Engel's law** in economics states that when income rises, the percentage of income spent on food is decreased, even if absolute expenditure on food rises (Engel, 1857). Therefore, income explains the changes in the quantity demanded due to the budget constraints of consumers. In the case of addicted and habitual product income has a strong effect. Empirical investigations indicate a suspicious behavior of income on the demand for food commodities.

A study in the USA found that consumer's decision to purchase convenience food mostly affected by the income of the consumer (Fanning et. al., 2002). Dasgupta et al. (2000) reported that consumer income had an impact on the decision to purchase frozen products. Sabur *et al.* (1997) in a study on food consumption behavior of consumers in Bangladesh found that per capita consumption of some agricultural commodities increased with the relative changes in income. Ali (2008) and Noreen (2002) also reported the total income had a positive relationship with the consumption of food and most of the food items that were consumed dependent on the income and household size. In Nigeria, where rice is a staple food and income elasticity was examined to determine how much demand of a product would

change following a percent change in income, revealed that the elasticity of income of rice is shown to be 0.77 and 0.4 for rural and urban households respectively. In this matter, rice has been seen as a normal good, with higher elasticities observed in rural areas (Kuku-Shittu O. & Pradesha A., 2013). An elasticity of income positively increased the consumption of fish valued 0.506 (Kutu) in Indonesia indicating that an increase in income will increase per capita fish consumption. Kusumastanto and Jolly (1997) explained that consumption of fish significantly related to income elasticity 0.596 indicating fish as a normal good and its consumption would increase with increased income. On the other hand, Shah and Khan (2004) reported that monthly income had no effect on the quantities of pluses, edible oil, sugar, and tea consumed except milk and meat in North West Frontier Province (NWFP) of Pakistan.

Most of the consumers are ignorant about the expenditure amount for tea and proportional expenditure of consumer's on tea is minimum, around 1 percent of the total monthly income of the households (Hazarika, 2012). Therefore, tea is considered a normal good and the impact of income on tea consumption is very low. Hazarika, (2012) also revealed that tea consumption does not influence by the monthly income of the consumers and they are interested to pay more for the best type of tea. As a close substitute of tea, Varun, (2008) also identified that income had a positive influence on coffee demanded and in case of the tea, family income is highly significant in urban areas than rural areas. Along the other factors influence the increased consumption trend in Bangladeshi market, growth in the income level of total population is considered as one of the major determining factor (Ahmmed, 2012, Alam & Akter, 2015). After her independence in 1971, the people of Bangladesh started gradually tea drinking. In 1990, the internal demand for tea was 14.21million kg which rose

to 85.93million kg in 2017. At present, domestic consumption has grown in excess of 80 million kg due to the up gradation of our economic development and steadily rising of middle-class income. Therefore, a positive impact of income has been reflected in the consumption behavior of consumers of tea.

### **3.5.2 Cross-Price Elasticity of Demand**

In economics, the substitution effect explained that a raise in the price of a commodity, the demand for its alternative good will increase by a consumer if there is no income effect (Wikipedia). Literally, tea and coffee are close substitutes of each other and when the price of one commodity rises; then there happens a positive effect on the quantity demanded of other good. Therefore the cross elasticity of demand between these two substitute goods is positive. Substitute goods are also known as competing goods. In the developed market, uncompensated cross-elasticity showed that in general tea and coffee are a close substitute (Kloraris, 2012) in the USA but this concept varies accordingly the economic status of a particular country. In a study on India, the major producer of both tea and coffee, for every unit increase in the price of tea, other things being constant, coffee consumption increases by 0.35 units (M. Indira, 1988) which indicate less significant. Similarly, when prices of tea come down, consumption of coffee also comes down because of shifting from coffee to tea drinking (ibid). Dharwad (2008), observed that tea is the most conventional and affordable beverage in India and it is observed as being old fashioned and less functional than some other substitute products.

As a habitual drink, the individual's involvement with tea drinking and their satisfaction retain them to move other alternatives. But in Bangladesh, tea has few substitutes and



because of its bitter taste tea is popular to a specific aged people. As a close substitute of tea, coffee is an imported item and is relatively expensive in our country context where per capita income is very low. As a hedonistic drink coffee is popular to the middle to high-class literate people and mostly drink occasionally out-of-home or in coffee-shop. On the other hand, as a low-priced beverage tea is acceptable to all classes of people. Therefore, switching from tea to coffee would involve more monetary cost and different taste inclination among consumers. Thus the possible threat of substitution effect for tea from coffee is limited. Alam et. al., (2010) mentioned that domestic tea industry of Bangladesh is considered to face a low threat from substitutes as switching cost to coffee, customers loyalty, the income level of customers, taste and preference and frequency of consumption revealed favorable to tea industry.

### **3.5.3 Effect of Population size on demand elasticity**

In developing and less developed countries the increasing size of the population creates a great impact on per capita consumption of food commodity. Alike, population growth causes a disproportionate positive impact on the demand for food. In this state, the price has a little impact on the demand for necessity and habitual food item. In a study on demand for rice in Nigeria Akpokodje et al., (2001) mentioned that the accelerating growth of population has a huge impact on the increased demand for the staple food rice. Aside from increasing global prices, local demand for rice has been increasing at a rapid pace in Africa in general owing to changing consumer preferences, growing urban populations and rising incomes (Nwanze, et al., 2006). Salama (1995) studied the food consumption pattern in Egypt and revealed that the increased rate of food consumption was highly dependent on population growth and

household size. The upward trend in the growth of population size is anticipated to continue where 83 million people are being added every year to the world's population. In 2017, the current population accounted for 7.6 billion and is expected to extend 8.6 billion in 2030 (UN, 21<sup>st</sup> June, 2017). As a habitual and health drink tea is gaining attention to the two third of the world population and the growing population positively affecting the demand for tea worldwide. Therefore, the growing population size will create a great impact on agricultural production, especially threatening for those countries highly dependent on agriculture like Bangladesh.

In terms of the tea industry of Bangladesh, is one of the promising sector facing uneven challenges to meet up the increased domestic demand due to the rapid growth of the population size, therefore consumption of tea is growing faster than tea production. The consequence behind this fasten growing tea demand is population rise, urbanization, and improvement of the quality of life (National Brokers Limited, 2002: p,8). In their study on tea industry, Hossain & Abdullah (2015) mentioned that the consumption of tea is increasing day by day mainly due to the rapid increase in population. With the socio-cultural acceptance and steady population growth especially an emergence of an educated health conscious people increased the domestic demand for tea accounts 82 m.kgs by 2016. In another study on India Hazarika (2012) found that the huge domestic consumption of tea not only accounted for by the high per capita consumption rather because of huge population size. Therefore, the growing trend of population size is considered as another significant explaining variable in defining the increasing demand for tea products.

### **3.5.4 Effect of habit formation on the elasticity of demand**

Along the other factors, habitual consumption has a important influence on demand for any product. In the absence of income and price changes, changes in the demand of a commodity may be attributed to changes in habits and tastes (Karagiannis & Velentzas, 2004). At the time of introduction of tea in Bangladesh, most of the people were remain ignorant about the health benefit of tea and a major portion of produced tea was exported to other countries. But gradually, as a popular and affordable drink tea drinking has penetrated to the people of Bangladesh. Now regular drinking of tea has become a part of our daily life and its acquired taste and habit formation influences the consumption pattern of tea. Habitual behavior termed as unconscious repetitive behavior affected by past behavior which influences current decisions (Kusumastanto & Jolly, 1997). Different researchers suggested that food consumption is highly affected by habit-formation embodies the effect of past consumption on present consumer expenditure (Sexauer, 1977). Past consumption pattern and habit influences the present consumer preferences and purchasing behavior, sometimes become difficult to change existing behavior of consumers. In Indonesia, fish consumption is dependent on the psychological food-buying habit of consumers valued 0.869 (Kusumastanto & Jolly, 1997).

A study on frozen food demand among consumers identified that habit of the target group had a contribution to increasing demand for these products (Bektas, et al., 2011). Similarly, in India habit-formation accounted 0.839 changes in demand for coffee (Venkatram & Deodhar, 2005) which accounted higher than other price and other economic factors. In the case of tea which is highly influenced by past behavior formed the habit and increases the

marginal utility of performing the behavior (Becker et al., 1994). Dhindsa (1983) investigated the determinants of tea consumption in U.K and U.S.A revealed that previous period consumption has great influence on present consumption in U.K. When habitual behavior is well established, individuals tend to disregard with the changes of price and income. Sometimes, the forming of habit toward product consumption indicates less responsiveness to monetary concerns as product price (Becker et al., 1994). Indeed, health consciousness also pushes up habit formation strongly and an association can be found between these two concepts. In many developed countries, on the habit formation of drinking tea regularly is directly influenced by consumer awareness about health beneficial effect of tea consumption (Klonaris, S. 2012). In a study on Indian tea consumers, found that 50% consumers drink tea as the habit and they are interested to pay more for having tea with better taste and suit to their habit (Hazarika, 2012). In a study, Hawaii tea consumers consider habit and health benefits as more important criteria in their purchasing decision than price (Shehata et. al. 2004). Though the habit formation effect was estimated on other markets in earlier, with this study, researcher has attempted to measure present and future consumption pattern on the basis of previous consumption behavior in the context of Bangladeshi tea market.

### **3.6 Approaches measuring Short-run and long-run elasticity of demand**

In most cases, a difference between short-run elasticities and long-run elasticities has been observed. The influence of independent factors on the dependent variable may change over time. Many researchers have used different econometric models to measure short-run and long-run elasticities (Table-2.1). Among them, Error-correction model one of the popular

methods to estimate short-run and long-run elasticities. In a study, Johnson et. al. (1992) suggests that rising in price will decrease consumption of all beverages in the short run, but no evidence is found that beverages use is price-sensitive in the long run. But the different situation was observed in case of coffee, as Venkatram and Deodhar (2005) used dynamic error-correction methodology (ECM) in their study and results showed that though price elasticity of demand for coffee is small, it is much smaller in the short-run than long-run.

**Table 3.1: Literature on long-run and short-run elasticity of demand**

Country	Item/ Commodity	Period	Long-run elasticity		Short-run Elasticity		Sources
			Price	Income	Price	Income	
India	Gasoline	1972-1994	-0.32	2.68	-0.21	1.18	Ramanathan (1999)
India	Coffee	1970-1992	-0.69		-0.29		Venkaratam & Deodhar, (2005)
Indonesia	Fish	1967-88	- 0.18	0.543	-0.06	0.274	Kusumastanto & Jolly (1997)
United States	Peanut Butter	1984-1994	-0.21		-0.09		Deodhar & Fletcher (1998)
Nigeria	Maize	2001-2010			-0.35		Ikudayisi & Salman (2014)
Indonesia	Rice & Paddy	2007-2017			-0.17		Makbul and Ratnaningtyas (2017)
Korea	Diesel	1986-2010	-0.55	1.478	-0.36	1.589	Lim et al., (2012)
Malaysia	Tobacco	1990-2004	-0.08	1.403	-0.57	0.028	Ross & Al-sadat (2007)
Kuwait	Gasoline	1970-1989	-0.46	0.92	-0.37	0.47	Eltony (1995)

This recommend that short-term price incentives will not realize any significant demand increase; rather coffee demand can be increased by non-price incentives like improving quality standards and generic promotion campaigns or brand advertising. No statistical analysis to measure the demand elasticities for tea in the Bangladeshi domestic market has yet been done. In this study, a demand function for Bangladeshi domestic market for tea is estimated using the methodology followed in estimating peanut butter demand in the United States (Deodhar and Fletcher, 1998). In the following table-2.1, short-run and long-run price and income elasticities found in different literatures are presented in brief.

The researchers used error correction model to estimate the short-run and long-run estimates of demand elasticities as well. The estimated demand equations showed that peanut butter demand is statistically significant and the results indicate that demand is not responsive to prices in long-run, but is elastic in the short-run.

### **3.6.1 Conceptual Framework (Justifications of using ECM model)**

To explore the justified impact of price and non-price factors on the demand function of tea, Error-Correction Modeling strategy has been used in this study. This technique can provide a better formal framework to measure the short-run and long-run sensitivity of demand. ECM integrates the previous period disequilibrium in the final equation. ECM methodology has more predictive ability than other traditional models (Nwachukwu & Egwaikhide, 2007). In this study the researcher has attempted to estimate tea demand elasticity using co-integration and ECM indicating the growth of tea demand can be attributed to rising income level, rising price and increasing population size during the specified time period. From the both

producer's and consumer's point of view, it is important to know the short and long run price and income elasticities of a commodity especially when a factor such as a habit formation determines the consumption.

### **3.7 Approaches to Economic Forecasting (ARIMA model)**

A number of approaches is available for forecasting economic time-series data. Among them, univariate modeling and multivariate time series forecasting are two popular approaches for future forecasting. Autoregressive integrated moving average (ARIMA) modeling is a particular subset of univariate modeling, where the autoregressive component explains the past value of time series and the moving average component explains the current and lagged values of a 'white noise' error term. In contrary, multivariate modeling consists of single equation models which contain exogenous explanatory variables. Multivariate models may consist of single equation models and an alternative, it includes the structural or non-structural system of equations. This study focuses on ARIMA models.

Majority of the studies has focused on forecasting the future production behavior of tea associating different factors rather than analyzing the growing pattern of consumption trend. In this study, the researcher has tried to explore the demand pattern of tea consumers which is dynamic in nature and be affected with numerous factors as price, the income of customers, the population size of a country, habitual effect. The knowledge about future data of consumption should be required for decision making which primarily depends on past and present data. Hence with the use of specific statistical approaches, future unpredictable data can be generated with the existing data series (assuming that past consumption behavior affects future behavior). In this situation, the ARIMA model by Box and Jenkins is the best-

fitted model for forecasting the future consumption pattern of tea. Certain studies have been carried out in the agricultural sector of Bangladesh using the ARIMA model for the purpose of making future forecasting. The production and demand pattern of tea changes over time and is affected by numerous factors.

### 3.7.1 Conceptual Development (Justification of using ARIMA model)

Forecasting and good prediction is a challenge for researchers and marketers. But to achieve customer satisfaction, continuous supplies of the product need to ensure to maintain consumer's demand. In recent times, ARIMA model becomes popular to the researchers for its unique characteristics. It has a fixed structure and specially built to analyze time-series data. Past data is highly relevant to forecast immediate future.

**Table 3.2: Literatures on forecasting using ARIMA model**

Country	Product/ service	Forecasted Year	ARIMA (p,d,q)	Findings	Sources
Sri Lanka	Tea	2016-2020	(2,2,1)	Forecasting of annual tea production on national level, high, medium and low grown area.	Kumarasingh & Peiris (2018)
Bangladesh	Tea	2014-1016	(1,1,2)	The forecasted value of tea production for the year 2014-16 has been studied in this paper.	Rahman, (2017)
Serbia	Corn	2015-2017	(1,0,1) (1,0,2)	The selected model explained downward trend of corn production due to climate change and dry season.	Ilic et al., (2016)
Pakistan & India	Wheat	1960-2015	(1,1,1) &(0,1,1) (1,1,0) &(0,1,1)	A comparative wheat production scenario is predicted for Pakis and India.	Iqbal et al., (2016)
Bangladesh	Tea	2014-2025	(0,2,1)	Comparison between the	Hossain &



				original series and forecasted series demonstrated statistical significance to forecast tea production in Bangladesh.	Abdullah (2015)
West Bengal (India)	Tea	2013-2020	(2,1,1)	Increasing trend was found in area, production and yield of tea in West Bengal.	Dhekale et. al., (2014)
Bangladesh	Pulse	2011-12 to 2015-16	(1,1,1) (0,1,0) (1,1,3)	Trend production of Pigeon pea, Chick-pea and Field-pea has been determined	Rahman, et.al (2013)
Suceava (Romania)	Tourism services	2012-2013	(4,2,1) (1,0,1) (4,0,5)	The development of tourism sector of Suceava will continue during next years.	Condratov, (2012)
India	Tea	58-69 <sup>th</sup> month	(0,1,1) (2,1,1)	Tea demand of India for next 58-69 <sup>th</sup> month has been forecasted on the basis of original series of data.	Gijo, (2011)
Pakistan	Wheat	2000-01 to 2021-22	(1,1,1) (2,1,2)	Forecasting about wheat production showed an increasing trend whereas wheat production area remains stable.	Iqbal et. al, (2005)

Consumer demand is dynamic and changes over the time affected with various determinants as population growth, price and the income of the people. Past and present data is required for future decision making. Therefore, time series analysis has a great extent over demand modeling parameters for forecasting during different periods. Appropriate statistical approaches using the best-fitted models direct to forecast (predict) tea production and consumer's demand pattern with the current data-set. In this study, the researcher used ARIMA model for forecasting both tea production and consumption so a comparative scenario can be visualized to take further necessary steps.

## CHAPTER 4

### METHODOLOGY OF THE STUDY

#### 4.1 Introduction

In the context of Bangladesh, the tea industry is an important contributor in the beverage sector as import substitution, income generation, and employment creation. Therefore, a clear picture of domestic demand pattern may generate understanding among government people, policymakers, marketers associated with this particular industry. Potential investors may design a future pathway to achieve their goals. In this study, the researcher has designed a comprehensive demand system to cover all possible factors that can affect the domestic demand function of tea. For the data collection purpose, mixed-methods research was used to investigate the effect of the possible factors on tea demand.

Therefore, two steps process has been conducted; the first one was the collection of expert opinion through the in-depth interviewing method and the second one was secondary data analysis using appropriate econometric models.

#### 4.2 Justification of Using Mixed-Method Approach

Mixed-methods research included both qualitative and quantitative research methods to minimize the limitations of both approaches. Creswell (2014) explained that mixed-methods research contains several core characteristics, integrated two forms of data, embedded the data and timing of data collection also be emphasized. The aim of using a mixed-methods

approach in this study is to gather a depth understanding of consumer demand pattern and the reasons of behaving in such a way. For qualitative research, an open-ended questionnaire was prepared to collect the responses through in-depth interviewing method. Second, for quantitative research purpose, secondary data was collected from various authentic sources and the econometric model was designed on the basis of qualitative research findings. To get an initial understanding about respondent's thoughts and evaluating criteria affecting the consumer's decision process, an open-ended questions approach has been applied. In fact, initial research is conducted to clarify, understand, provide insight and define the nature of a problem with the use of qualitative data analysis (Zikmund, 1994; Malhotra, et al., 2008).

#### **4.2.1 In-depth interviewing method:**

The in-depth interviewing method is an important technique to understand the dynamics among respondents. Through interviewing the selected experts, interviewer tried to explore the possible factors which may influence the state of demand among the people of Bangladesh. Experts were selected on the basis of their expertise and involvement with the tea industry and problem area. In-depth interviewing method attributes direct responses from the respondents which help research to uncover a clear understanding of a particular respondent (Malhotra, 2008). To analyze the qualitative data, content analysis is used in this study where data can be analyzed qualitatively and quantitatively at the same time (Gbrich, 2007). Content analysis is a systematic and categorizing approach to explore the huge amount of information determining the trend and patterns of used words, their frequency, the structures and their relationships (Mayring, 2000; Gbrich, 2007).

#### **4.2.2 Findings of Content Analysis:**

From the content analysis, a number of subjective and objective factors that directly affect the consumption pattern of tea consumers were identified. Profile of the participants of the in-depth interview has shown in Appendix-3. From the content analysis, several factors characterized consumer's demand pattern for tea has identified as:

1. Price of tea products: Retail price of tea affects more than auction price,
2. The income level of consumers: Alike other commodities, demand for tea also characterized with the per capita income of buyer,
3. Population growth of a country: A growing pressure of population positively influence consumer's demand,
4. Taste & preference: Unique taste of tea makes it popular to the Bangladeshi people,
5. Habit formation/Addition for tea: Regular tea consumption which is affected by past consumption behavior of consumers, and
6. Healthy properties of tea: Tea consumption becomes popular among people due to growing awareness about the healthy beneficial effect.
7. Price of coffee as a substitute product: Coffee is a close substitute product of tea and changes in the price of tea may positively affect the demand pattern of coffee. But coffee is an imported item in the context of Bangladesh and due to its high price it is less popular to the customers than tea.

Finally, on the basis of depth interviewing findings, the author has conceptualized the framework of dynamic tea demand model for further statistic investigation.

### **4.3 Secondary data collection and empirical estimation:**

With the huge population (160 million) and 0.340 kg per capita consumption of tea, Bangladesh constitutes a big and competitive tea industry worldwide. In addition, as a habituated necessity item, the demand pattern of tea is characterized to have a fluctuation due to competition in the market. Therefore, researchers recommended the re-evaluation of the demand model of tea industry after time duration to get better forecasting results, as of dynamic market scenario (Nelson, 1973). In this study, to estimate the domestic demand function of tea industry the aggregated time-series secondary data has been collected from possible authentic and reliable sources. To measure the influence of the possible factors on the domestic demand for tea two layers of the econometric model has been used:

- i. Measuring the short-run and long-run price and non-price elasticities of tea demand with Error-Correction Model (ECM),
- ii. Forecasting the future trend of tea production and consumption with the Autoregressive Integrated Moving Average (ARIMA) model.

Tea is a popular drink to the two-thirds people of Bangladesh and with the aggregate data, an overall picture of consumption pattern of Bangladeshi tea consumers can illustrate than individual-level data. As a big industry, the population size of tea consumer is also huge; therefore individual-level data collection and its analysis are considered to be complicated and time-consuming, sometimes imprecise. To examine the effects of price and other non-price factors (income effect, population size effect and the effect of past consumption on present demand) on tea demand, different econometric models have been applied. In the context of Bangladesh, due to lack of complete data-set very limited research has been done

to measure the demand elasticity of tea and other commodities. Hence, to generate fundamental conception about income and price elasticity, and other dynamic issues of tea consumption behavior, aggregated time-series data has been used in this study. Time-series data is a sequence of observations of the definite variable at a specific time interval over a period commonly as daily, weekly, monthly, quarterly and annual frequencies. Economic time-series data contains some characteristics as apparent trend, high level of persistence on shocks and co-movements with other series (Enders, 2010).

For this research purpose, annual aggregated time-series data was collected from Bangladesh Tea Board, World Bank publication, Bangladesh Statistics Bureau, Bangladesh Tea Association, International Tea committee, and other sources for 1974-2017 financial years. But due to unavailability of data, the researcher was not able to include all the variables in the framework of tea demand model found from qualitative research. Annual secondary data of variables from various sources are presented in the Appendix 4 & 5 and their descriptive statistics are presented in the table- 4.1.

**Table 4.1: Description statistics of the variables**

<b>Variable</b>	<b>Description</b>	<b>Mean</b>	<b>Std. Deviation</b>
D	Quantity of internal consumption (mkg.)	29.98	24.2207
Pt	Retail Price of tea (tk./kg.)	108.701	57.064
Yn	Per capita income (tk.)	449.91	296.68
Pn	Population size of Bangladesh (million)	116.41	29.31

**Source: Data Analysis**

### 4.3.1 Tea demand elasticity model

With the increasing auction and retail price of tea in the domestic market internal demand for tea also growing very sharply. Understanding the sensitivity of demand for tea to changes in prices and other non-price factors has important implications for policies related to production expansion, import substitution, and new agricultural technique initiation. Therefore, special attention has been guided towards studying the demand analysis of the tea market (Willson, 1992; Nick Hall, 2000; Klonaris, 2012) as economic development of some countries highly dependent on tea industry. After investigating the theoretical evidence and depending on the available data a demand function model for tea is specified as a linear functional form:

$$D_t = \alpha_0 + \alpha_1 Pt_t + \alpha_2 Yn_t + \alpha_3 Pn_t + v_t$$

.....(1)

Where, D, Pt, Yn, and Pn represent natural logarithms, respectively:

D is the annual internal consumption of tea (mkg.);

Pt, average auction price of tea (kg.);

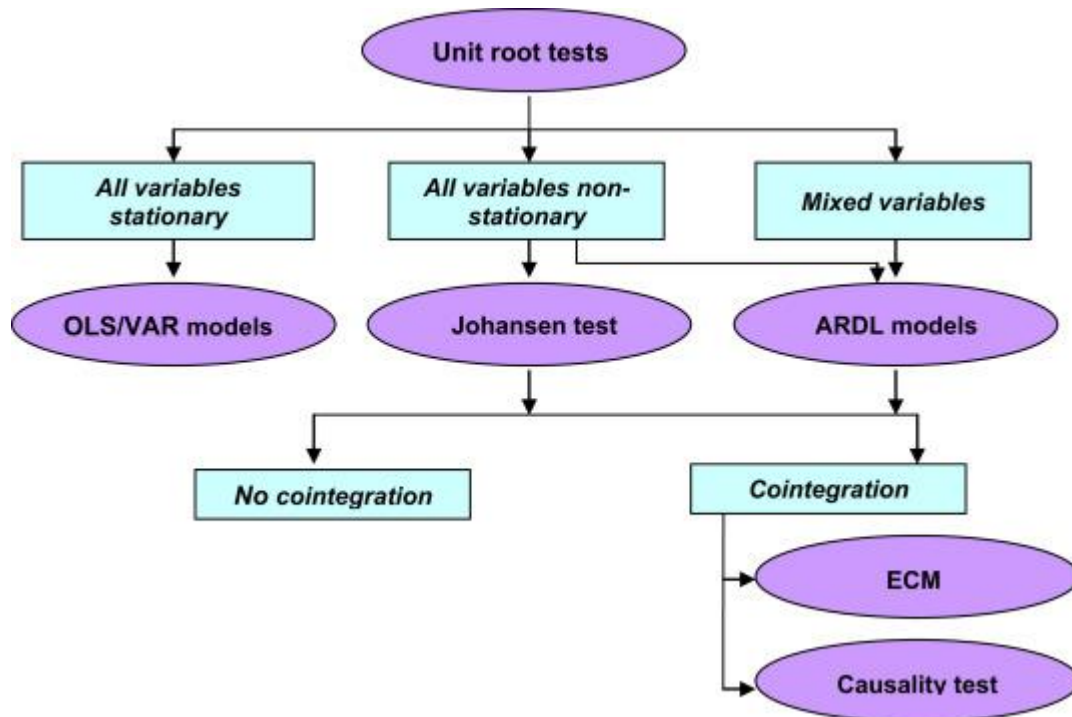
Yn, annual per capita income (tk.);

Pn, Population Size (million).

Recent studies in demand estimation found that non-stationary data may yield spurious causality (Stock and Watson, 2007) among time-series variables. A common trend of non-stationary is rendered among the variables and regression coefficients become biased (Davidson and Mackinnon, 1993). Therefore, it is important to confirm stationarity before

further proceed. In this study, the method has been selected on the basis of the basic approach shown in figure- 4.1.

**Fig-4.1: Method selection for time series data.**



OLS: Ordinary least squares; VAR: Vector autoregressive; ECM: Error correction models. ARDL: Autoregressive distributed lags; Source: Shrestha and Bhatta, (2017).

#### 4.3.1.1 ECM (Error-Correction Model) Model specification:

To confirm stationarity, I have to examine the unit roots of the specific variables (D, Pt, Yn, Pn) following Engle and Granger (1987). As Error-Correction model first introduced by Sargan (Sargar, 1984) in his study and later popularized by Engle and Granger corrects for disequilibrium with explanation that when two variables X and Y are cointegrated, then their



relationship can be expressed as ECM (). This test is often done by augmented Dickey-Fuller (ADF) (Dickey and Fuller, 1979; Said and Dickey, 1984) and the Phillips-Perron (PP) (Phillips and Perron, 1988) tests. After that, as the variables are found non-stationary at level, then I have to apply first difference and elasticities of tea demand have to be estimated with the differenced data. Table- 4.2 shows the results of ADF test and PP test indicating that all the variables are become stationary after 1<sup>st</sup> difference. Therefore, the researcher decides to use Error-Correction Model (ECM) to measure the short-run and long-run elasticities of tea demand as multiple variables are included in this model.

**Table 4.2: Results of Stationarity Tests (Augmented Dickey-Fuller test & Phillip-Perron test)**

<i>Variable</i>	<i>ADF test</i>		<i>Phillips-Perron test</i>	
	<i>Level</i>	<i>First-difference</i>	<i>Level</i>	<i>First-difference</i>
D	-0.0113 (0.9945)	-9.7239 (0.000)	2.5640 (1.000)	-9.4017 (0.000)
Pt	-3.2563 (0.0900)	-4.6640 (0.0036)	-0.4686 (0.8872)	-11.7699 (0.0000)
Yn	-0.9624 (0.9380)	-11.4959 (0.000)	-0.1134 (0.9412)	-19.0442 (0.000)
Pn	0.68680 (0.9905)	-7.1079 (0.0000)	0.6765 (0.9903)	-7.0825 (0.000)

\* Represent the rejection of the null hypothesis at the 5% level.

**Source: Data Analysis**

To estimate short-run and long-run elasticities with ECM model involves three steps (Stern, 1992). The first step is to investigate the level of stationarity with unit root test. When the variables are found non-stationary, we have to take the first difference and observe the stationarity of differenced ones. Next, is to examine the link among two or more variables

to generate an equilibrium relationship spanning the long run, then variables are said to be co-integrated. Co-integration refers to as a systematic conjoint movement among two or more economic variables in the long-run (Engle and Granger, 1987). With the Johansen co-integration test procedure (Johansen and Juselius, 1990) an optimal lag length can be chosen which specifies the rule of Akaike's information criterion (AIC). Hence, if the variables are found to be co-integrated after test result, then long-run elasticities can be estimated from co-integration equation. Lastly, the short-run elasticities can be measured from an ECM method.

If the variables become stationary at the level I(1) and co-integrated, coefficients from the error-correction model (ECM) shows the relationship in the short-run and the coefficient on the lagged residual measures the speed of adjustment to the long-run equilibrium (as a percentage). The ECM can be estimated accordingly as follows:

$$\Delta D_t = \beta_{10} + \sum_{i=0}^{L_{11}} \beta_{11i} \Delta P_{t-i} + \sum_{j=0}^{L_{12}} \beta_{12j} \Delta Y_{t-j} + \sum_{k=0}^{L_{13}} \beta_{13k} \Delta Pn_{t-k} + \sum_{l=0}^{L_{14}} \beta_{14l} \Delta D_{t-l} + \beta_{15} \epsilon_{t-1} + u_{1t}$$

.....(2)

Here  $\Delta$  is the difference operator,  $\beta$ 's are parameters to be estimated,  $L$ 's are the numbers of lags,  $\epsilon_{t-1}$  is the error-correction term (ECT) derived from the long run co-integration relationship and  $u_t$ 's are the serially uncorrelated error terms. Coefficients  $\beta_{11}$ ,  $\beta_{12}$ , and  $\beta_{13}$  give the short-run price, income, and population elasticities, respectively.  $\beta_{14}$  shows the short-run habit formation effect while  $\beta_{15}$  stands for the speed of adjustment headed for the long-run equilibrium (Eltony, 1995). In the ECM, the optimal lag lengths are selected by using AIC suggested by Pantula et al. (1994).

#### 4.3.1.2 Results of Vector Error-Correction Model:

To test unit roots and co-integration, 0.05 was used as a threshold level in this study. Here, the researcher employed Phillips-Perron and Augmented Dickey-Fuller (ADF) method for the unit root test for all variables and null hypothesis could not be rejected as the variables are non-stationary at level (table- 4.2). However, the null hypothesis could be rejected for variables in their first differences as the p-values of PP and ADF- values are smaller than 0.05. Therefore, all time-series data become stationary at the level I(1).

**Table 4.3: Regression estimates: Demand Equation**

Variable	Estimated Coefficient	t-ratio
Constant	-14.56387	-2.02
$\Delta P_t$	-0.0778961	-2.14**
$\Delta Y_n$	0.0080187	-2.87*
$\Delta P_n$	0.713849	-0.87
$P_{t-1}$	-0.0197294	2.02**
$Y_{n,t-1}$	0.0376937	4.11*
$P_{n,t-1}$	0.8061703	-2.53**
$-D_{t-1}$	-.5734788	-5.16*

\*\*significant at 5 percent level and \*significant at 1 percent level respectively  
R-squared = 0.5286, df-41; The  $R^2$  value for the demand equation is 0.52. Using equation (2)

#### **Source: Data Analysis**

Based on the econometric regression, the estimated parameters alongside their significant levels are shown in table- 4.3. All coefficients are carrying the expected signs and the majority of the estimated variables are statistically significant. From the estimation, it has been found that the coefficients of the variables, as the retail price of tea, lagged income and one period lagged quantity (previous year consumption) is significant at 1 percent and 5

percent levels. Whereas, the influence of population size on tea demand is insignificant. Therefore, in this stage, only the price of tea and the income level of the customer were considered as significant variables on tea demand continued for further investigation.

In the ECM method, the optimal lag length was selected by using Akaike's information criterion (AIC) in equation (2) described by Pantula et al. (1994). To measure goodness-of-fit, AIC is a measure to illustrate the trade-off between variance and bias in the model. In addition, the lag length is selected which minimize AIC also lessens the estimated information loss. Thus, the optimal lag used in this analysis is four (table- 4.4).

**Table 4.4: Results of optimal lag selection:**

Lag Order Selection Criteria

Endogenous Variables: D, Pt, Yn

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-707.7402	NA	8.35e+10	36.49950	36.67012	36.56071
1	-486.0377	386.5581	2201873.	25.95065	26.80376*	26.25674*
2	-468.0154	27.72666	2041704.	25.84694	27.38254	26.39790
3	-445.9962	29.35889*	1611509.*	25.53827*	27.75635	26.33410
4	-431.0520	16.86012	1964917.	25.59241	28.49298	26.63311

\* indicates lag order selected by the criterion

**Source: Data Analysis**

The results of table- 4.5 represent the existence of co-integration among tea demand with the retail price of tea, the income level of customers and population size of Bangladesh. Co-integration refers to a long-run relationship among the variables. In the second line,  $H_0$  suggests that at least one co-integration probability is 0.14, and here one co-integration is

more apparent as the value is greater than 0.05. Thus, the result shows long-term co-integration among variables.

**Table 4.5: Results of Johansen Co-integration Rank Trace test:**

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.486431	47.38555	42.91525	0.0168
At most 1	0.288126	22.06344	25.87211	0.1386
At most 2	0.213972	9.148972	12.51798	0.1714

Trace test indicates 1 cointegrating eqn(s) at the 0.05 level

\* denotes rejection of the hypothesis at the 0.05 level

**Source: Data Analysis**

#### 4.3.1.3 Results of short-run and long-run elasticities:

The existence of co-integration among retail prices of tea and income level with the tea demand are estimated with Vector Error-Correction model. Table- 4.6 and 4.7 explain the long and short-run price, income and population elasticities of tea demand. From the result, the model is fitted with the observed data fairly as indicated by the R-squared value (0.596).

**Table 4.6: The result of Vector Error-Correction model showing the short-run effects**

<i>Error-Correction</i>	<i>Coefficient</i>	<i>Standard Error</i>	<i>t-statistics</i>	<i>P-Value</i>
Coint. EQ.1[ECM(-1)]	-0.14881	.0612387	-2.43	0.015**
D(D(-1))	0.639637	0.19393	-3.29822	0.0081*
D(D(-2))	0.011719	0.208494	0.056208	0.9556
D(D(-3))	0.305867	0.177809	1.72020	0.0973***
D(Pt(-1))	-0.067496	0.04609	2.2827	0.0259**
D(Pt(-2))	0.086868	0.034314	2.531606	0.0177**
D(Pt(-3))	0.057981	0.04631	1.25213	0.1848

D(Yn(-1))	0.078041	0.042923	1.818172	0.0806***
D(Yn(-2))	0.046653	0.0322018	1.457092	0.1571*
D(Yn(-3))	0.083244	0.049641	1.676925	0.1055
D(Pn(-1))	0.801869	0.827229	0.969342	0.3413
D(Pn(-2))	1.475108	0.860652	1.713943	0.0984***
D(Pn(-3))	0.748656	0.855490	0.875119	0.3895
Constant	3.809294	2.85899	1.33239	0.1948
R-squared	0.595900			
F-statistics	2.949265			
Prob (F-statistics)	0.009138			

\*\*significant at 5 percent level and \*significant at 1 percent level respectively

**Source: Data Analysis**

In Equation (2), the lag lengths of  $L_{11}$ ,  $L_{12}$ , and  $L_{14}$  are chosen as 1, 2 and 1, respectively. Table-3.6 represents the short-run price elasticity of tea demand is estimated to be -0.067, income elasticity to be 0.078, population elasticity to be 1.48 and these variables are statistically significant at 5%, 1% level, and 10% level. The relative signs for elasticities are also consistent with the economic theory. Though the elasticity of price and income are statistically significant, their estimated coefficient is very low and in-elastic with the tea demand. Whereas, lagged consumption quantity of tea shows statistical significance at 5% level with the estimated value to be 0.639, implies that tea demand is characterized by habit formation. In parallel (table- 4.6), the error correction coefficient term for tea demand was (0.149), measures the speed of adjustment of tea prices towards long-run equilibrium. The estimated value carries the expected negative sign which is significant at 5% level and less than one indicates its appropriateness.

To test the appropriateness of the model, the Durbin-Watson test was used to find out the presence of autocorrelation in the residuals through regression analysis. As ECM model includes lagged dependent variables and therefore, the value of Durbin h-statistics is -1.90 and p-value is 0.26. Therefore, there is no serial autocorrelation among the variables.

**Table 4.7: The result of Vector-Error Correction model (VECM) showing the long-run effects**

<i>Variables</i>	<i>Coefficients</i>	<i>Standard Error</i>	<i>t-value</i>
D(-1)	1.0000		
Pt(-1)	-0.359472	0.15383	-2.27083
Yn(-1)	0.615867	0.31028	1.984874
Pn(-1)	0.242569	0.11393	2.129106
Constant	-35.81356		

**Source: Data Analysis**

Table- 4.8 implies the short-run and long-run price, income and population elasticities of tea demand. Here, tea demand is inelastic with respect to income (0.07) and price of tea (0.067) and short-run price and income elasticity much lower than long-run elasticity. In opposite, tea demand is elastic with population growth (1.48) in the short-run and inelastic in the long-run (0.24).

**Table 4.8: Long-run and short-run tea demand elasticities**

	Own Price	Income	Population
Short-run	-0.067496	0.078041	1.475108
Long-run	-0.359472	0.615867	0.242569

**Source: Data Analysis**

### 4.3.2 Forecasting Internal Demand and Production of tea with ARIMA model:

For forecasting and modeling of the future trend, the ARIMA model has become most popular as it shows good predictive performance (Gunathilaka & Tularam, 2016). In Fig 4.2 the present trend of internal consumption and production of tea are shown. Through this model possible future trend can be forecasted with present and past time-series data. In this study, the author used ARIMA model to forecast the future trend of internal consumption and production of tea for policy purposes.

#### 4.3.2.1 ARIMA Model specification:

ARIMA stands for Autoregressive Integrated Moving Average is the most conventional method of non-stationary time-series data. This model is basically based on a combination of autoregressive (AR), integration (I) and moving average (MA) process discussed by Box and Jenkins (1976). Integration (I) refers to the reverse process of differencing to generate the forecast appropriately. In the ARIMA (p,d,q) model, “p” stands for the order of autoregressive process, “d” denotes the order of the data stationary and “q” indicates the order of moving average process. The general formula of the ARIMA (p,d,q) can be written as follow Judge et al. (1988) :

$$\Delta^d y_t = \delta + \theta_1 \Delta^d y_{(t-1)} + \theta_2 \Delta^d y_{(t-2)} + \dots + \theta_p y_{(t-p)} + e_{(t-1)} \alpha e_{(t-1)} - \alpha_2 e_{(t-2)} \alpha_q e_{(t-2)} \dots \dots \dots (3)$$



### **Box-Jenkins methodology:**

One of the popular method Box and Jenkins (1976) methodology can handle any series, stationary and non-stationary, with or without seasonal variation. This methodology consists of three successive steps:

1. identification of the model,
2. estimation of the model and
3. model diagnostic and forecasting.

At the first step of model identification, stationarity of time series is checked, as the preliminary prerequisite is to create the time-series stationary. The original time-series must have constant mean and variance value over time. In this study, time-series yearly data of internal consumption (million kg.) of tea were used to forecast future tea demand. In the time-series data no seasonal variation was observed, therefore non-seasonal ARIMA models were used here.

#### **4.3.2.2 Results and Interpretation:**

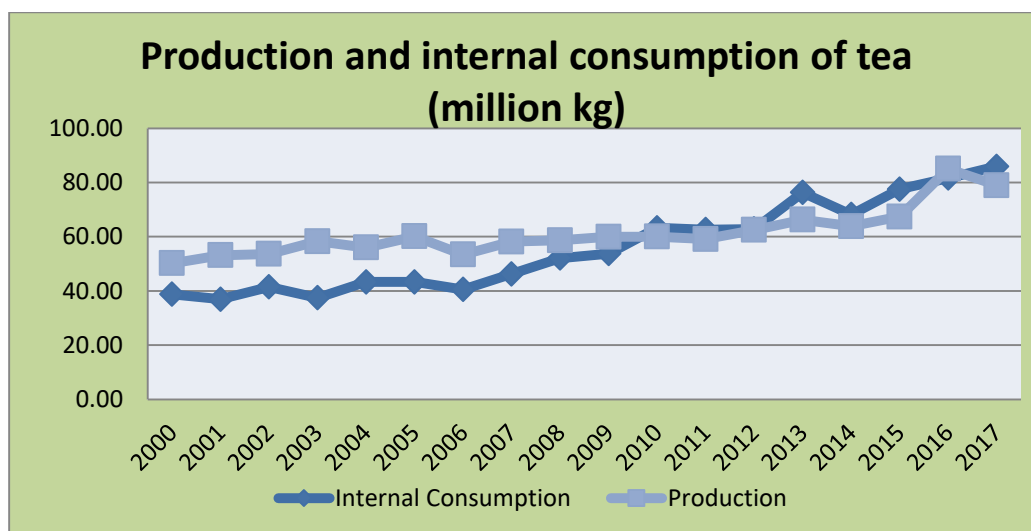
To check the stationarity of the time-series data, researcher applied Augmented-Dickey-Fuller (ADF) test and Phillips-Perron (PP) unit root test and found that after first differencing variables become stationary which suggest that there is no unit root (table-3.9). The graphical illustrations of the original and first differenced series of internal consumption are presented in Figure 3.2(a) and (b).

**Table 4.9: Unit root test of internal consumption, production of tea:**

	Dickey-Fuller (ADF test)		Phillips-Perron (PP) test	
	Test statistic	Critical value (.01)	Test statistic	Critical value (.01)
Internal consumption	-1.442	-3.524	-0.881	-4.205
D. Internal consumption	-11.283	-4.214	-12.778	-4.214
Production	-2.2721	-3.524	-2.849	-3.524
D. production	-7.032	-3.528	-6.991	-3.528

**Source: Data analysis**

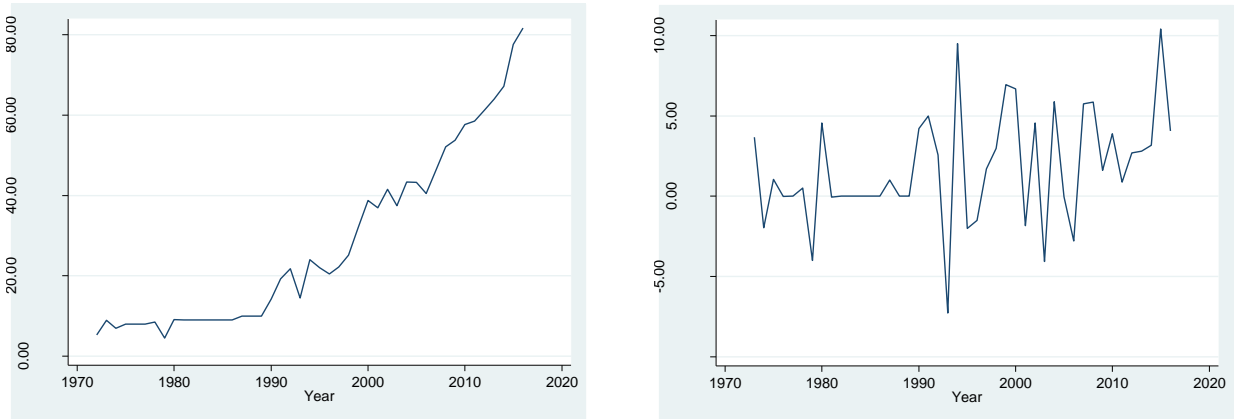
**Fig- 4.2: Domestic consumption and production trend of tea**



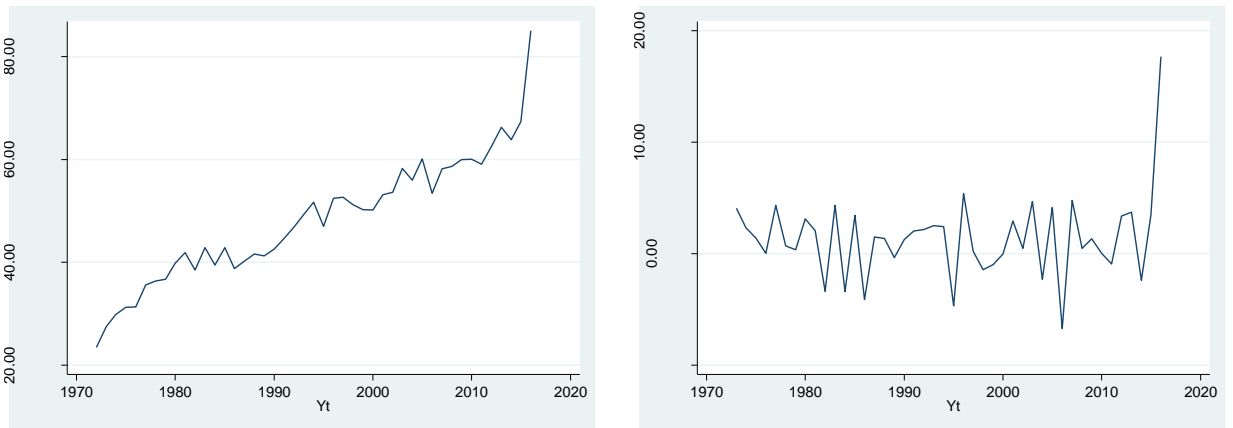
**Source: Bangladesh Tea Board (BTB)**

Figure 4.1 describes the annual internal consumption of tea which indicates a gradually increasing trend with some fluctuations over the study period 2000-2017. During this period the variance is unstable which further leads the tea consumption data series is not stationary at level (fig-4.2(a)). However, fig- 4.2(b) shows that after 1<sup>st</sup> difference tea consumption data series reflects stable variance which leads the data toward stationary.

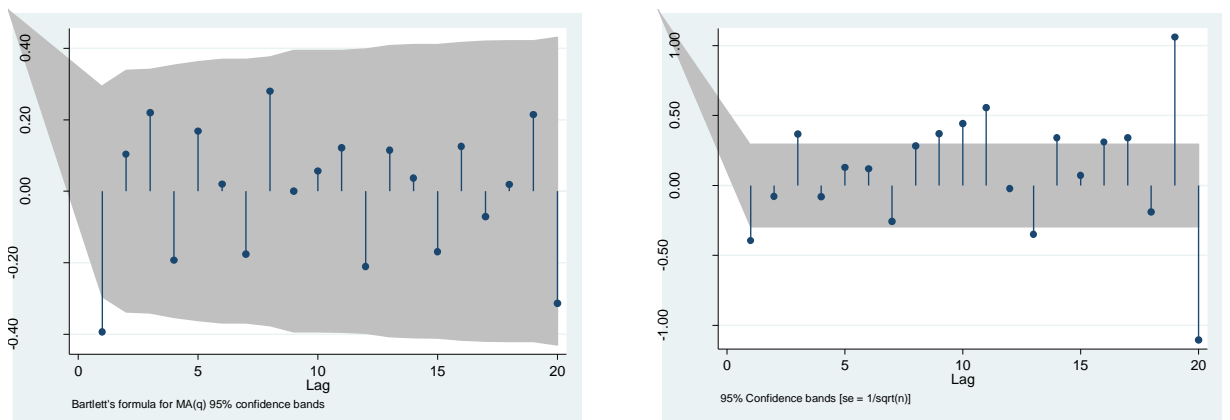
**Fig- 4.2(a): plot of original data and 1<sup>st</sup> difference data of internal consumption of tea**



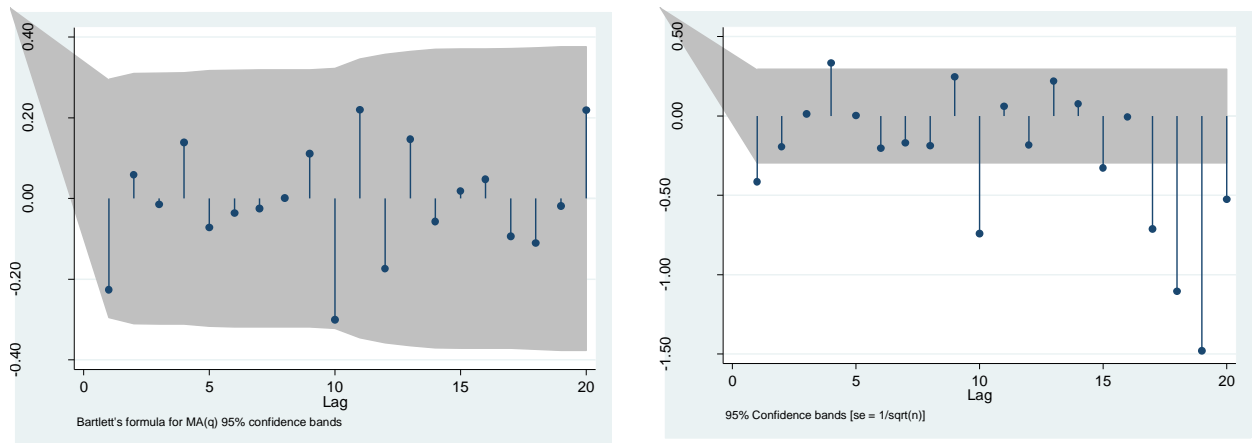
**Fig- 4.2(b): plot of original data and 1<sup>st</sup> differenced data of production of tea**



**Fig- 4.3(a): Time series (1<sup>st</sup> diff.) plot of ACF and PACF of tea consumption data of Bangladesh**



**Fig- 4.3(b): Time series (1<sup>st</sup> diff.) plot of ACF and PACF of tea production data of Bangladesh**



To make the data stationary and to stabilize the variance first difference is enough for this data-set. Therefore, the difference order is 1 and it has been said that integrated order 1 showed in figure-4.2 (a). Figure 4.3 (a) mentions alternative positive and negative ACF and it also shows exponentially decay PACF indicates an autoregressive moving average process. ACF with the significant spike at lag 1 and PACF with significant at lag 2 suggest that 2<sup>nd</sup> order autoregressive and 1<sup>st</sup> order moving average are effective for tea consumption in Bangladesh. However, using the process, it is found that the ARIMA (1,1,0) model with AIC= 252.66 and BIC= 265.15 is the best model for forecasting internal tea consumption in Bangladesh. The results of the estimated parameters of different combination of ARIMA (p,d,q) are shown in the table- 4.10.

Table- 4.12 reveals the forecasted value of internal tea consumption in Bangladesh, for the next eight years from 2018 to 2025 was obtained from ARIMA (1,1,0) at the 95% confidence interval. The best-fitted model ARIMA (1,1,0) found that the possible forecasted tea

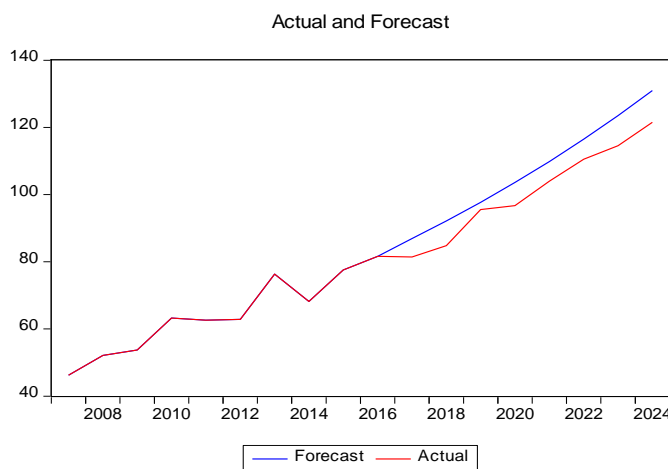
consumption will be 135.75 mkg. in 2025 and graphical presentation of the forecasted value has shown in fig- 4.4.

**Table- 4.10: Performances of different ARIMA (p,d,q) models of tea consumption in Bangladesh.**

	ARIMA (0,1,1)	ARIMA (2,1,2)	ARIMA (2,1,3)	ARIMA <b>(1,1,0)</b>	ARIMA (2,1,0)
Const.	3.63*	2.71*	3.59*	<b>3.66*</b>	3.77*
L1.ar		3.11*	-7.75*	<b>-2.69*</b>	-2.53**
L2.ar		-2.10**	-6.38*		-0.43
L1.ma	-2.04**	-7.39*	3.71*		
L2.ma		5.45*	2.19**		
L3.ma			-0.47		
AIC	253.6196	251.8653	252.6611	<b>252.447</b>	254.213
BIC	258.9721	262.5704	265.1504	<b>257.7996</b>	261.3497

**Source: Data Analysis**

**Fig- 4.4: Actual and forecasted value of internal consumption of tea in Bangladesh.**



**Source: Data Analysis**

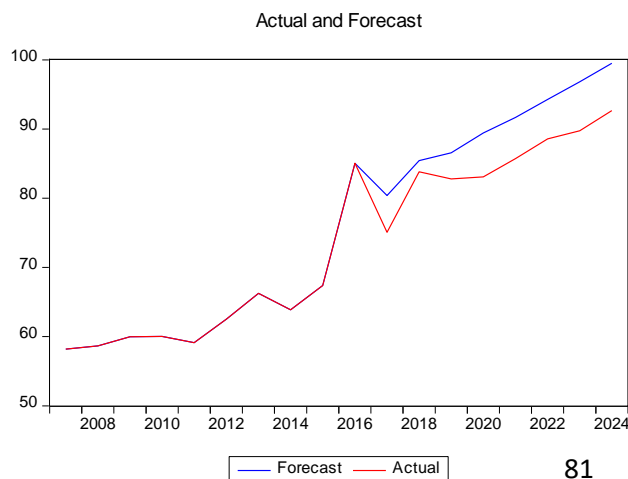
Whereas, figure 4.2(b), explains the ACF and PACF of tea production of Bangladesh and indicates that there is no significant spike in the first-differenced series of data. Therefore, production data series become stationary at first difference as no significant effects of Auto-Regressive and Moving Average has been reflected in the differenced data. Different parametric combinations of ARIMA (p,d,q) model of tea production has been analyzed and the best-fitted model is found as ARIMA (0,1,0) with the minimum value out of all selection criteria presented in table- 4.11.

**Table 4.11: Performances of different ARIMA (p,d,q) models of tea production in Bangladesh**

	ARIMA (0,1,0)	ARIMA (1,0,2)	ARIMA (2,0,2)
Const.	2.17**	1.75***	1.82***
L1.ar		13.73*	-5.19*
L2.ar			-2.47**
L1.ma		-1.82***	-3.45*
L2.ma		1.81***	1.80***
AIC	244.11	262.488	260.31
BIC	247.57	271.522	271.15

Source: Data Analysis

**Fig 4.5: Actual and forecasted value of tea production of Bangladesh**



The graphical presentation of the actual and forecasted value of tea production is shown in the fig-4.5. The forecasted amount of tea production has been shown in table-4.12 with the ARIMA (0,1,0) model and obtained that in 2025 forecasted tea production will be 101.34 mkg.

**Table 4.12: forecasting table of internal demand and production of tea in Bangladesh**

	<b>Forecasted (Consumption)</b>	<b>LCL</b>	<b>UCL</b>	<b>Forecasted (Production)</b>	<b>LCL</b>	<b>UCL</b>
2018	88.17	80.75	95.59	84.16	78.63	90.18
2019	97.41	89.35	105.48	83.87	77.25	90.50
2020	101.32	92.08	110.57	87.25	80.08	94.42
2021	108.26	97.94	153.44	87.82	80.36	95.28
2022	114.64	102.55	240.31	92.88	84.87	100.90
2023	121.39	106.13	284.54	94.25	85.13	103.37
2024	127.85	102.27	377.87	98.38	85.04	111.71
2025	135.75	31.20	432.45	101.34	51.11	151.57

**Source: Data Analysis**

## CHAPTER 5

### FINDINGS OF THE STUDY

#### 5.1 Consumption and production trend of tea in Bangladesh

The annual trend of the variables has analyzed using time-series analysis. Fig- 4.1 shows continuous positive progress of domestic demand and production of tea. Data explains that the upward trend of tea production with an annual average rate of increase of 2.68% during the last ten years (2006-2016) with the average production amount of 64.11 million kg of tea annually. Whereas, tea consumption is increasing with an annual average rate of increase 4.11% during the last ten years (2006-2016) with an average consumption amount of 64.46 million kg annually. Therefore, internal demand is increasing at a higher rate that production could not keep pace with growing demand. In 2016, Bangladesh produced 85.05 million kg tea, which was the record production in the country reflected in fig- 5.1.

#### 5.2 Short-run and long-run price and non-price elasticities of tea demand

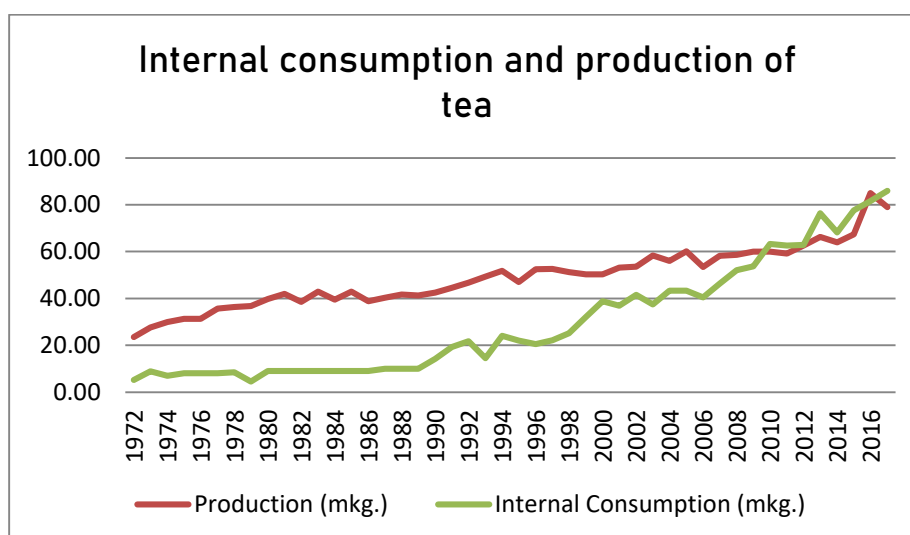
This study aims to explore the short-run and long-run elasticity of tea demand through co-integration and error-correction model (ECM). From the regression analysis found that demand for tea is inelastic with respect to price, suggesting that tea has very few or no substitutes in the domestic market.

The result shows that a one percent increase in price gives rise to tea consumption less than one percent. Additionally, the estimated coefficients of variables of price are significant and negative in their signs. Furthermore, long-run price elasticity (-0.36) for tea is larger than



short-run elasticity (-0.067), explains that consumer's response toward tea demand is more responsive in the long-run. This may be explained that though consumer's demand for tea is not responsive in the short-run but in the long-run price will influence more and consumers may search for alternatives. When consumer tea demand is less responsive with price, then it justifies the use of non-price factors as income, population size and past consumption behavior to determine the sensitivity of demand.

**Fig 5.1: Year wise internal demand of tea**



**Source: Bangladesh Tea Board**

Result of ECM explains the income elasticity and population elasticity along the price elasticity of demand. The demand of tea is inelastic in terms of income expect that a one percent increase in income gives rise to tea demand less than one percent. Unlike price elasticities, the income elasticity is higher in the long-run (0.62) than the short-run (0.078). This can be due to the fact that the proportional expenditure of consumer's income for tea is less. But comparing with price elasticity, consumers of Bangladesh are more sensitive to

income. Positive relation of income with the elasticity of tea demand indicates that if per capita rises then tea demand will also grow but slowly.

On the other hand, aggregate tea demand is elastic with respect to the population size of the country. Therefore, we can explain that one percent increase in population volume gives rise to tea demand more than one percent. A rapid tendency to consume tea stocks can be explained in the short-run. Demand for tea with respect to population is elastic in the short-run (1.48) but surprisingly inelastic in the long-run (0.24). Therefore, the growth of the population has an immediate pressure on tea demand. Finally, consumer's demand for tea is more responsive to the population rise than price and income elasticities.

From the analysis, another important factor has identified which influence significantly consumers' demand for tea is past purchase behavior. The estimated value of lagged consumption quantity of tea to be 0.64 implies strong habitual effect which indicates the influence of past consumption on present consumption behavior. The increase in population and positive change in preferences or habit towards tea consumption are two important factors for increasing tea consumption in Bangladesh.

The error-correction coefficient is 0.15, indicates the slow speed of adjustment between consumer's short-run and desired long-run demand. Due to the slow adjustment process, the difference between long-run and short-run elasticities can be justified (Table-9). Hence, the ECT is significant but tea consumption will be restored very slowly within seven years.

To conclude, the VECM analysis reveals the significant effect of price and non-price variables in the short-run and long-run with the expected signs, though price and income are inelastic with the tea demand elasticities.

### **5.3 Future trend of tea consumption and production in Bangladesh**

Future demand for products highly depends on present and past consumption pattern of consumers. To forecast future demand, ARIMA model is one of the traditional methods of non-stationary time series analysis which explains past and lagged values and stochastic error term. Results of the analysis reveal that the best fitted ARIMA approach includes (1,1,0) for the domestic consumption of tea and ARIMA (0,1,0) for the annual tea production of tea in Bangladesh. The forecasted values of domestic production and demand for tea in Bangladesh for the next six years from 2018-2025 as obtained from ARIMA (1,1,0) and ARIMA (0,1,0) correspondingly, at 95% confidence interval. The estimated value of tea consumption will stand at 135.75 million kg with Upper Consumption Limit (UCL) and Lower Consumption Limit (LCL) is 432.45 million kg and 31.20 million kg respectively, in 2025. Whereas, in 2025 the future production of tea will reach at 101.34 million kg with Upper Production Limit (UPL) is 15.57 million kg and Lower Production Limit (LPL) is 51.11 million kg.

Therefore, an increasing tendency of tea consumption and production has been forecasted with the data series and in particular, rate of tea consumption is higher than production rate of tea. In 2025, tea production is forecasted to reach 100 million kg but tea consumption is forecasted to attain at 135 million kg where a gap of 35 million kg is shown.

## CHAPTER 6

### DISCUSSION & MANAGERIAL IMPLICATIONS

#### 6.1 Discussion on Findings

The findings of this study supplement many other findings from empirical studies done earlier. Some findings do not agree with theoretical explanations. A detailed discussion of the findings with the reference is presented ahead. An interpretation of the findings and managerial implications of this study are presented at the end. Furthermore, long term sustainability of tea industry largely depends on clear understanding of market demand.

From the empirical investigation of this study, found that domestic tea demand is statistically responsive with the price and non-price variables which support the theoretical demand model. Short-run elasticities differ from long-run elasticities which supports the earlier researches. It is shown in this study that the long-run elasticities are much larger than short-run elasticities which indicate that the demand for tea in Bangladesh is growing, at a rapid speed.

It is evident from the analysis that the price and income movement within the tea market is inelastic, suggesting that quantity demand for tea changes at a lower rate than income and price changes. Thus, this result supplements with the findings of Klonaris, (2012) and Chatterjee S., (2011) that income and prices have no significant impact on the tea consumption, as the purchase of tea accounts relatively low percentage of the total budget of consumer's (Shehata et al., 2004). Therefore, tea consumption does not necessarily increase

with a rise in the income levels of consumers, as tea is more characterized as habitual drink than necessity item. Rather, an increase in income can lead to qualitative changes in the consumption of tea or even a switch to other competing beverages.

According to National Brokers Limited, (2002), tea consumption among Bangladeshi consumers is rising as a consequence of population rise, urbanization and improvement of the quality of life. This study suggests that tea demand is elastic in terms of changes in population size in the short-run but inelastic in the long-run. Ehrlich & Holdren (1971) showed that a given increase in population size accounts for an exactly proportional increase in consumption which corresponds to our findings. Therefore findings of the study supplements with the results of Hazarika et al (2009) that internal tea consumption was increasing every year by 12.69 per cent due to the rise in population which resulted that tea export was decreasing annually by 8.77 per cent due to increasing internal consumption.

Our research also shows that past consumption behavior plays an important role in habit formation and positively affects consumer's demand for tea. This is similar to the findings by Kusumastanto & Jolly, (1997) which show that lagged quantity of fish consumption significantly positively explains the demand elasticity of fish. It is worth mentioning here that past consumption behavior influences present consumption pattern indicates that consumers have a positive inclination to consume tea. Therefore, the dynamic tea demand model shows that tea consumption depends on the consumer's psychological consumption habit.

The coefficient of short-run disequilibrium is only 15% explains very slow adjustment process towards long-run equilibrium. Therefore, marketers should understand that non-price

demographic factors influence more rather than the price on consumption pattern of tea consumers.

This study disclosed that the best models were ARIMA (0,1,0) and ARIMA (1,1,0) for tea production and consumption, respectively. With this analysis, short-term forecasting for tea production and consumption can be done efficiently. Time series plot of tea consumption and production shows the actual and predicted values for the period 2008-2025 and a noticeable increasing trend is revealed in the coming years. The projected data confirmed that the expected internal consumption increment (36%) is much higher than the increment of tea production (27%) by 2025, comparing the base period of 2017. Hence, the future uncertainty of tea production and consumption could be minimized if they are forecasted properly and with the necessary steps were taken against losses.

## **6.2 Managerial Implications:**

Incessant population growth create the global food and beverage supply-demand balance less stable which release an important area of intense research about food production systems. Careful assessment regarding changing agricultural environment and system which directly affect consumer's demand pattern is become an essential step to understand current and future foodstuff protection issues. Therefore, the outcome of this research uncover the significance of the variables which affect domestic demand for tea and current and future trend of tea consumption and production.

Findings of the study show that the domestic tea industry is inelastic in terms of price; hence non-price factors influence more on tea demand. Though income and lagged consumption

amount are inelastic with the demand for tea, they have a positive influence on tea demand which supports the demand theory. So, it is obvious to say that per capita consumption of tea will significantly increase with per capita income and positive change in the habit which indicates a guaranteed domestic market for Bangladeshi tea in the future.

High-income dwellers are inclined to search for good quality tea with their emerging new lifestyle and interested to pay more money for branded tea products. Consumers are more conscious about good quality products rather than price and focus more on price reliability than sensitivity. Increasing attention on the quality of products, active promotion, and increasing brand loyalty may encourage to shift to the branded from non-branded tea items (Hazarika, 2012). On account of rising tea prices and healthy domestic demand, players are expected to focus on the local market. So, the estimates of domestic tea demand function show less responsiveness in terms of price and income than the impact of past consumption behavior.

As the demand curve is shifting to the right with the insignificant impact of price on tea demand, an increase in investment in this sector could have a positive effect on the home market. A massive investment in this sector can be a great opportunity for the producers to gain their lost position in the international market. The rapid growth of population expected to boost up tea consumption in Bangladesh at a faster rate. The current population size of Bangladesh is estimated at around 160 million and roughly 1.7 million people being added every year to Bangladesh's population. Hence, there is no alternative except increasing production of tea to retain and expand the tea market. Along with, due to habitual effect consumer cannot change their consumption of tea immediately.

The study also reveals that a huge gap between tea demand and production will arise in 2025, as the increasing rate of demand is much higher than the rate of production. Therefore an imbalance situation may arise in internal import and export condition of Bangladesh due to import of tea to fulfill the domestic demand for tea. This may also create extreme competitive pressure for local tea producers and affect government's 'export diversification policy'. Besides this, Bangladesh tea industry is also facing a terrible investment crisis for the last few years to increase its production at a minimum rate. In a study, Ahammad (2012) suggested that to increase production, initially, Bangladesh tea industry would require at least 3,891.90 million taka to produce extra 23.09 million kg of tea in 12,973 hectare land within 2025. Whereas, the situation is the rate of growth of national investment in tea sector is very small compared to accumulated investment in Bangladesh economy.

An observation on collected secondary data revealed that along the rising prices of tea products, the demand is also increasing rapidly and a difference between the auction price and retail price of tea was found. The rising price is remunerative for the producers but it reduces consumer's buying power. In the tea equation, growers are in one side and consumers stand in the opposite side. Sustainability of tea will not possible to achieve by one-sided favor for growers at the expenses of consumers. Now consumers have to sacrifice more money to purchase the same amount of tea items as before. But growing demand indicates consumer's willingness to pay more money for high-quality tea which is consistent with the findings of Liu, et al. (2013) found that Chinese consumers expressed a high degree of willingness to pay more for safe, high-quality food. Proper initiative in the marketing field can guide to achieve higher margin of profit. So, investment for market creation through



product development and marketing process become essential to survive with the future demand.

Tea is a popular drink as a low-priced, non-alcoholic beverage and less vibrant with the substitution effect. It is being observed that the demand for tea is expected to increase in the domestic alike international market in the future. So, a strategic movement is desired to restore the competitive position in the international market against production slowdown. In parallel, to achieve future food security, tea production, processing, distribution, and availability system need to enhance to face the challenge of expanding human population and global competition. Private and government initiative requires investment for modern machinery and equipment to produce quality tea with low cost. As the Bangladeshi government is suffering from the land crisis for tea cultivation, the unproductive and idle high land area can be a better option for tea cultivation. Though small holding tea cultivation (SMTC) has been started at a limited scale, more initiative needs to require making this farming popular among farmers. With this step, poverty can be reduced through employment creation and upgrade the socio-economic condition of rural people (Khan, et al. 2014). Through imposing import duty on tea imports, dumping of inferior or low-priced tea should be restricted to protect the local tea industry.

Through changing management or ownership of unprofitable tea gardens need to convert them toward a profitable one. To ensure maximum utilization of land in tea gardens some long-term and short-term measures need to introduce immediately. Once the bushes are planted, its gestation lag is five to six years and after that the bushes become productive and the yield output is being harvested. Long-term measures may includes extension of tea

plantation with high yielding variety, replacement of uneconomic or old bushes, infilling the gap between the existing tea bushes with clone tea or high yielding varieties of the existing area (Dwibedi H., (1999). Whereas yield changes are possible with short-term measures as through intensive cultivation using high quality fertilizers and pesticides, improving cultural practices like manuring, timely pruning of tea bushes and engaging skill manpower for fine plucking style directly affects tea productivity. To achieve competitive advantage, Bangladesh tea industry should focus on the labor-welfare issue as productivity in this sector highly depends on the performance and efficiency of the tea workers. To reduce unemployment problem in the tea garden areas, widespread socio-economic development programs should be introduced by the government and non-government agencies (Majumder & Roy, 2012).

Future escalating trend of tea consumption and production has visualized in this study but the gap between demand and supply of tea indicates future constraints and opportunities in Bangladesh tea industry. In the international market, strong competitors are selling tea at a cheaper price with the same quality of Bangladeshi tea which becomes a threat for the local companies. But players of Bangladeshi tea industry found a great opportunity to account healthy domestic demand and rising tea prices, as per capita consumption of tea of Bangladeshi people is yet very low in contrast to other countries. Along with, to capture exportable position in the international market there is no alternative to increase production of good quality tea. Value-added tea, high quality blended tea, organic tea production and marketing can be a sign of unique strategy for the local companies to grasp in the global market with premium price. To struggle with the existing competitive beverages, convenient tea products like instant teas need to popularize in the domestic market (Chatterjee S., 2011).

Marketers should focus on non-price incentives rather price incentives as consumers are less reactive toward price changes. Therefore, raising awareness about healthy drink through generic promotion, an opening of tea retail outlets for ‘out-of-home’ consumption can add a new avenue in the journey of tea.

To create the tea industry vibrant with strong competitors in the global market, the proper initiative needs to take from private and government level. The long-term development plan, impose of import duty, providing loans with easy terms and conditions, an increase of labour wages and infrastructure development may protect the indigenous tea industry. Short-term loan for investors, storage facility, infrastructure development, promotion of Bangladeshi tea foreign marketers are major initiatives the government can take for the sustainability of Bangladesh tea industry. To minimize the gap between demand and supply, socio-economic reformation and population control programs are being suggested. For the overall development ‘National Tea Policy’ need to design for the Bangladeshi tea industry. Therefore, tea industry related authorities should improve production strategy to produce good quality teas at competitive prices. For this purpose, they should work in three directions as continuous product development, intensive marketing and promotion, and institutionalization.

## CHAPTER 7

### CONCLUSION AND FUTURE STUDY

#### 7.1 Conclusion

The economy of Bangladesh is highly dependent on agriculture, whose performance mainly depends on the maximum utilization of arable land, high-quality and large amount of crop production, sustainable economic development, and food security. Over-burdened growth of population becomes threatened on agricultural land. Urbanization and industrialization are the main reasons behind the land crisis (Hasan, et al., 2013) and residence of increased population are expanding at the cost of agricultural land (Rahman, M. T., 2017). Food security is the main concern for today's world and necessary steps should be taken to preserve agricultural land from the use of nonagricultural purposes (Hasan, et al., 2013). The farmers of Bangladesh are striving to raise the crop productivity to fulfill the upward demand trend of population. Therefore, selection of high yield varieties, adequate supply of inputs, modern marketing and distribution process adoption, massive education programs for farmers and latest and modern technology acceptance are major steps need to initiate to enhance production.

Consumer demand is dynamic and unpredictable in nature which never be concluded by a single variable. To ensure uninterrupted supply in the market and to achieve competitive advantage, understanding the determinants of demand is very significant. An attempt to estimate tea demand elasticity using co-integration and ECM indicate that the growth of tea

demand can be attributed to rising income level, rising price and increasing population size during the specified time period. Along with, knowledge about future market regarding demand and supply facilitate marketer to design their business decisions accordingly. As future forecasting is a critical part of the decision-making process, now marketers are using different statistical tools for its appropriateness. In this study, ARIMA approach has given the best fitted annual tea consumption model (1,1,0) and annual tea production model (0,1,0). Therefore, it can be estimated that the increment of tea production by 2025 is predicted as 27% compared to the total production of 2017. By 2015, 36% of the internal consumption increment can be expected compared to the consumption estimated in 2017.

To meet the increased domestic consumption, Bangladesh Tea Board can take two steps, first increasing local production and second one is importing tea from the world market which will be a cause of losing foreign currency. Therefore, to protect the domestic tea industry and the livelihood of the marginalized people, government and privately-owned tea gardeners should focus on strategy development to increase tea production. In this purpose, to enhance the productivity a huge long-term investment is required. In the tea industry the benefits from the capital outflow takes considerable time to realize. The interim period between first tea plantation and first commercial harvesting is estimated of three to five years which is unusual from other agricultural commodity. Hence, in most cases, investors suffer apprehensive which implies low growth rate of investment in the tea industry. Along with, investment for tea in Bangladesh is very low than national investment and scenario is that investment is decreasing while turnover is increasing of Bangladeshi tea.

Bangladesh tea industry is a small player in the international market but it plays a substantial role through employment creation, import substitution and trade balancing in the national economy of Bangladesh. The tea industry of Bangladesh is celebrating 160 years commercial history of tea cultivation and still contributing 17% of the total GDP accounted Rs. 9,922.80 million (BBS, 2016). Tea is cultivated in such land where no other agricultural commodity can be produced commercially and competitively profitable, hence it is important in utilizing the optimal level (Hossain, 2011). This study will direct toward discovering future constraints and opportunities for the resilience of the Bangladesh tea industry. The government should design the import policy to protect the indigenous tea industry ensuring the higher share of consumer's taka against tea producers.

Tea tourism in the area of tea gardens could be promoted to generate revenue and indirectly branding of tea gardens is possible to the consumer (Shah and Pate, 2016). Particularly, tea tourism can be considered as motivation of sharing tourism experience, tradition, culture and history related to the consumption of tea (Jolliffe, 2007). Advanced research on innovative high-yielding tea variety, technology modernization and maximum utilization of available resources should be focused immediately to increase tea productivity. The Government should facilitate more Bangladesh Tea Research Institute (BTRI) for continuous up-gradation of high yielding, quality tea clone variety, integrated pest management scheme, standardized tea plant pruning cycles and better tea processing techniques. Re-plantation and rejuvenation pruning program as an example of the success of Indian tea industry (Hazarika & Muraleedharan, 2011) may initiate for Bangladesh tea industry to increase productivity.

Overuse of fertilizers and chemical pesticides on agricultural land can be a cause of deterioration of soil health which will be a threat to the future generation. Therefore, ecological and sustainable production method in tea cultivation needs to adopt replacing conventional approach (Sultana et al., 2014). Conversion toward organic farming method can reduce the harmful impact of agro-chemicals on environment and human health. Greater purchasing power and proliferation of global media and brands change consumers perception toward the use of eco-friendly and sustainable products. Growing awareness of healthy diet encourages Bangladeshi people toward organic tea consumption. In a study, Sumi & Kabir (2018) identified that the health benefit of organic tea, environmental concern about organic farming and trust positively influence buying intention of organic tea among Bangladeshi people. Advanced research and adoption of alternative agro-chemical management practices can character this industry more profitable and sustainable. Government initiatives for setting financial institutions or banks for granting loans against tea producers and rural infrastructure development may aid to attain goals in a dynamic and proficient manner. For the long-term investment, Bangladesh Government may collaborate with the foreign contributors for the financial supports with easy terms and conditions and low rate of interest.

Tea garden workers are most deprived and poorest section of our society (Sankrityayana, 2006) and these communities are the most vulnerable people of Bangladesh (Majumder & Roy, 2012). A lot of evidence explains that tea workers especially women live inferior standard of living condition compared to other major tea producing countries in the world (Hassan, 2014). Hence, a collaborative action should be initiated by tea garden authority, government and non-government agencies to improve the living standard of the tea workers (Kamruzzaman et al., 2015). Use of harmful weedicides and herbicides should be stopped

which badly affect the health of women workers. Wage determination process for tea laborers should be democratic, scientific, participatory and transparent. According to the ILO principle, labor union rights need to be implemented by all respected bodies of tea industry. To overcome tea worker crisis, new technology which alternate human labor need to be adopted for enhancing tea cultivation and processing.

Selected number of traders dominates the tea industry increases the chance of abnormal profit; hence easy access of prospective brokers can make the tea industry more competitive. Establishment of more warehouses with minimum charges can facilitates the tea manufactures storage facility which may have indirect effect on price reduction. Access of up-to-date information of international and local demand, supply and price of tea can help the auctioneer for the proper judgment of the marketability of tea. Tea quality plays an important role in determining the final value of tea at auction. With the product quality attributes, products can be differentiated in the international market and consumers are willing to pay premium price for the highest quality of tea (Outschoorn, 2000). Proper knowledge of physical, chemical and thermodynamic processes among tea manufacturers along with proper time duration of the process can ensure the good quality tea production. Production of high-quality tea and increasing yield size may reduce production cost (Khisa & Iqbal, 2001). Producers should concentrate on clone tea with high yielding variety which will ensure the good quality also.

Climate change becomes a major challenge for tea cultivation alike other agricultural commodities. Climate that is conducive to tea growth not only affects tea productivity but also influence the quality of tea harvested (ONCRA, 2014). To produce high-quality tea and



increase yield size, sufficient rainfall, day length, and the proper temperature are required (De Costa et al., 2007). Lack of predictable pattern and extreme weather caused low yield and harmful effect on tea quality. Appearance of new types of diseases and pests reduces the resilience of tea crops. Due to the position in the sub-tropic average yield size of Bangladeshi tea is very low compared with other major tea producing countries. Climate change adaptation plans, weather forecasting, soil improvement measures and sufficient investment for irrigation system need to introduce for sustainable performance. Bangladesh has no instrument to measure Maximum Residue Level (MRL) of various pesticides yet now. It may create severe problem to export or sales promotion, as European countries are very conscious about their health and hygiene. Proper measurement instrument need to install in every tea estates to overcome this problem.

Price of tea is unpredictable and sensitive as the producers and consumers do not have any direct control over the auction system. Local and international demand pushes up the tea prices which is remunerative for tea producers but reduces consumer benefits as they need to pay more for tea. Understanding the factors which affected demand in the past will help to develop expectations about demand in the future and the impact on market price. In one side the upward trend of internal consumption of tea threatens the export surplus and other hands it opens a great opportunity for the marketers to invest. Therefore, the factors which characterize consumer choice and how individual consumer responses are reflected in the market place are key components of this economic theory.

Marketers of different countries are showing their interest on value-added forms through packaging, blending and containing (Ahmed & Mina, 1982). Different country markets are

showing their interest for value added tea. This industry may target young generations by emerging in the market with different value-added tea products as iced tea, instant tea, tea in vending machines, cold brew tea, ready to drink tea and as an ingredient in food preparation. Local and multinational companies should concentrate more on brand marketing through producing value added tea to face the changing consumer's requirements in the world market (Hilal, 2012). Good governance of procurement and additional transparency are essential to secure the trust of the client, suppliers and consumer. Innovative distribution channel and more promotional campaign focusing tea history and tradition may help to create unique brand image (Monirul, & Han, 2012) in the market. Special marketing research on innovative promotion and effective distribution management may help the competing firms to attain competitive advantage both globally and nationally (Huda et al., 2012).

Insignificant growth of tea production for the last ten years and the rapid increase of internal consumption badly affect the exportable position in the world market. Now the situation arises that Bangladesh is turning into a tea-importing country from tea-exporting one within a very short time due to fast-growing domestic demand. In parallel, continuing increase in tea consumption indicates a future guaranteed market for Bangladeshi tea producers. Hence, there is no alternative to increase tea production with active support from private and government level urgently. In this line, the Bangladesh Tea Board has decided to intensify effort to increase the availability of more tea in domestic and export markets (ITC, 2002: p-32). But the government should promote for the sustainable production process, otherwise, overuse of chemicals and fertilizers will be a cause of soil erosion and degradation. Immediate attention is required to improve the manufacturing sector covering quality of tea, its productivity, cost of production as well as marketing system (Islam, 2005).

## **7.2 Limitation of the study**

This study is very contemporary as Bangladesh tea industry is facing a crucial crisis of tea production and exportable surplus against the growing trend of internal consumption. Although this study has been fairly comprehensive and its implications towards management practice have been quite interesting, it also suffers some limitations. In this study, the researcher has used the aggregated data which generally limits to examine the impact of prices and non-prices factors on the individual consumer level. Consequently, the differential impact of independent indicators on the demand for tea of various sub-groups of the population is unable to evaluate properly and accurately. Another major challenge faced by the researcher is accumulation a vast volume of data of this historical industry in a single report. Some important determinants were not possible to incorporate in this study due to data unavailability. The total population size of the country was considered as an important independent factor in this study instead of the total population size of tea consumers due to lack of authentic secondary data.

As the demographic pattern of consumers is dynamic in nature, therefore assessing consumer behavioral pattern in a particular time period may not be reflective for the whole population. Agriculture sector totally depends on nature, and vibrant with the climate condition, therefore forecasting of future production may not be appropriate every time.

### **7.3 Future Research**

As an important matter of economics, responsiveness of individual consumer demand largely influences the economic development of a country. Use of quarterly and monthly data could provide more relevant results in understanding the determinants for tea demand as aggregated annual time-series data used in this study. Use of primary data instead of secondary data can provide a different view about the domestic tea industry. Further advanced model development can provide new directions for maintaining proper government and business decisions. Cross-price elasticity could not be estimated due to data unavailability. For further study measuring the effect of substitution can provide a new elastic effect for tea demand. As tea price is not responsive with the price of coffee and cocoa in the domestic market, but in the global market cocoa and coffee gaining ground, influence adversely tea prices through wide fluctuations.

Demand can also be elastic with the promotional effort as advertising, sales promotion, and direct selling. To measure the buying intention of buyers the effect of trade promotion and trade fairs can be measured in further studies. Branding also gained increasing attention among buyers and marketers also focusing on branding as an important tool of marketing strategies. Therefore, the effect of brand image on consumer' demand for tea products can broaden the knowledge of responsiveness of factors of tea demand. Future researches considering consumers with different environmental settings, social status, different age, and income group could strengthen or generalize extensive findings of the study.

Further study on consumer responsiveness toward branded and non-branded tea products, value-added tea products (green tea, organic tea, flavor tea e.g.), high-involvement and low-

involvement buying can explore new avenue of consumer behavior. An attempt to test the consumer behavioral theories on economically higher and middle class customer regarding to a developing countries like Bangladesh can provide diverse understanding about consumers. Investigation of association of consumer psychographics with the variables affecting buying behavior of tea products could be a possible extension of the next work. Reproduction and extension of similar work could be made comparing the tea demand of a developing country like Bangladesh with the developed country. Finally, more extensive research on habit-formation effect on tea demand and consumer reaction toward tea as a healthy drink can define diverse elasticity of tea demand. As Bangladesh tea industry contributed 1% on the national GDP of the country, more study needs to focus on trade policy and trade agreement to promote in the international market.

Finally, being a major exportable item and a popular drink among Bangladeshi consumers, a more comprehensive study on the attractiveness of this particular industry requires to overemphasize as a potential area of research.

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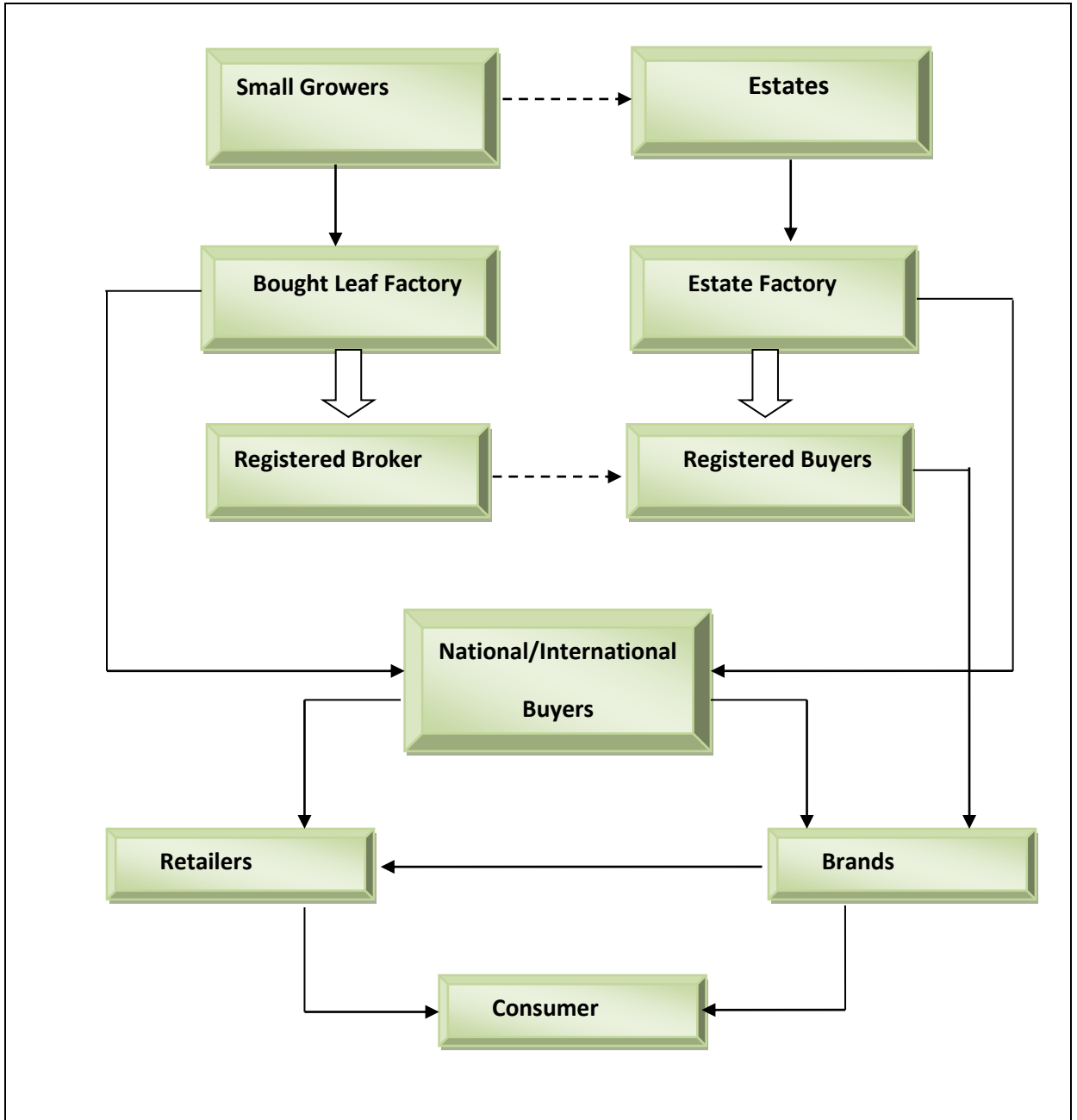
## Appendix- 1

Country	2011		2012		2013		2014		2015	
	'000 Tons	Percent	'000 Tons	Percent	'000 Tons	Percent	'000 Tons	Percent	'000 Tons	Percent
China	1623	35.6%	1789.7 5	38.1%	1924. 5	38.5%	2095.5 7	40.3%	2278	43.0%
India	1095.4 6	24.0%	1135.0 7	24.2%	1208. 8	24.2%	1207.3 1	23.2%	1208.6 6	22.8%
Kenya	377.91 2	8.3%	369.4	7.9%	432.4	8.7%	445.10 5	8.6%	399.21 1	7.5%
Sri Lanka	327.5	7.2%	330	7.0%	340.2 3	6.8%	338.03 2	6.5%	328.96 4	6.2%
Turkey	221.6	4.9%	225	4.8%	212.4	4.3%	226.8	4.4%	258.54 1	4.9%
Viet Nam	206.6	4.5%	211.5	4.5%	217.7	4.4%	228.4	4.4%	170	3.1%
Indonesia	150.2	3.3%	143.4	3.1%	145.8	2.9%	154.4	3.0%	129.29 3	2.4%
Iran	103.89	2.3%	95.272	2.0%	116.8 1	2.3%	119.38 8	2.3%		
Argentina	92.892	2.0%					85.40	1.6%	83	1.6%
Japan	82.1	1.8%	85.9	1.8%	84.8	1.7%	81	1.7%	76.4	1.4%
Bangladesh	59.13	0.8%	62.52	0.9%	66.26	0.9%	63.88	0.9%	66.347	1.3%
Myanmar			94.6	2.0%	96.3	1.9%	98.6	1.9%		
World	4561	—	4693	—	4693	—	5195	—	5285	—
Total	—	93.86%	—	95.46%	—	95.46%	—	96.23%	—	94.2%

**Source: International Tea Committee**

## Appendix-2

### Distribution Chain of Tea industry



### Appendix-3

Profile of participants in in-depth interviewing method:

No.	Code name	Age	Sex	Occupation
1.	Dr. Kazi Muzafar Ahammed	62	Male	Secretary & Researcher, BTA
2.	Rimon	25	Male	Student, Dept of Economics
3.	Kazi Samsuddin	42	Male	Retailer
4.	Aminul Islam	50	Male	BTB, Dhaka
5.	Abdullahil Mamun	35	Male	Brand Executive, Ispahani Ltd.
6.	Md. Madhul Kabir Chow.	46	Male	Deputy Director (Trade), BTB
7.	Yaasir Quader Abedin	39	Male	Asst. Manager, Kazi & Kazi Tea
8.	Munir Ahmed	60	Male	Deputy Director (Planning), BTB



**Appendix-4**

<b>Year</b>	<b>Tea area (in hectare) without nurseries</b>	<b>Yield per hectare (in kg.)</b>	<b>Production (million kg)</b>	<b>Internal Consumption (million kg)</b>
1972	42649	552.00	23.48	5.26
1973	42866	639.00	27.55	8.93
1974	42603	746.00	29.89	6.96
1975	42396	676.00	31.28	8.01
1976	42500	779.00	31.30	8.00
1977	43343	884.00	35.64	8.00
1978	43509	875.00	36.35	8.50
1979	43730	830.00	36.70	4.50
1980	43969	911.00	39.81	9.06
1981	44544	928.00	41.90	9.00
1982	44681	916.00	38.54	9.00
1983	45256	966.00	42.86	9.00
1984	45329	843.00	39.46	9.00
1985	46446	932.00	42.89	9.00
1986	46703	805.00	38.77	9.00
1987	46588	867.00	40.26	10.00
1988	47378	930.00	41.62	10.00
1989	47439	828.00	41.27	10.00
1990	47023	958.00	42.56	14.21
1991	47284	952.00	44.61	19.21
1992	47665	1028.00	46.79	21.77
1993	47670	1059.00	49.30	14.50
1994	47751	1082.00	51.73	24.00
1995	47920	995.00	47.04	22.00
1996	48337	1105.00	52.44	20.50
1997	48616	1039.00	52.67	22.20
1998	48570	1149.00	51.25	25.17
1999	48510	952.00	50.26	32.11
2000	47678	1147.00	50.22	38.79
2001	49313	1152.00	53.15	36.95
2002	50226	1199.00	53.62	41.50
2003	50896	1298.00	58.30	37.44
2004	51265	1242.00	56.00	43.33
2005	52317	1326.00	60.14	43.30

2006	52407	1174.00	53.41	40.51
2007	53367	1240.00	58.19	46.27
2008	54105	1238.00	58.66	52.12
2009	55857	1245.00	59.99	53.74
2010	55742	1224.00	60.04	63.26
2011	56150.48	1203.00	59.13	62.63
2012	57024.36	1250.00	62.52	62.88
2013	57644.14	1320.00	66.26	76.34
2014	58468.21	1230.00	63.88	68.18
2015	59018	1270.00	67.38	77.57
2016	59758.98	1587.00	85.05	81.64
2017			78.95	85.93
<b>Mean</b>			<b>48.98</b>	<b>29.98</b>
<b>Standard Deviation</b>			<b>12.90</b>	<b>24.22</b>
<b>Source</b>	<b>BTB</b>	<b>BTB</b>	<b>BTB</b>	<b>BTB</b>

**Appendix- 5**

<b>Year</b>	<b>Export (million kg)</b>	<b>Export Earning (million tk.)</b>	<b>Import (million kg)</b>	<b>Average Auction price (per kg.)</b>	<b>Ave. retail Price(per kg)</b>	<b>Per capita income (in taka)</b>	<b>Population (in millions)</b>
1972	13.19	7.67					
1973	20.31	20.31				120	
1974	21.53	105.23		4.90	15.66	160	0.00016
1975	23.5	190.79		7.54	19.29	210	0.00021
1976	22.33	257.45		9.94	19.51	200	0.0002
1977	29.42	558.76		17.73	26.86	170	0.00017
1978	28.63	769.11		19.07	34.27	160	0.00016
1979	27.1	620.79		18.35	26.46	190	0.00019
1980	23.88	510.00		20.79	26.46	230	0.00023
1981	29.85	664.76		17.99	26.46	260	0.00026
1982	31.32	760.28		20.00	30.00	240	0.00024
1983	30.81	1096.38		32.00	60.00	220	0.00022
1984	30.74	1690.67		49.00	72.50	210	0.00021
1985	25.85	1560.68		52.00	95.00	220	0.00022
1986	29.82	973.10		25.00	90.00	240	0.00024
1987	21.41	901.32		36.00	82.50	270	0.00027
1988	27.56	1204.81		40.00	85.00	280	0.00028
1989	25.12	1263.45		46.00	95.00	290	0.00029
1990	22.57	1283.00		49.00	97.50	290	0.00029
1991	25.4	1523.61		49.00	100.00	310	0.00031
1992	27.15	1230.76		46.00	100.00	310	0.00031
1993	31.92	1597.59		46.00	110.00	320	0.00032
1994	23.65	1521.00		46.00	110.00	320	0.00032
1995	25.43	1241.45		41.00	100.00	320	0.00032
1996	26.13	1176.03		49.00	100.00	330	0.00033
1997	25.17	1311.18		50.00	102.50	360	0.00036
1998	22.23	2032.29		75.50	142.50	390	0.00039
1999	15.18	1678.29		61.65	157.10	400	0.0004
2000	18.1	825.73		56.96	141.10	410	0.00041
2001	12.92	1122.14		59.79	125.53	420	0.00042
2002	13.65	894.99		57.10	115.04	430	0.00043
2003	12.18	939.93		65.89	115.00	450	0.00045
2004	13.11	915.07		62.68	142.70	490	0.00049
2005	9.01	934.04		68.45	144.26	540	0.00054

2006	4.79	742.62		78.23	151.84	560	0.00056
2007	10.56	469.59		92.02	187.92	590	0.00059
2008	8.39	899.01		91.58	198.75	650	0.00065
2009	3.15	976.95		121.84	208.00	710	0.00071
2010	0.91	433.50	4.13	154.02	136.90	780	0.00078
2011	1.47	176.68	4.98	179.98	156.53	870	0.00087
2012	1.5	213.51	1.92	165.14	158.68	950	0.00095
2013	0.54	222.28	10.62	228.24	170.78	1010	0.00101
2014	2.66	133.04	6.96	185.16	199.88	1080	0.00108
2015	0.48	122.00	10.68	177.94	192.70	1190	0.00119
2016	0.62	120.00	8.83	185.55	204.20	1316	0.001316
2017				191.00	208.90		
<b>Mean</b>	<b>18.25</b>	<b>842.04</b>	<b>6.87</b>	<b>71.61</b>	<b>110.98</b>	<b>442.41</b>	<b>297.40</b>
<b>Standard Deviation</b>	<b>10.38</b>	<b>527.64</b>	<b>3.37</b>	<b>58.84</b>	<b>58.39</b>	<b>117.49</b>	<b>29.28</b>
<b>Source</b>	<b>BTB</b>	<b>BTB</b>	<b>BTB</b>	<b>BTB</b>	<b>BBS</b>	<b>World Bank, BBS</b>	<b>World Bank</b>

Source: Bangladesh Tea Board (BTB), Bangladesh Statistical Bureau (BBS), World Bank Publications, Bangladesh Tea Association (BTA).