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The Assam Tea Value Chain: The Need for Better Information Flows

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Abstract

Tea cultivation is part and parcel of Assam's economy. This paper uses Value Chain Analysis as a tool to study the tea industry in Assam. The main purposes are to map the existing tea value chain, identify the main drivers of profit and use various indicators to assess the performance of the tea value chain. A detailed review of major constraints in the industry and problems faced by various stakeholders in the chain is conducted. Various recommendations and points of intervention to enhance efficiency, productivity and responsiveness are discussed.

Key words: Value Chain Analysis, Assam, tea estates, auction, made tea, plantation labour

Introduction

Assam is a mountainous state in the far north-east of India, to the east of and partially bordering Bangladesh and partially bordering Bhutan. The tea industry in Assam is almost 200 years old. The tea plant is known as *Camellia Sinesis.* Assam tea is famous globally for its rich and aromatic flavour. At present, there are 24 large tea estates and around 35 administrative districts in Assam, responsible for the livelihoods of millions (Government of Assam, 2018). The state of Assam has around 56 per cent of the area under tea cultivation and is responsible for producing more than 50 per cent of India's tea. Assam black tea has a malty and brisk taste while Assam orthodox tea, one of the choicest teas in the world, has a bright liquor and rich taste. A strategic location and unique environmental conditions are responsible for this quality and reputation and help Assam tea to be identified with it's own Geographical Indication (GI) registration (FA0, 2016).

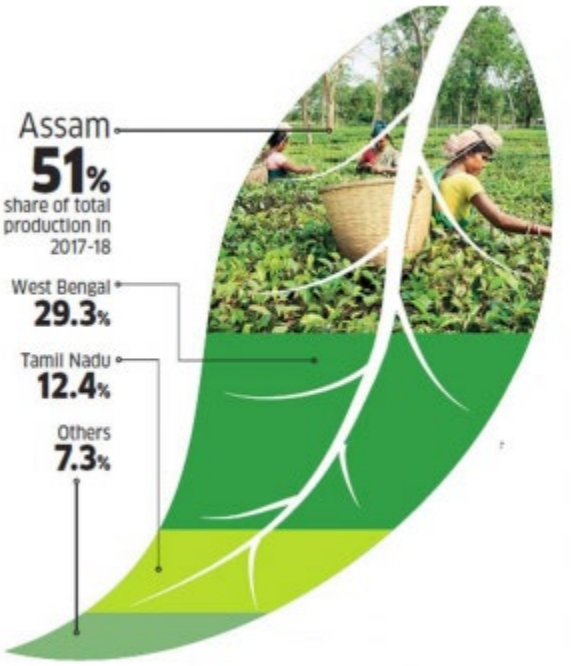
However, while the number of small tea growers is continually increasing in Assam, ongoing exploitation by the big players remains in the forms of low wages, poor health conditions, and poor health facilities (Borah, 2016; ILO, 2018; Trustlaw, 2015). Additionally, there are concerns about the long-term sustainability of the industry in relation to the ongoing threat from climate change (FAO, 2016; Tocklai Tea Research institute, 2016; Van der Wal, 2008), and in relation to declining productivity (Das, 2014; Laskar, 2018).

In this paper, the concept of value chain analysis is used to map the tea value chain and understand the various factors that constraint the overall productivity of the chain. An overview of the Assam tea industry is provided, then the existing tea value chain is mapped, the main drivers of profit are identified and various indicators are used to assess the performance of the tea value chain. A detailed review of major constraints in the industry and problems faced by various stakeholders in the chain is conducted, and various recommendations and points of intervention to enhance efficiency, productivity and responsiveness are proposed.

Overview of the Indian Tea Industry

After China, India is the second-largest producer of tea in the world. The tea industry has a special place in the Indian economy. It nearly employs 3 million people and plays a key role in India's GDP, contributing some 3 per cent (Talukdar and Hazarika, 2017). Some 16 states in India grow tea but just three states contribute more than 95 per cent of its production. Assam alone contributes more than 50 per cent (Figure 1). In 2018 there was a 6 per cent increase (or 74,500 tonnes) in tea production as compared to the previous year, for a total production of 1.325 million tonnes (Tea Board of India, 2018). Conversely, there has been a decline in the export of tea in the past few decades, from 53 per cent of the world's tea trade in 1971 to only 15 per cent in 2017 (Economic Times, 2017). Various explanations have been offered such as the availability of substitutes due to higher production by other countries, the rise in domestic consumption, and the low efficiency of the tea value chains leading to reduced competitiveness (Talukdar and Hazarika, 2017).

Figure 1. Tea production in different states of India



Source: BASIC (2019)

The tea industry includes both small holders and large estates. The small tea growers are ill-equipped with technology, they receive relatively low wages and low prices, and they use relatively more energy and agrochemicals. Empowerment of this segment is essential for the industry's growth and productivity. A

statutory body, the Tea Board of India, was set up under the Tea Act 1953 in the Ministry of Commerce and Industry to promote the Indian tea industry and mitigate challenges faced by it.

Analysis of the Tea Industry and Marketing System in Assam

Industry structure

Assam has around 750 estates and about 100,000 smallholder plots. Structural changes in tea cultivation were noticeable in the past few decades when small tea growers started cultivating unutilized uplands (Borah, 2013). Initially, the concept of cultivating tea in small plots was successful in Kenya and came into existence in Assam after 1975. Table 1 demonstrates the steady shift from large to small plantations.

Table 1. Comparison of changes in the numbers of small tea growers in India and Assam

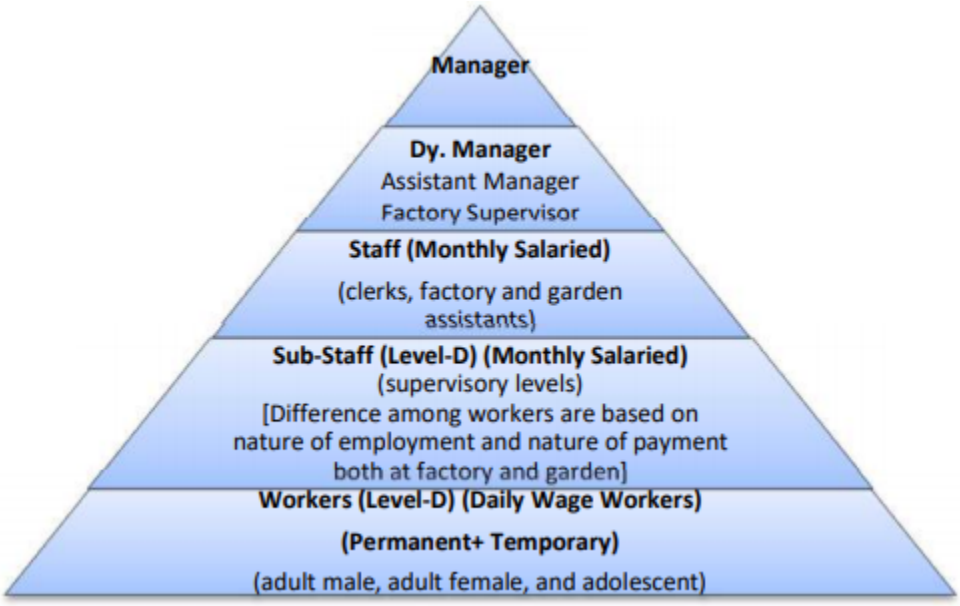
Year	No. of small tea growers in India	No. of small tea growers in Assam	Percentage increase over previous year in Assam
1998		16759	56.19
1999		24930	59.33
2000	110396	30607	22.77
2001		38269	25.03
2002		41548	8.57
2003	127366	45444	6.53
2004		46949	6.07
2005	139041	48292	2.86
2006	141544	50795	5.18
2007	157504	64597	28.88
2008	157504	67463	3.05
2010		68459	1.48
2011	157504	68465	0.01
2012		68523	0.08
2013		78350	14.34
2015		82805	5.69
2016		84577	2.14

Source: (Das, 2019)

The employment structure (Figure 2) shows that there are various actors involved in the Assam tea value chain. Involvement of different actors in the value chain provides various intervention points which can enhance the productivity of the tea value chain. The top spot is occupied by managers, deputy and assistant managers while temporary and permanent labour occupies the bottom of the pyramid. Employees are generally salaried people. Sardars, or garden supervisors, are responsible for assigning work to the labourers. As far as the workforce is concerned, men work in the factory and women are assigned work in the tea gardens. Although women represent more than 50 per cent of the labour workforce, they are paid less than males and are victims of informal and irregular employment (Mishra et al., 2011). Reducing gender inequality is an area of concern in Assam tea value chains.

The tea sector is the largest employer in the formal private sector, employing nearly 1.2 million permanent workers (Trustlaw, 2015; Balaton-Chrimes and Macdonald, 2016). According to the Plantation Labour Act (1951), the large estates and plantation management must provide adequate social and economic welfare benefits. However, research illustrates that workers are subjected to low wages, miserable housing and living conditions, exploitative work patterns, inadequate access to sanitation and clean water and lack of collective bargaining (Bhowmik et al., 1996; Guha, 2012; Bhowmik, 1981). The risk faced by producers due to climate change demands innovation in technology putting pressure on already rising costs.

Figure 2. Employment model of the tea industry in Assam



Source: (Saha, Bhue , & Singha, 2019), TISS 2019

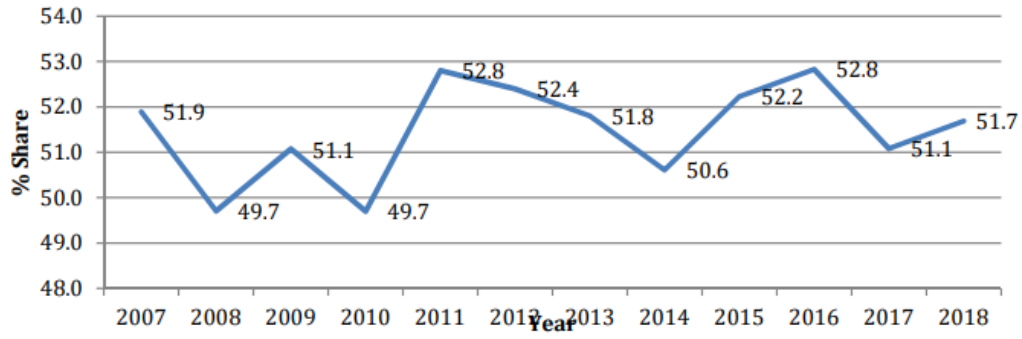
Production

Assam is the largest single tea-growing region of the world (Tocklai Tea Research Institute, 2016). As depicted in Figure 1 above it is responsible for producing over 50 per cent of India's tea, although this share varies from year to year (Figure 3). One-sixth of global tea is produced by Assam alone (Tea Board India, 2016; Economic Survey, Assam, 2015). Assam provides the world's finest black tea (FAO, 2016) as well as some quantities of white and green tea (Global Network for the Right to Food and Nutrition, 2016). To signify the importance and quality of Assam tea, it is registered as a Geographical Indication tagged product. In the last twenty years, the industry has seen numerous dramatic changes in terms of production, price, consumption, land utilization and price mechanisms. Figure 4 depicts annual changes in Indian and Assam tea production from 2007-2018. The spike in 2011 was due to a combination of good rainfall and a new credit program for smallholders (Talukdar, 2012).

Exports

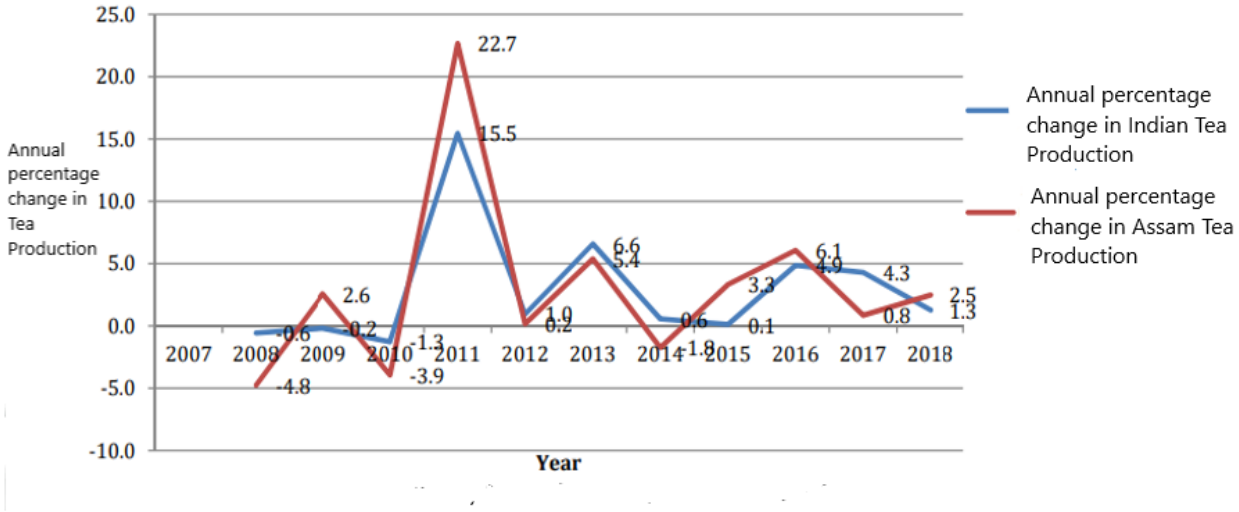
The five major countries that import Assam tea are Germany, Netherlands, France, the United Kingdom and the United States. Based on data collected and CIF import prices, different trends can be observed (Figure 5).

Figure 3. Assam's share in India's total tea production



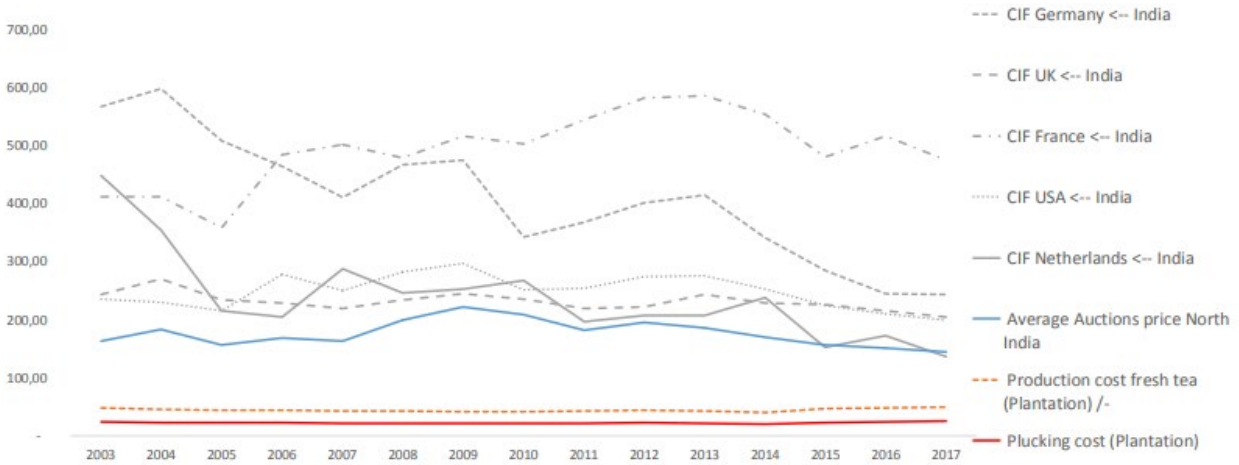
Source: (Saha, Bhue , & Singha, 2019), TISS (2019)

Figure 4. Annual percentage changes in Assam and Indian tea production, 2007-2018



Source: (Saha, Bhue , & Singha, 2019), TISS 2019

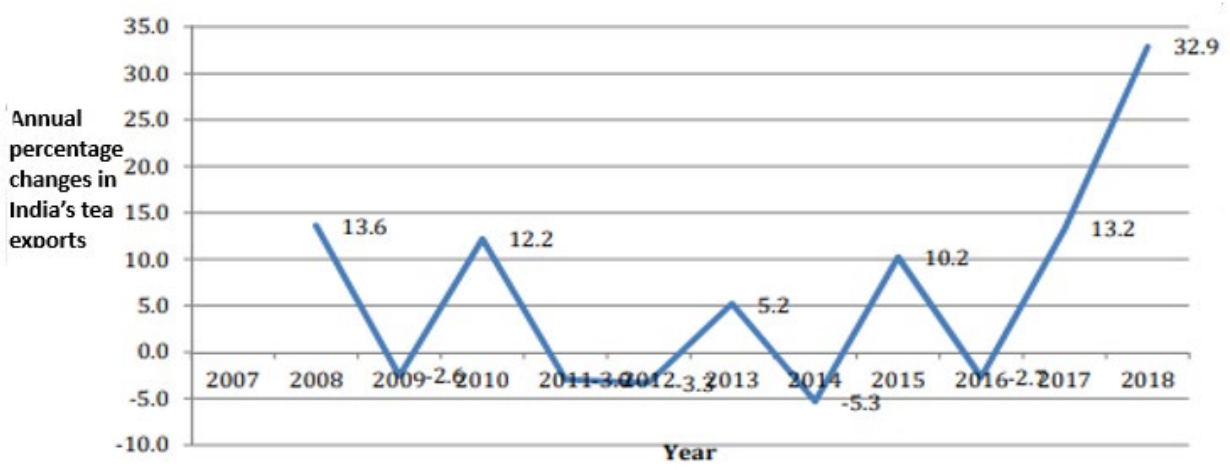
Figure 5. Distribution of value of Assam tea estates to Indian exports (Inflation adjusted), 2003-2017



Source: BASIC (2019)

In the Netherlands, which was a profitable market for black tea in 2003, import prices have fallen by 70 per cent in the last 15 years (from INR 447.30/kg (9.12 AUD) to INR 144/kg (2.93 AUD). Similarly, Germany's import prices have fallen by 60 per cent. France, having a price of INR 474/kg (9.66 AUD) in 2017, set it apart from other countries. The relatively stable and higher price indicates that French buyers are looking for quality, a market well-suited for Assam tea. Due to the fact that tea is not a popular beverage in France, it is probable that French customers are searching for higher quality items than their counterparts in other nations (BASIC, 2019). The United States and the United Kingdom have similar import prices (BASIC, 2019). While Indian tea exports have shown a sharp increase since 2016 (Figure 6), issues such as low traceability, poor quality tea, and less sustainable and environmentally friendly farming practices pose a threat to export-oriented supply (Van der wall, 2008).

Figure 6. Annual percentage changes in India's tea exports, 2007-2018



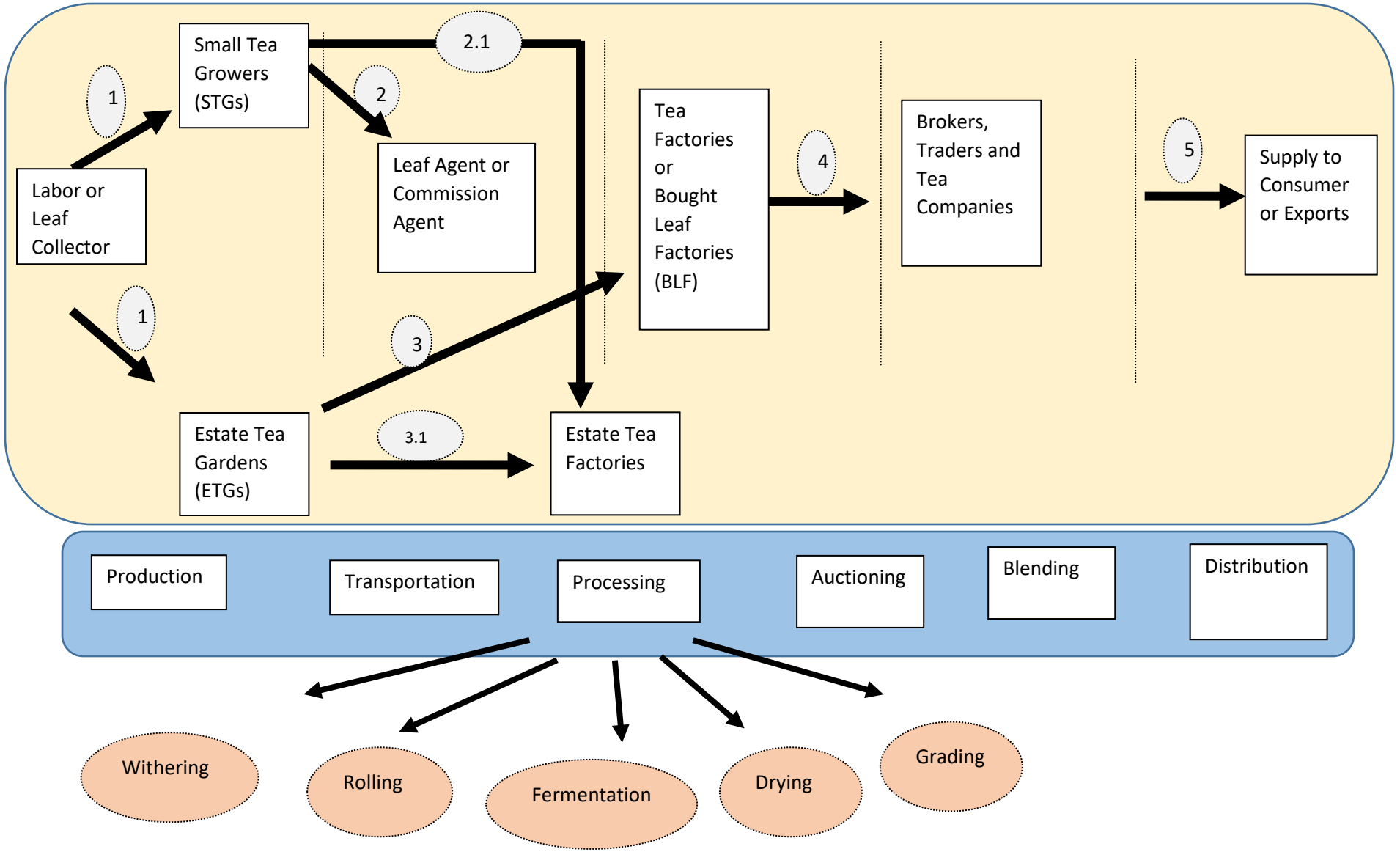
Source: (Saha, Bhue , & Singha, 2019), TISS 2019

Mapping the Assam Tea Value Chain

Figure 7 gives a brief outline of the Assam tea value chain. Its key features are discussed below in terms of five key steps:

Step 1 (Production) - In Assam, two types of tea gardens produce fresh tea leaves, Estate Tea Gardens (ETGs) and Small Tea Gardens (STGs). ETGs have tea factories as part of their estate whereas STGs are gardens of 10-12 hectares or less and do not have their own tea factories (Karabi, 2019). Tea leaf plucking refers to collecting green tea leaves from the bushes. It is the key operation for manufacturing good quality tea. Plucking is done from 7 am to 4 pm and the minimum weight of tea leaves to be plucked each labour/day is 25kg approx. Next to plucking, the second vital process is pruning. Pruning means cutting the tea bushes down to a suitable length known as the plucking table which is essential for maintaining vegetative growth. Generally, tea plants are pruned in alternate years (Paul & Mondal, 2018). From the value addition perspective (Table 2), STGs only relate to tea production, so there is no value addition for them. Data from 100 small tea growers in 15 villages were collected and based on that, costs and incomes were calculated (Sonitpur district was chosen as it is the leading tea-growing district of Assam) (Das & Mishra, 2019). Production cost is INR 16.90/kg and selling price is INR 19.54/kg giving a net
to tea factories for processing.

Figure 7. Components of the Tea Value Chain in Assam



To meet their daily capacity or full production capacity Estate Tea Factories buy tea leaves directly from STGs **(Step 2.1)**. According to the Tea Board of India (2018), 25 per cent of green leaves produced by ETGs are bought by Tea Estates.

Step 3 (Processing) - Again two types of factories exist. One is Bought Leaf Factories - they do not have their tea garden and they process leaves received from STGs, while the other is Estate Tea Factories that receive leaves from ETGs **(Step 3.1)**. Processing involves five broad steps – 1) withering - done to remove surface moisture, 2) rolling - leaves are twisted and rolled into wrinkled strips, 3) fermentation – an oxidization process to bring out flavour and strength, 4) drying - done to extract moisture and prevent further fermentation, and 5) grading - tea is graded according to shape and size and then stored in airtight containers.

From Table 2 and Figure 8, it is clear that the highest value addition is done at this level because costs like electricity, firewood, taxes, agent's commission, repair of machines, generators and trucks were all borne by processors. Also for producing 1kg of processed/made tea, the processor has to buy 4kg of green tea leaves. Total value added to the chain is INR 129.18/kg resulting in an income of INR 20/kg (Das & Mishra, 2019).

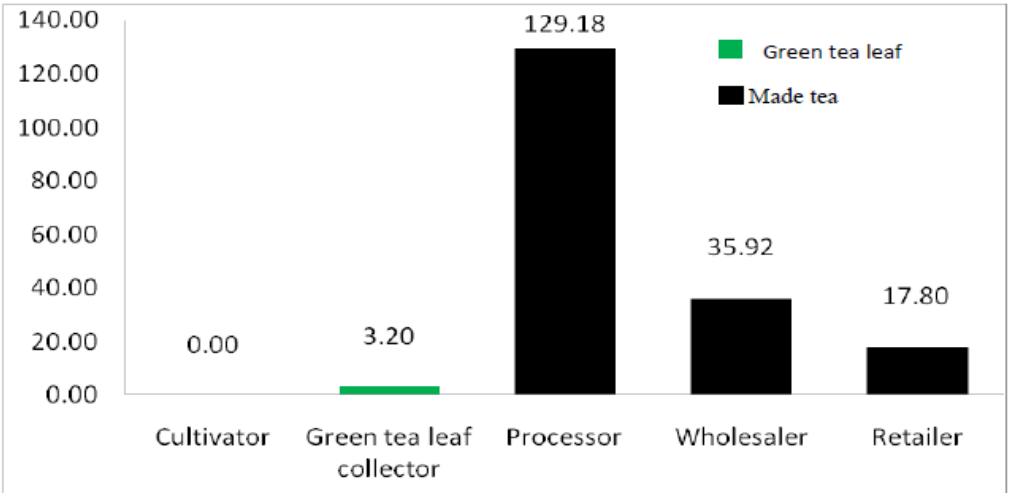
Table 2. Average value of various stakeholders in Assam tea chain

Players	Value Addition Process	Cost of procurement per kg (Rs)	Total cost of Value Addition per kg (Rs)	Total production cost per kg (Rs)	Selling price per kg (Rs)	Net Income per kg (Rs)
Small tea growers' cost of production	-	-	-	16.91	19.54	2.63
Green Leaf Collectors	Collecting green leaves And delivering to processors	19.54	3.20	22.74	24.60	1.86
Processors	Converting green tea leaf to made tea, packing, labelling	24.60	129.18	153.78	173.78	20.00
Wholesalers	Blending and packaging	173.78	35.92	209.70	212.20	2.50
Retailers	Sorting and sale promotion and quality control	212.20	17.80	230.00	234.00	4.00

Source: (Das & Mishra, 2019).

Step 4 (Auctioning) – Trade between producers and buyers take place at auction houses. Brokers mediate the sale of processed (or "made") tea via auctioning. Because brokers are the primary driving force behind auctions, they wield considerable control over how the system is operated. Again, in the case of Indian

Figure 8. Cost of value addition/kg of tea



Source: (Das & Mishra, 2019)

auctions, several large purchasers wield great sway over the price of tea, such as Hindustan Lever, Tata Tea, and others. The wholesaler value addition is INR 35.92/kg which is the second-highest in the value chain. Three key big players are - J. Thomas & Co. handles 40 per cent of all tea auctioned in India, followed by Eastern Tea – 13 per cent and Contemporary Brokers – 8 per cent (Hazarika, 2013).

Step 5 (Blending) - After the wholesalers/tea companies buy tea from different tea processors, the final step is blending of bulk processed tea and packing it into conveniently sized packs. Tata Global beverages have 10 packing and blending factories in India alone (BASIC, 2019). Other major players are Unilever, James Finlay, Teekanne etc.

Step 6 (Distribution) - Finally, the distribution network of the wholesalers and retailers is responsible for tea reaching the customers (stores, cafes and restaurants). Due to the growing penetration of modern retail in India, it is emerging as the biggest channel for purchasing of tea (IBEF, 2018). Sorting, customer relationship, promotion, monitoring and quality sale are some of the areas at which retailers look after. Retailers bear the highest procurement cost of INR 212.20/kg and add the value of INR 17.80/kg (Das & Mishra, 2019).

Drivers of Profit

Table 3 lists various drivers that may derive profit for various stakeholders in the Assam tea value chain.

Performance Indicators for the Assam Tea Value Chain

A combination of financial and non-financial indicators must be used to determine the performance of any value chain. The most relevant indicators for measuring the performance of the Assam tea value chain are listed below:

Production cost - Laskar (2018) observed that labour cost occupied the prime position as compared to other costs of cultivation like material, welfare and miscellaneous (Table 4). In the organised sector, two-thirds of the cost of production was occupied by labour cost. For small tea growers, the only cost involved

Table 3. Drivers of profit in the Assam tea value chain

Profit drivers	Effects	Beneficiaries
Adapting climate change strategies	To combat the negative effect of climate changes on tea production and reduce damage to crops from floods and droughts	Tea grower
Organic agricultural practice	Improves soil fertility and its water holding capacity	Tea grower
Working conditions	Better education, health and sanitation facilities will increase overall production and growth	Tea grower and labour
Training programmes	Enhance skill set of labour to increase efficiency and profit	Tea grower and labour
Infrastructure	Road connectivity and power supply will attract factories to set up in remote areas and also, reduce the cost of transportation for small growers leading to development and prosperity	Tea grower + labour + factory
Direct Sale	Without auction, small tea growers can receive a better price for the tea, fewer middlemen more profit	Tea grower
Certified standards	High-quality standards increase exports and provide a better market margin	Exporter + tea grower
Awareness programmes	Several government schemes are there for labour. Knowing about trade unions can provide a bargaining platform to various labourers thus increasing productivity	Labour
Automation	Semi plucking machines to overcome the shortage of labour, minimize labour cost with no quality compromised	Tea estates
Non-Conventional energy method	Using wind and solar energy to lower energy costs	Tea Estates
New tea varieties	Will attract foreign buyers	Exporter
Vertical Integration with international companies	Improve and increase market and distribution channel in foreign countries	Exporter

Source: author's compilation

Table 4. Comparison and importance of different costs

Factors	Most Important (Score=4)	Very Important (Score=3)	Important (Score=2)	Less Important (Score=1)	Net Important (Score=0)	Total Score	Rank
Worker Cost	46	2	2	0	0	194	1
Material Cost	39	7	4	0	0	185	2
Capital Cost	7	9	32	2	0	121	3
Welfare Cost	0	23	13	12	2	107	4
Misc.	0	11	30	9	0	102	5

Source: (Laskar N, 2018)

was cultivation cost, costs like health, subsidised food, education and pension for labourers were not involved in their cost of production (Borah, 2013). Prices have stagnated over the past five years in the range of INR 125-132/kg (Economic times, 2018).

Productivity - Higher productivity depends on many factors such as bush age, bush density, the skill set of labour, proper pruning and plucking, improved drains etc. (Goswami et al., 2006). As observed from Table 5, overall productivity has increased steadily but the picture is different for small tea growers. The area under tea plantations has grown but productivity is still less than for the large growers. Possible reasons that have been proposed are non-application of fertilizers and manure, less technical knowledge and ageing plantations (Arya, 2013). Uncertain climatic conditions are another factor behind low productivity.

Price - Price is generally determined by the grade of tea and its region of production. Machine-based (crush-tear-curl) generated tea fetched INR 150/kg while Orthodox tea was priced at INR 500/kg. Darjeeling tea got a price three times higher, i.e. INR 1500/kg, than Assam tea (BASIC, 2019). Generally, prices are fixed by agents and tea estates well before the auction, small growers have to accept the prices they are offered. The low number of processing factories and the weak bargaining position of small growers' results in a lower price.

Marketing and promotion - In regional areas brand names are important and marketing campaigns play a key role in promoting brand awareness. To promote their tea products as a healthy and premium alternative to other beverages, big players like Unilever and Tata have tapped famous Bollywood actors. Compared to 2009, branded tea is 70 per cent more expensive in 2017. Branded packs of loose tea were priced at INR 344/kg in 2017 while unbranded loose tea was INR 203/kg, 40 per cent below branded tea products (BASIC, 2019). Borah (2016) observed that small tea growers do not receive any marketing support from the government leading to low prices.

Quality - Quality is determined by the combination of both internal and external attributes like flavour, aroma, strength, briskness, colour and character of the tea leaves. It varies from time to time and garden to garden. It is also determined by a combination of both climatic and soil conditions. Age of tea bushes

Table 5. Area and production by small and large growers

Year	Small Growers (up to 10.12 ha.)			Big Growers (above 10.12 ha.)			Total		
	No. of Tea Gardens	Area	Product-ion	No. of Tea Gardens	Area	Product-ion	No. of Tea Gardens	Area	Product-ion
2007	64597	88674	106881	825	232645	405004	65422	331319	511885
2008	NA	88674	NA	760	230113	437810	760	321437	487497
2009	NA	88674	NA	760	230060	451970	760	321687	499997
2010	NA	88674	NA	760	229790	450100	760	322222	480286
2011	78091	88674	NA	760	229140	476767	78856	322210	589110
2012	68459	88674	NA	761	233536	590120	69220	322210	590120
2013	68459	88674	NA	761	233536	629050	69220	322210	629050
2014	76949	71871	144254	761	232529	466716	77710	304400	610970
2015	82805	83880	139491	761	232529	386694	83566	316409	526185
2016	84577	78203	NA	767	226197	NA	85344	314400	642180

Source: (Karabi, 2019)

less than 50 years is essential for producing good quality green leaves (Karabi, 2019). Indiscriminate use of pesticides has increased production but threatens the quality and value of Assam tea as a brand.

Working conditions - Lack of essential services, breaching of maternity rights, poorly maintained living quarters, inadequate supply of nutritious food and clean water, absence of preventive clothing, exposure to hazardous chemicals, no rest time during working hours and low wages are some of the factors that lower the performance of the Assam tea value chain (Global Network for the Right to Food and Nutrition, 2016).

Infrastructure and communication - Modern civilization depends on communication. Road connectivity in remote areas of Assam is poor and also there is not any drivable connection between small tea gardens and tea leaf processing factories. An increase in transportation time causes a loss of moisture content in tea leaves during summer and also lowers the quality, thereby reducing its weight and leading to lower prices compared to those received by the estates (Das, 2014). Inadequate supply of power forces plantation factories to rely on diesel, further increasing their cost of production.

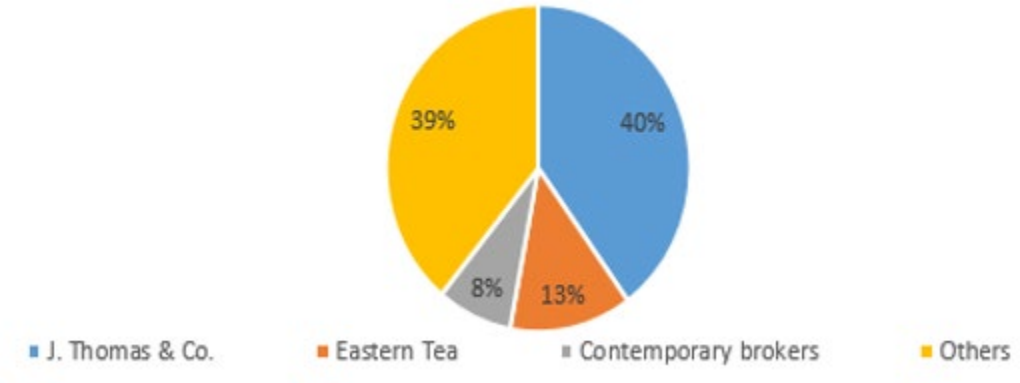
Major Constraints and Challenges faced by the Assam Tea Industry

As indicated above, the tea sector of Assam has been weighed down by many factors. In this section, major impediments are discussed and assessed as to how they alter the quality and productivity of tea leaves in the Assam region.

Defects in the auction system - Auction houses are key constituents of the tea value chain. Producers or growers do not participate in the auction directly. There are no information flows from broker to producers. As shown in Figure 9, auction trading is an oligopolistic market controlled by a handful of buyers. J. Thomas and Co. is the largest Indian tea broker and controls 40 per cent of all the tea auctioned, followed by Eastern Tea at 13 per cent and Contemporary Brokers at 8 per cent (Hazarika, 2013). The

auction comes to halt if there is no bid from these big players and if they bid, there will be no other buyer to bid. Brokers, in close coordination with big players always have an upper hand in the auction market.

Figure 9. Share of Indian tea brokers



Source: BASIC, 2019

These big players use their countrywide network of sales and marketing to set the prices. New buyers are at a disadvantage in the auction market as brokers do not accept their bid because of lack of credibility and also new buyers have to compete with the big players in the same auction.

From 2009 to 2017 income generated by small farmers has decreased from INR 78.45/kg to INR 45.30/kg i.e. by 42 per cent. This is a very small share of the auction price received by brokers (Table 2) (BASIC, 2019). Small tea growers relying on cash for food, health and education are greatly affected. This clearly shows that control over tea prices rests in the hands of a few buyers which is a major challenge to increasing wages and improved working conditions. As a result, farmers are not able to invest in new inputs/technology leading to poor yield and quality. Moreover, transportation cost, brokerage charges, longer transaction times and warehousing charges are areas of concern in the auction system. The entire transaction takes about 35 days to complete (Ministry of Agriculture, India, 2015).

Biotic and abiotic stress due to climatic variability - Tea production, due to specific agro-climatic needs, is very sensitive to climatic variability. Annually, the Brahmaputra River floods the tea gardens causing waterlogging and bank erosion. Around 15-20 per cent of the crop is damaged due to waterlogging in various districts of Assam (FA0, 2016). Tea leaves need sufficient and evenly distributed rainfall. Heavy rain washes the topsoil causing a reduction in the water holding capacity and microbial activity. Moreover, the increase in temperature increases the probability of pest infestation. Higher temperature causes plants to become more stressed as they become more water deficit, making them susceptible to the attack of pests (FAO, 2016). The outbreak of looper caterpillar, tea mosquito bug and red rust has already damaged large areas in Assam. Hazardous and toxic agrochemicals are used extensively to stop the increase in pest infestation. Irregular rainfall, frequent floods and droughts, pest infestation, enrichment of carbon dioxide and increasing temperature alter both the quantity and quality of tea leaves, hampering the sociological and economic conditions of small tea growers (FAO, 2016). To combat and manage the adverse effects of climate change, growers have had to make large changes in their existing practices to produce the best quality tea.

The issues faced by small tea growers - The movement of tea leaves from estate tea gardens to the estate tea factory is quite efficient, whereas the supply of tea leaves from small growers to factories is not efficient. Three hours is the ideal time interval between plucking and processing of leaves (Paul & Mondal,

2018). Generally, small tea growers are at a considerable distance from tea processing factories which involves higher logistics costs and reduces the quality of tea leaves as the transfer time is greater than three hours. The large estates have fixed labour for plucking whereas small tea gardens lack sufficient permanent labourers so there are often delays in plucking, further reducing the quality. The supply chain involving small growers also includes more players as compared to an estate garden, therefore a larger share of the profit goes to transportation, tea factories and agents, and a smaller share to the small tea growers.

Worker exploitation - The Assam tea industry is highly labour intensive and most of the plantation workers belong to India's tribal population which is one of the most excluded segments of the society. The wages of tea plantation workers are very low compared to other employment sectors. For example, there is a huge difference between the wages paid to Assam labourers (INR 137) compared to South Indian labourers (INR 216) despite their low level of production (Sarkar, K. (NRPPD), 2015). Low education levels mean there is an ineffective representation of workers to negotiate for better pay. This makes it difficult for workers to afford nutritious food or to provide education to their children and to have a basic lifestyle. Personal Protective Equipment (PPE) is not assigned to workers exposing them to harmful chemicals. Living conditions are poor, with no electricity and an inadequate supply of safe drinking water. Health-related issues like anaemia and diarrhoea are quite prevalent among workers. Healthcare facilities are poor, with few qualified doctors, inadequately trained staff and language differences between staff and workers. Gender inequality in terms of wages, type of work and decision making is widespread. The abovementioned reasons cause low productivity, high absenteeism from the workplace, and migration of workers to other sectors of the economy.

Interventions for Improvement

Table 6 provides several potential intervention areas from the International Labour Organisation that would be required to improve efficiency, responsiveness and competitiveness of the Assam tea value chain. To build on this list, several possible strategies could be employed to minimize or mitigate the major constraints and challenges mentioned in the previous section.

Role of government - Brokers have a significant influence on price determination, making the auction a one-sided operation. Proper scrutiny of the whole system by the government and the Tea Board could transform this partial system (where producers have no role) into a sound system. Schemes like Minimum Support Price (MSP), in which a minimum fixed price is given to producers of other commodities (cash crops rice, cotton, wheat) by India's government, should be implemented for tea as well. MSP would protect small growers and reduce their dependence on the auction system. Introducing online auction practices, increasing transparency at auction centres, and modernizing auction houses with modern technologies to offer better facilities to attract foreign buyers are some of the remedial measures taken by both government and India's Tea Board to develop an effective auction system (Hazarika, 2013). More could be done.

Direct sale rather than auction sale - As evident from Figure 10, there has been a steady decline in auction prices since 2007. Traders and retailers have revealed that the price received via direct sales is much higher than the auction market. There is a difference of between INR 8-10/kg (Saha, Bhue, & Singha, 2019; TISS 2019). The price set in the auction is publicly available, but the price prevailing during direct selling is difficult to access. This is a motivation for small growers and producers to opt for direct selling and increase their income. In North India, there has been an increase in direct sales due to the direct marketing of orthodox and organic tea to the international market, where it is sold at a higher price compared to the

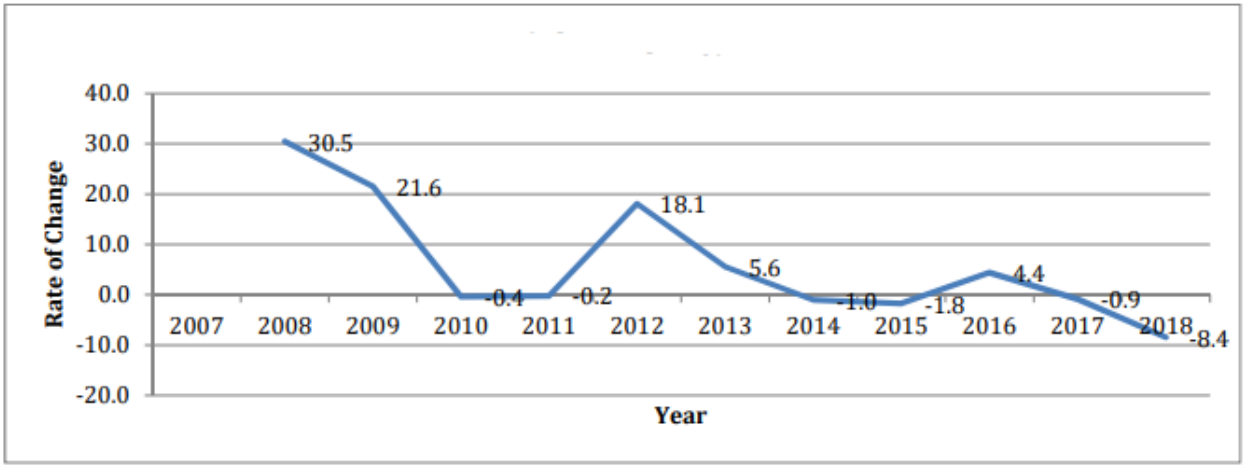
auction price. Looking at the trend in Figure 11 the share of all Indian tea sold in the direct retail market is holding steady. Assam tea growers should learn from this and rely more on direct selling.

Table 6. Proposed Areas for intervention by ILO

	Area	Explanation
Intervention Area 1	Increase adoption of good practices and products in worker management and health and safety	Targeted activities should seek to increase labour productivity through improved working conditions and improved PPE (a 'win-win' for both workers and plantation owners)
Intervention Area 2	Increased consumer communication	Increased Fairtrade communications on issues, progress and impact of interventions in Assam to raise public and consumer awareness on the challenges and successes in the region.
Intervention Area 3	Industry collaboration and research into plantations' and residents' needs	Many of the challenges that the sector faces are deeply embedded and require time to change. The programme suggests a number of activities which could catalyse long-term improvement of the sector through strengthening key industry players. It will aim to conduct participatory research on residents' and workers' aspirations in particular around the provisions of the PLA and share best practices and lesson learning with industry actors (through forums, workshops and publications), encouraging the adoption and replication of improved ways of working by actors.
Intervention Area 4	Increased access to services, products and information promoting good practices on health and wellbeing amongst residents on tea plantations	Living conditions remain challenging, despite plantation investment. This intervention will aim to improve broader living conditions for plantation residents.
Intervention Area 5	Increase earning opportunities for workers and residents	Activities will aim to ensure that large numbers of plantation families have increased earning opportunities, additional sources of income, and are better able to manage their money

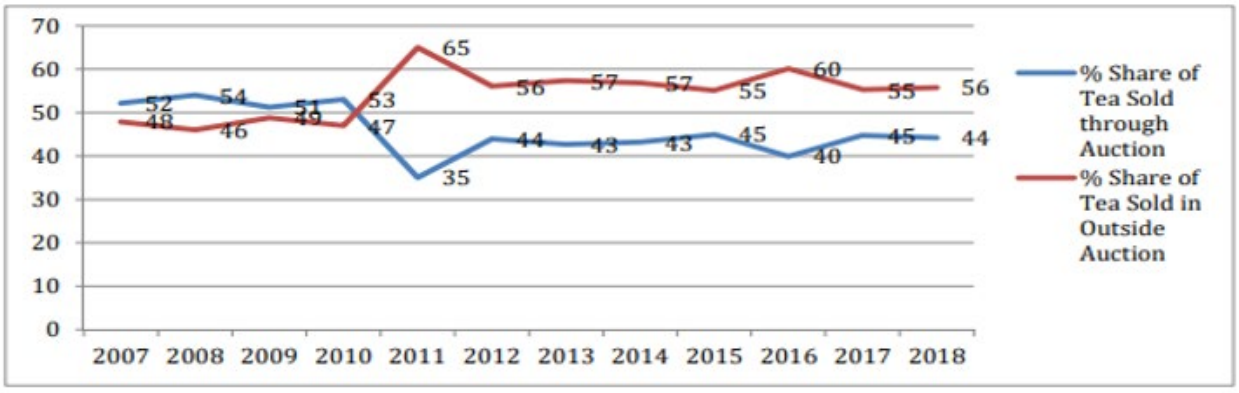
Source: ILO (2018, p17)

Figure 10. Rate of change in tea auction price in India, 2007-2018



Source: (Saha, Bhue , & Singha, 2019), TISS 2019

Figure 11. Share of tea sold in and outside the auction

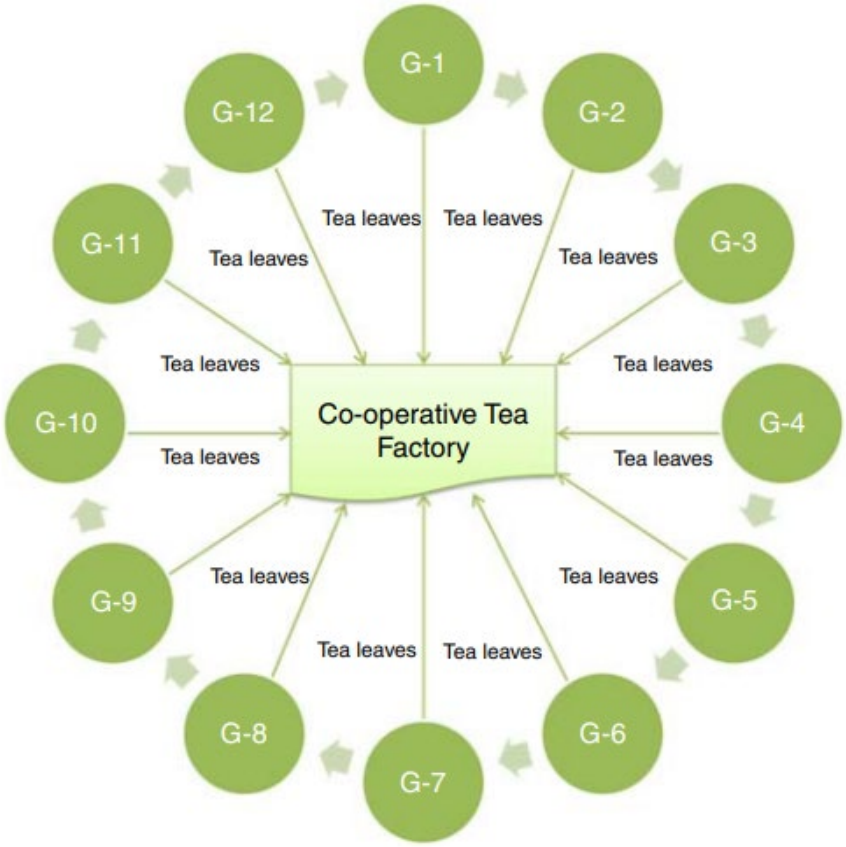


Source: (Saha, Bhue , & Singha, 2019), TISS 2019

A proposed cooperative model for small tea growers – A group of small tea growers could form a co-operative and set up a factory in the centre of the State (the best place for maximum efficiency). This would remove all the tea agents involved and lower the logistics requirements, thereby maximizing the participating small tea growers' profitability. The co-operative could employ fixed labour, plucking the best quality tea leaves and supplying it within three hours to their co-operative factory. This model is quite responsive as well because leaves can be plucked and supplied immediately as demand is known.

The INDCO factory or Industrial Co-operative factories is a similar initiative by small tea growers of Nilgiris. As the figure 12 demonstrates that a group of 12 different small tea growers form a co-operative. They transfer the grown tea leaves directly to the co-operative factory set by them, removing all the middlemen and saving both logistics and inventory costs (Paul & Mondal, 2018).

Figure 12. Example of the co-operative tea factory



Source: (Paul & Mondal, 2018)

Adapting strategies and management practices – many agronomic strategies have been recommended by the Tocklai Tea Research Institute (2016) to combat the impact of climate change. These include:

- Mulching immediately after the rainy season to conserve soil moisture by lowering evaporation rate, and reducing soil erosion and surface run-off (FA0, 2016). Napier grass, water hyacinth, Eupatorium can be used as mulching material. It lowers the soil temperature in summers.
- Implementing effective drainage as the only possible solution to waterlogging caused by the floods from the Brahmaputra River. Drainage removes excess water from the land and reduces excess moisture in the soil. It improves aeration and nitrogen economy of soil, increases the depth of rooting and infiltration rate in the soil.
- Adopting integrated nutrient management to reduce the chemical load (Kashyap, 2009). This practice is a combination of inorganic, organic and biofertilizers that are applied to the soil, minimizing the nutrient loss and optimizing crop nutrition and soil health.
- Harvesting of rainwater is a key practice to fulfil irrigation needs, maintain humidity in tea bushes during water stress is an effective method and lower evapotranspiration cost of water.
- Laying compost made from weeds, grasses and cut jungles improves soil structure, aeration and protects bushes against wind erosion as the humus in the compost binds soil particles. Moreover, organic matter in compost enhances the microbial activity, keeping soil fertile and healthy.

These well-known best practices need to be more effectively promoted.

A number of other more minor recommendations have been made (ILO, 2018) to improve working and living conditions. These include:

- Better use of radio and television channels to spread awareness among the local populations regarding labour rights, sanitation, education, public health and clean drinking water. Strengthening labour unions and promoting labour rights awareness campaigns is crucial to advocate worker rights and their representation on a variety of social dialogue platforms.
- Establishing business-to-business spaces where different actors exchange information about the positive impact of fair working conditions and discuss various possible solutions to mitigate industry challenges. Decent wages, including cash and non-cash benefits, should be provided so workers can have a decent life. Besides concentrating on economic aspects, the industry should focus on improving the welfare mechanism for workers' social up-gradation and developing a sense of belongingness to communicate their requirements and needs to the management freely.

Conclusion

The Assam tea value chain is of great significance to the Assam State in terms of productivity, exports, employment, and economic aspects. However, low prices, low wages, lack of transparency, and the domination of some big players are matters of concern. Production has increased, but the productivity of small tea growers still lags. Assam has not strictly implemented some of the quality restrictions, and lack of government intervention has caused stagnation in prices. To mitigate the above problems and combat the negative effect of climate change, cultivators have to change their current management practices and increase their technical skills, as well as making sure information flows throughout the chain, to benefit all chain participants.

By way of comparison, the Sri Lanka tea industry has been recently reviewed by Perera and Rathnayake (2021) and Rathnayake et al. (2021). Both Sri Lankan tea and Assam tea have an excellent reputation in the world market and are quite similar in terms of labour intensity and the role of the large tea estates. Climate change, poor agricultural practices, exploitation of labour, and poor managerial skills are some of the challenges faced by both regions and these issues have adversely affected the performance of their value chains. The role of government and the involvement of policymakers is essential for the efficiency and sustainability of both value chains. Promotion of tea tourism and tea bars/cafes as suggested by Perera and Rathnayake (2021) for Sri Lanka could also be tried in Assam to provide jobs and enhance the livelihood of the tea plantation workers.

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