IMPACT OF MECHANISATION IN TEA INDUSTRY ON EMPLOYMENT: A CASE STUDY OF TWO TEA GARDENS OF SONITPUR DISTRICT, ASSAM

A Dissertation

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Certified that the subject matter of this Dissertation is the record of work done by Premananda Borah, that the contents of this dissertation did not form a basis of the award of any previous degree to him, or, to the best of my knowledge to anybody else, and the dissertation had not been submitted by him for research degree in any other University.

In habit and character, Premananda Borah is a fit and proper person for the degree of MASTER OF PHILOSOPHY.

Shillong,
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CHAPTER I

INTRODUCTION

During the recent past, partly on account of an increase in the cost of production of tea and partly on account of other factors, a certain section of the tea industry has been pressing hard for mechanisation of the industry. They expect that mechanisation would bring down the per unit cost of production. In 1932, crushing, tearing and curling (C.T.C.) machine was first invented and used. But it has been widely used in Assam only after 1945 (after the second World War), since that time the process of mechanisation has been steadily increasing and at present a major part of the tea industry has introduced sophisticated machines and equipments in the different areas of tea manufacturing. One consequence of this rapid rate of mechanisation in the industry, has been that the problem of unemployment among the tea labourers has become acute. As the tempo of mechanisation increases, the demand for labour in the various fields of tea manufacturing is likely to decrease, giving rise to a persistent and increasing volume of unemployment in the tea industry.

In the post independence years there was a rapid growth of Trade Unions and they began espousing the cause of tea garden workers somewhat aggresively. Since the employers were already organised in the Indian Tea Association (ITA), Tea Association of India, Assam Tea Plantations' Association and United

Planters' Association of South India and other bodies, a new era of collective bargaining began in the tea industry in India. Trade unions have also come to play an important role in providing the labourers with some welfare amenities. So far as the impact of mechanisation on employment amongst the tea garden labourers is concerned, the role of the trade unions in tackling some of the adverse effects has become significant. The study analyses the problem of tea garden labour unemployment consequent on mechanisation and the role of trade unions in ameliorating its adverse economic consequences among the labourers.

In the context of our study, 'mechanisation' in tea industry implies the introduction of machine tools in the process of production of tea which replace to an extent the large scale deployment of human labour in the production process.

The concept represents the extension of man's physical efficiency through the substitution of machine energy for human energy.

Mechanisation is related with technological progress. In one sense, technological progress refers to the introduction of new or improved processes, which require fewer or cheaper inputs per unit of output. Mechanisation and automation are sometimes equated with technological progress, the former represents the extension of man's physical efficiency through the substitution of machine energy for human energy, while the

latter supplements his mental and sensory processes as well.[1]

Technological improvement has always been the means of replacing manual labour with machine labour. By accelerating the speed of processing and achieving greater accuracy machinery reduces the time spent on producing things and considerably facilitates the work of the labourer. Besides mechanisation increases the efficiency of labour and raises the production per worker. By its nature it reduces the quantum of labour required to produce a unit of output.

In the early days of Tea manufacturing in India, the leaf was withered in the sun, rolled by hand and dried by charcoal fire. Even as early as 1870 machines gradually began to help the manual methods previously used in tea manufacture. From 1945 onwards, the introduction of C.T.C. machine in tea manufacturing in Assam has brought about great changes over the 'old orthodox system' followed in India.

'Unemployment' is involuntary idleness due to lack of work.[2] 'Unemployed' refers to persons belonging to the labour force, not doing any work during a specified period but seeking work at that period.

In concept and terminology the widely accepted practice is to consider a person as unemployed if he is a member of the

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[1] D. Bhattacharyya - The role of Technological Progress in Indian Economic Development, World Press, Calcutta 1972, p. 2.

[2] Md. Masum - Unemployment and Underemployment in Agriculture B.R. Publishing Corporation - Delhi 1982, p. 3.

labour force, and if it is not unambigously clear who is or who is not in labour force, it will be equally unclear who is and who is not unemployed.[3] In a predominantly rural and largely non-monetised economy it is not possible to precisely identify who is and who is not in the labour force because of the difference in working age in different parts of the country, differences in the period of work, seasonal nature of the demand for labour, the large number of unpaid workers in household and family farmers etc. Further the distinction between members of the labour force and dependents cannot be clearly drawn especially when in many rural areas men, women and children above a fairly young age may all devote a part of their time to productive activities. Yet another difficulty with the concept of labour force is that the number of people wanting work may vary with the amount of work available, when jobs are scarce, 'discouraged workers' cease to bother to look for work when they think that there is no chance of finding any, and again begin to do so when chances improve. This leads to changes in the size of the labour force that is very hard to predict.

Raj Krishna[4] has conceptualised unemployment in terms of the criteria of time, income, willingness and productivity.

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[3] T. Mathew - Rural Development in India - New Delhi 1981, p. 10.

[4] Raj Krishna - Rural Unemployment - A survey of concepts and estimates for India. Delhi 1976, p. 18.

'Time criterion', would consider one as unemployed if "he is generally occupied during the year for a number of hours (or days) less than some normal or optimal hours (or days) defined as full employment hours or days" ; "income creterion", would have one as unemployed, if "he earns income per year less than some desirable minimum"; "willingness criterion" would have him in the ranks of the unemployed if "he is willing to do more work than he is doing at present - he may either be actively searching for more work or be available for more work if it is offered on terms to which he is accustomed"; and the "productivity criterion", would place him in the ranks if "he is removable from his present employment in the sense that his contribution to output is less than some normal productivity, and therefore his removal would not reduce output if the productivity of the remaining workers is normalised with minor changes in techniques and or organization".

In this study, the concept of unemployment that comes close to the analysis of the problem we have undertaken is one relating to time criterion. Owing to mechanisation, the number of workers who are "occupied during the year for a number of hours (or days) less than some normal or optimal hours (or days)" are on the increase. The casual labourers are employed not more than six months in a year.

The rate of growth of casual labour in the mechanised tea garden is likely to be higher than in the non-mechanised garden while that of the permanent labour force is likely to be lower

in the former than in the latter.

Tea as a non-alcoholic beverage is said to be one of the chief joys of life and no other drink except water is consumed by many and in so much quantity.

It is difficult to trace the exact period at which it was first used as a beverage. It is equally doubtful to say with reasonable accuracy when plant cultivation began in its original form.

Previously, tea was mainly cultivated in China. In 1823, wild tea plants were found in some parts of Assam. In 1839, the Bengal tea Company was formed in Calcutta with the object of purchasing East India Company's plantations in Assam for the purpose of developing tea plantation. In the same year, a company was formed in London with the same object and soon after, the two companies were amalgamated into the Assam Company. The 'Jorehaut Tea Company' was incorporated on June 29, 1859.

The success of these two companies led to a rapid expansion of tea cultivation. By 1860 there were more than fifty private companies engaged in the production of tea. At present there are more than 700 tea gardens in Assam alone.

After independence, the British companies sold their estates to Indian enterprenuers and shifted their activities in tea plantation to the East-African countries. Now, the world tea market is shared mainly between India, Srilanka and the East-African countries.

The tea industry workers in Assam are mostly immigrants from Bengal, Bihar, Orissa and Madhya Pradesh. Originally they were brought to Assam by middlemen called 'Arkatis' and 'Sardars'[5] on contract basis. At the expiry of the contract period, the 'Coolie'[6] was legaly free, but was repeatedly induced to re-engage himself. Thus having once come to a tea garden, there was practically no possibility for the labourer to return to his native place.

Wages were very low, and inspite of many legislations, the labourers' standard of living remained miserable. They depended on the planters for the necessities and amenities of life. The estate manager was the only authority for him to turn to, having every kind of right over him including the legal right to punish him.

However, over the years the conditions have greatly altered. Tea workers now constitute the newly class-conscious working class of Assam.

There are various trade unions like INTUC, CITU etc. under which the tea plantation workers are organised to safeguard their legitimate rights. At present Asom Chah Mazdoor Sangha (ACMS) which is affiliated to INTUC has the dominant role in

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[5] 'Arkatis' and 'Sardars' - who supplied labour to the garden acting as middlemen.

[6] Coolie - the term used for labour in the tea plantations.

case of trade union activities in Assam. Other trade unions affiliated to AITUC, CITU, are also active in the tea industry.

The workers in the tea estate are classified into different categories.

First is the category of permanent workers : A permanent worker is one who generally resides inside the tea estate in the housing colony established and owned by the estate and whose name is entered in the role of the estate workers. It usually includes any worker who has completed 6 months of work on probation in the estate.

An 'outside worker' is an estate labourer who generally resides outside the garden but whose name is entered in the estate roll. He is usually treated like a permanent worker.

A 'temporary worker' (generally called 'faltu'), is not a regular or permanent worker but is employed only temporarily. These workers are discharged whenever the work load diminishes. This category of workers are referred to in our study as 'casual labourer'.

Unemployment among the tea garden labour population is wide spread in Assam. The causes of unemployment are of various kinds. Our investigation is confined to the effect of mechanisation on employment.[7]

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[7] There have been various studies on the many aspects of tea industry in Assam, including that of the tea garden labourers, such as,

A. Guha - Planter Raj to Swaraj, ICHR New Delhi, 1977.

R.C. Awsthi - Economics of tea Industry of India, Gauhati 1975.

Sir Percival Griffiths - The History of Indian Tea Industry, London 1967 etc.

For the purpose of our study we have taken the two gardens of Sonabheel Bamgaon and Pavoi tea estates of the Sonitpur District of Assam. Sonitpur district has only been recently constituted (1983), earlier it was part of Darrang District. The new district covers an area of 52,352 square Kilometers and according to the 1971 census report, the total population of the district was 901,614.[8] There are 63 tea gardens in the district. Darrang district had 93 tea gardens before bifurcation.[9]

The district is in the middle of the Brahmaputra Valley. On the north of the district is Arunachal Pradesh and on the South, the mighty Brahmaputra river. Lakshimpur district is on its eastern side and Darrang district on the western. Sonitpur district comprises of two sub-divisions of Tezpur and Biswanath.

Sonabheel Bamgaon tea garden is situated in the Tezpur sub-division, while Pavoi tea garden is in the Biswanath sub-division. Sonabheel Bamgaon garden is about a distance of 10 Km. from Tezpur, the district Head Quarters. This garden is in the midst of the tea growing area. Fifteen medium and big-sized tea gardens are found around this garden in this area.

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[8]Due to disturbances in Assam, no census could be conducted in this state in 1981.

[9]1981 Tea Board report.

The Sonabheel Bamgaon T.E. has been constituted by the merger of Sonabheel and Bamgaon estates which were owned by Bazaloni Group. It was after the merger that the Sonabheel Bamgaon garden has become a big-sized one; comprising an area of 677.18 hectares, out of which, tea cultivation is in 550.25 hectares of land.

Pavoi tea estate is situated in the Biswanath subdivision. It is 12 Kilometers away from the sub-divisional head quarter of Biswanath sub-division, Biswanath Charali. The tea garden is owned by the Macllien and Magor Company. This is a 'sterling company' the head office of which is in London. The garden is near the border of Assam with Arunachal Pradesh. The total area of Pavoi tea garden is 697.34 hectares out of which 337.02 hectares are under tea plantation.

These two tea gardens selected for our study are situated in the middle of Assam Valley which is highly tea growing area. They are representative 'big gardens', according to the Tea Board of India classification.[10] Sonabheel Bamgaon consists of 677 hectares in area and Pavoi tea garden of 697 hectares. These two gardens are also representative tea gardens of Assam in respect of their activities - plantation, processing, manufacturing and marketing, the number of labourers employed, the nature and degree of mechanisation and the Trade Union activities, etc. A study of

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[10] Tea gardens consisting of less than 400 hectares of land are classified as small gardens whereas gardens consisting of more than 400 hectares of land are classified as big gardens".
Report of Expert Committee on Small Growers, Tea Board of India, August 1982, p. 10.

these two tea estates would enable us to have a fairly good and meaningful picture of the entire tea industry of the state.

Both primary and secondary data have been collected for the purpose of the study. For the collection of primary data we have used two different schedules - one for the tea garden management and the other for the workers.

In addition to collecting data relating to the management with the help of management schedules, filled up by the respective managements of the two tea gardens, we have also gathered relevant and important informations through personal interviews with the managements. For the information regarding labourers, detailed study of the selected households have been undertaken. In selecting households, we have adopted the systematic random sampling procedure. In Pavoi tea estate 63 out of 632 and in Sonabheel Bamgaon 74 out of 745 households have been selected and visited for detailed study.

The secondary sources of data have been the publication of the Tea Board of India, Department of Economics and Statistics, Assam, Assam Government Publications, Department of Income Tax, Assam, etc., INTUC offices, CITU Publications, etc.

We have divided our study into six chapters.

In the first chapter, we present the problem being studied, the background of tea industry, the nature of employment in tea gardens, the definition of concepts used in our study, and gardens

selected for study, have been discussed in this chapter.

In chapter IInd, we give a short over views of the tea industry in India, and in Assam in particular, including the present position of the industry in Assam. The IIIrd chapter deals with the methods of tea cultivation and manufacturing and the modern innovations introduced in the industry. In the Fourth chapter, we deal with the impact of mechanisation on aspects of the industry. A comparison of the two selected gardens in respect of the impact of mechanisation on employment has also been discussed in the chapter. The Fifth chapter deals with the role of trade unions in the industry and its various activities in providing welfare amenities to the garden labourers.

In the Final chapter we present the summary of our findings and the concluding observations on the problem of mechanisation and employment in the tea industry in Assam.

CHAPTER II

SOME ASPECTS OF TEA INDUSTRY IN ASSAM

The importance of tea as an international beverage assuming global dimensions belongs to the era of Western expansion in the East, after the 16th century. From about 1715 the East India Company took complete control of the tea export from China until 1833. In 1833, the Government of China refused to renew the agreement with the East-India Company which had earlier been given complete monopoly over the tea export from China.

Tea bushes were not new in Assam in the 1830, nor was drinking of tea a newly introduced practice in Assam. In fact, wild bushes of tea plants were found in the forest areas of Assam from very early times. In 1815 Britishers reported the discovery of tea bushes in the state. However, it was not until the Bruce brothers took the initiative to bring it to the notice of the Government of India that its cultivation was taken up on a systematic, large and commercial basis. Tea cultivation received an impetus after the report of the Wallich Committee in 1835.

Initially tea production was under Government auspices. But it was soon found that cost of production was very high and that to get labour for its cultivation was very difficult; so the estates were sold to private companies.

Many companies were formed in Calcutta and London in 1839, and in 1845 these companies were amalgamated into a single one

under the name of "The Assam Company". On June 29, 1858 "The Jorehaut Tea Company" was established. Owing to the enormous profits earned from tea plantation, many British and Indian enterpreneurs entered the business of tea plantation. But most of the big plantations were owned by the Britishers as the Government of India granted them various types of concessions. Thus the way for 'colloniisation' of Assam by the British started with the establishment and growth of tea plantations. And these plantation radically altered the whole socio-economic structure of Assam.

POSITION OF INDIA IN TEA PRODUCTION AND EXPORT

India is the largest tea producing country in the world. According to the Tea Board of India report 1981-82 following is the position of India in respect of tea production.[1]

In the international tea market, India is the largest exporting country. SriLanka and the East-African countries also export a large quantity of tea to the world market. But it is reported that the prospect of further increase of tea production in these countries is limited. So, India would remain the largest tea producing and exporting country in the world, and has the prospect of improving that status in the future. The following table shows the share of export of tea of different countries in the world market for the year 1978-81.

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[1]Under the Chairmanship of Dr. N. Wallich, the Botanist of Botanical Gardens of Calcutta.

[illegible]

TABLE NO. 1

Area, Production and Exports etc. of Indian Tea at a Glance

Area Under Tea	- 384,305 hectares.
No. of Estates	- 13,410
Total Production (1982)	- 565,40 million Kgs.
Value of Tea Crop (1982)	- 8116,46 million Rs.
Average yield per hectore	- 1,456 Kgs.
Estimated average daily No. of labour	- 846,659
Average Production per labour	- 673 Kgs.
Total Exports (1982)	- 189,333 Kgs. (excluding instant tea)
Value of Exports (1982)	- Rs.35,55,525
Internal consumption (1982)	- 378,031 Kgs.

Source- Tea Board Statistics, Tea Board of India 1982-83.

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TABLE NO. 2

Share of Export of Tea of Different Countries

(In Tons)

Country	1978	1979	1980	1981
India	1,76,051	1,99,639	2,24,000	2,45,594
SriLanka	1,92,553	1,47,453	1,94,593	1,49,708
East Africa	1,56,094	1,59,820	1,37,962	75,807

(Source - Tea Board Statistics Tea Board of India 1981-82)

It is seen that India's share in the world market is more than 30 per cent of the total export. And India has the capacity of producing more and superior quality tea in the future.

DISTRIBUTION OF OWNERSHIP

In the initial phase of the industry, it was exclusively British both in capital and enterprise. In 1840, two thirds of the Government experimental gardens were transferred to the Assam Company. They were exempted from rent and many incentives were granted to bring large areas of waste lands under plantation.[2] A set of rules were designed known as the "Waste land Rules" of 6 March 1838, which granted special facilities to the British enterprise.

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[2]A. Guha - Planter Raj to Swaraj - Indian Council of Historical Research, New Delhi 1977, p. 13.

So, a typical tea company in India was a 'sterling company' with its head office in London. Britain provided the biggest market for the produce. Until the beginning of the first World War, almost all the big tea estates were under the British companies. In the thirties Indian companies entered the industry and bought some tea estates from the British planters. Yet the majority of the companies remained with the British.

The following table shows the ownership distribution of tea estates between Indian and non-Indian planters over a period of four decades

TABLE NO. 3

Tea Crop under Indian and Non-Indian Control (In percentage)

Year	Indian	Non-Indian
1937	15.9	84.1
1948	23.7	76.3
1954	30.0	70.0
1969	41.6	58.4

(Source - S. Monoharan, Indian Tea a stretegy for development, S. Chand & Co., New Delhi. Page- 111).

After Independence many British companies sold their estates to Indian companies and shifted their plantation to the East-African countries like Kenya, Tanganiyika, Uganda, Malawi and elsewhere.

Tea industry is an important sources of Government revenue, contributing to the Government coffers by way of export and excise duties and sales taxes. Moreover, the clearing of jungle infested lands, the construction and financing of railways, roads, schools and hospitals, and the provision of wholesome drinking water have been some of the important contributions of the tea plantation industry to the economy of India and particularly of Assam. It also makes important contribution not only to national income, but also to employment, foreign exchange earnings, and tax revenues.

ASSAM : THE TEA PRODUCING STATE

Largest tea producing States of India are Assam and West Bengal in the North and Tamil Nadu and Kerala in the South. Punjab, U.P., Bihar, Tripura, Himachal Pradesh and Karnataka, also produce tea, but in negligible quantities. The North Indian region accounts for approximately 75 percent of India's tea area and production, while the remaining 25 percent is accounted for by the Southern region.[3]

The following is the state wise number of tea estates in India from 1951-1981.

TABLE NO. 4

Though the number of tea estates in Northern India is less in comparison to the South Indian States, the area of tea

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[3]R.C. Awasthi - Economics of Tea Industry of India, United Publishers, Gauhati 1975, p. 1.

TABLE NO. 4

No. of Estates in India

States	1951	1961	'71	'74	'75	'76	'77	'78	'79	'80	'81*
Assam	785	744	750	754	756	753	756	763	769	777	777
West Bengal	296	301	296	297	297	297	298	299	302	305	305
Tripura	55	55	53	54	54	56	56	56	57	57	57
Bihar	9	3	3	3	3	3	3	3	3	3	3
Uttar Pradesh	45	33	30	31	31	31	31	31	31	31	31
Himachal Pradesh	1,115	1,385	1,385	1,385	1,385	1,385	1,385	1,385	1,385	1,385	1,385
Manipur	-	-	-	-	-	-	-	-	1	1	1
Sikkim	-	-	-	-	-	-	-	1	1	1	1
Arunachal Pradesh	-	-	-7	-	-	-	-	-	-	-1	1
TOTAL NORTH INDIA	2,305	2,521	2,517	2,524	2,526	2,525	2,529	2,538	2,549	2,561	2,561
Tamil Nadu	2,772	4,059	6,450	6,535	6,520	6,521	6,561	6,611	6,642	6,704	6,725
Kerala	1,125	1,976	3,032	4,173	4,203	4,105	4,124	4,093	4,099	4,110	4,109
Karnataka	12	13	16	15	15	15	15	15	15	15	15
TOTAL SOUTH INDIA	3,909	6,978	9,498	10,723	10,738	10641	10700	10719	10,751	10,829	10,849
TOTAL IN INDIA	6,214	9,499	12051	13,247	13,264	13166	13229	13257	13300	13,390	13,410

* Provisional.

(Source : Tea Statistics - 1981-82 - Tea Board of India).

TABLE NO. 5

State wise Area of plantation, production and labour employment

State	Area in Hectares	%	Production (000 Kg.)	%	Labour employed (Average Daily)	%
Assam	1,82,325	51.14	2,23,665	51.36	3,97,370	51.84
West Bengal	88,499	24.82	1,04,087	23.91	1,98,074	25.84
Tamil Nadu	34,646	9.72	57,531	13.21	75,721	9.88
Kerala	37,271	10.45	42,729	9.81	72,745	9.49
Other States	13,775	3.87	7,456	1.71	22,683	2.95
All India	3,56,516	100.00	4,35,468	100.00	7,66,593	100.00

(Source : Bulletin of Agricultural Economics & Statistics, F.A.O., March, 1975 Vide - N.Saha and P.D. Saikia - article-Tea Industry in Assam.

An Assessment - Published in Problems of tea industry in Northeast India North East India Council for Social Science Research, February, 1981). Page-14.

plantation of North Indian States comprises more than 75% of the total area of tea plantation in India

The following table shows the state wise area of plantation quantities of production and the average number of labour employed in 1971.

TABLE NO. 5

Tea plantation and manufacturing is a major industry of Assam. In India, Assam has the largest area under plantation and highest number of employment. The above table indicates this position.

Tea is cultivated in all the eight original plains districts of Assam.[4] The district of Lakhimpur (now bifurcated into Lakhimpur and Dibrugarh districts) used to lead in respect of both area and production of tea. With the bifurcation of the district, Sibsagar now leads in respect of both area and production (this district has also been bifureated into Sibsagar and Jorhat districts). Although Cachar district comes next to it in area, it lags behind in production to Darrang District (now bifurcated into Darrang and Sonitpur districts). Nowgong and Goalpara are less important both in area and production. The following table shows the district wise number of estates, area under plantation and production of tea during the year 1980.

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[4]Now most of the districts have been sub-divided.

TABLE NO. 6

District wise area of Plantation, Production and Number of Estates

Districts	No. of estates	Area in Hectare	Production in '000 kg
Darrang (now Darrang & Sonitpur)	93	34,798	62,701
Goalpara	13	2,486	3,885
Kamrup	15	3,122	4,498
Dibrugarh & Lakhimpur	250	63,165	1,16,460
Nowgong	23	7,004	9,274
Sibsagar and Karbi Anglong & N.C. Hills	268	57,823	72,422
Cachar	115	32,171	31,451
Total :	777	2,00,569	3,00,700

(Source : Tea Statistics - Tea Board, Calcutta, 1982-83)

CONTRIBUTION OF TEA TO THE ECONOMY OF THE STATE

The contribution of tea industry to the economy of Assam is quite significant. It has been estimated by the State Directorate of Economics and Statistics that tea industry contributed about 19.7% of the state income valued at current prices in 1950-51. This came down to about 11% in 1970-71 though in physical terms, the quantum of production of the tea industry has nearly doubled. The contribution of tea industry

to the state income of Assam is given in the following table.

TABLE NO. 7

Contribution of Tea Industry to the State Income of Assam (at current prices) (Rs. in crores)

Year	Cultivation	Processing	Total
1950-51	28.0(11.8)	18.6(7.9)	46.6(19.7)
1960-61	33.7(10.0)	22.4(6.7)	56.1(16.7)
1970-71	51.7(6.8)	34.5(4.6)	86.2(11.4)
1972-73	67.0(7.7)	44.6(5.1)	111.6(12.8)

Note:- Figures in brackets indicate % of the total state income of the year.

(Source- Economic Survey 1973-74, Department of Economics and Statistics, Assam).

A sizeable amount of the state income comes from the tea industry in the form of taxes and duties and other levies imposed on the industry. The State Government levies Agricultural Income tax on 60 percent of the total income of the plantations while on the remaining 40 percent, the Central Government levies income tax and supper tax.

The amount of Agricultural Income Tax received by the State Government are given below-

The other tax revenues which the State Government received from this industry are land duty, professional tax, factory licence fee on tea production and manufacture, and sales tax

on the tea sold in the local market.

TABLE NO. 8

Agricultural Income Tax Collected by the Assam Government

Year	(Rs. Crores)
1971-72	2.73
1975-76	12.94
1976-77	17.49
1977-78	32.42
1978-79	35.04
1979-80	17.53
1980-81	15.60
1981-82	14.64
1982-83	8.00
1983-84 (Provisional)	11.09

(Source- Commissioner of Taxes, Assam 1983-84)

TEA INDUSTRY AS A SOURCE OF EMPLOYMENT IN ASSAM

According to Tea Board of India, the State of Assam alone employs near about 4.5 lakhs workers in tea industry both in the field and in the factories. Besides male and female members of the family, children above the age of 12 years are also employed. The following table shows the number of labour employed in Assam in tea industry.

TABLE NO. 9

Labour Employed in Tea Industry in Assam, from 1954-1980-81

Year		No. of labour employed
1954	..	5,09,157
1960	..	4,53,761
1963	..	4,55,007
1966	..	4,21,861
1971	..	3,97,370
1972	..	4,95,316
1973	..	3,98,723
1974	..	4,01,129
1975	..	4,02,195
1976	..	4,03,660
1977	..	4,10,676
1978	..	4,02,633
1979	..	4,44,039
1980-81	..	4,46,773

(Source- Tea Statistics, Tea Board of India, 1981-82)

CONTRIBUTION OF TEA IN OTHER FIELDS

The tea industry also contributes to the economy of Assam in other ways. For instance, the expansion of plywood industry in Assam, a major industry which produces a large amount of tea chest plywood, has been greatly facilitated by the industry. Also fertiliser which is needed for tea plantation : thus the

tea industry has had a great influence in the expansion of many sectors of industry in Assam.

The tea industry has also been instrumental in clearing and developing jungles and forests which were converted into tea gardens. Soil conservation has also been facilitated in that the trees which are grown for shading prevents soil erosion.

The industry has been the main factor for the improvement of the means of communication in several areas of the State. The most important are the Assam Trunk roads built on both banks of the Brahmaputra, the railways built to carry tea from different parts of the State to Calcutta, and the steamghats which developed for the same purpose.

Besides all these, the development of trade and commerce in the region alongwith the tea industry has been another consequence of the growth of tea industry. Shops which are known as 'Keya gola'[5] were opened in all the tea gardens. Weekly markets also developed near the tea estates.

The tea industry has thus been instrumental in an all-round development of the economy of Assam.

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[5] 'Keya gola' - Shops owned by a Marwariman.

LABOUR UNIONS IN THE TEA INDUSTRY

With the development of tea industry there occured also the rise of trade union activities in Assam. Various Trade Unions like INTUC, AITUC, CITU etc.[6] began their activities in the state to protect and promote the tea plantation workers' legitimate rights. At present ACMS (Assam Chah Mazdoor Sangha) which is affiliated to INTUC and which is the only recognised trade union by the Indian Tea Association, has the dominate role in the Assam plantations. Yet the activities of the other trade unions like AITUC, CITU etc. cannot be minimised.

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[6]INTUC - Indian National Trade Union Congress.
AITUC - All India Trade Union Congress.
CITU - Centre of Indian Trade Union.

CHAPTER III

MECHANISATION IN TEA INDUSTRY

Cultivation and Manufacture of Tea :

Until about 1861 the Indian tea industry had been developed on sound and steady lines by men who were as much interested in its long-term progress as in its immediate prosperity. By 1860, the Assam Company had become prosperous, the Jorehaut Company had paid dividends right from its inception and a number of individual owners had also made good profits. All these successes attracted people from different occupations as well as some retired servants of the East-India Company and some government officials to enter the industry as planters. But many of them did not know much about tea cultivation.

"Tea companies, with or without tea lands, sprang up overnight, shares rose to fantastic heights; lands were cleared without any consideration of their suitability or the availability of labour and highly placed civil servants threw up their posts to become planters".[1]

This 'mad rush' to the tea industry brought about a crisis in it. A few of the causes of the crisis were.

(1) the lack of restraint on the part of Government in granting land

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[1] Sir Percivel Griffiths - The History of Indian Tea Industry, London, 1967. Page 97.

(2) the shortage of labour and the expansion of the industry regardless of this factor;

(3) the lack of experience of many proprietors regarding both cultivation and manufacture;

(4) insistence of many proprietors on quantity at the expense of quality and

(5) the food shortage due to the Bengal famine of the 1860 s and the burden placed on the proprietors of supplying rice and other food-stuffs at concession rates far below actual costs to the labourers.

The crisis demonstrated the need for efficient management and the companies which survived tightened up supervision of their estates and took measures to rectify the shortcomings.

Machinery for rolling was still used only by a few pioneers. Manufacturing was still primitive-rolling was done by hand, ideas about fermenting were vague, and firing was still done over charcoal fires. Therefore, ideas about introducing new machineries and newer methods of cultivation was greatly sought after.

The industry began to do better from 1894 onwards, dividends were higher than at any time since the slump of the sixties. And in the years following this period the seasons were good and the profits were satisfactory. Exports to North America increased and the re-export trade from United Kingdom grew rapidly. From this period onwards, the industry has been steadily improving.

At present it has to compete with several countries in the world market, and as the consumption of and demand for tea are increasing around the whole world and especially so in the domestic market, the actual tea production and sale are also increasing.

Cultivation and Manufacturing of Tea :

Different stages followed in the cultivation and manufacturing of tea are the following :

A. Cultivation

(a) Location of gardens.

(b) Layout.

(c) Seed supply.

(d) Vegetative propagation.

(e) Cultivation.

(f) Pruning.

(g) Fertilizers.

(h) Shade trees.

(i) Plucking.

(j) Pests and diseases.

(k) The life of the tea bushes and replantation

(l) Drainage and Irrigation and

(m) Weeding.

B. Manufacture

(a) Transport of tea leaves to the factory.

(b) Withering.

(c) Spreading.

(d) Rolling.

(e) Fermenting.

(f) Firing or drying.

(g) Sifting or sorting and grading and

(h) Packing.

We examine below briefly the above mentioned methods of cultivation and manufacture of tea.

A. Cultivation.

(a) Location of Gardens - It was believed earlier that tea should be planted on slopes, because it was thought that the plant would not thrive in stagnant water. However, later it was realized that it was not necessary to plant it on slopes. The important factor for the location of a tea garden is the climatic condition. It determines the variety of tea that can be grown to the best advantage. Climate affects crop distribution, quality and flavour and also influences the time of maximum seed fall. The relevant climatic conditions are (i) rainfall, (ii) soil, and (iii) sunshine.

It is estimated that the average rainfall required for proper tea cultivation is about 60 inches (152.40 Centimeters) although 80 inches (193.20 Centimeters) of rainfall is preferable. There is a direct correlation between the variations in the absolute humidity during the season and the tea crop.

Sunshine is another important climatic factor, as it controls not only the air temperature but also affects the incidence of some pests and blights.

Soil is also a main factor which influence the cultivation of tea. Toklai[2] Scientists, after a careful study of the chemical constitution of tea soils established the fact that an undue percentage of lime is harmful to tea. Their first conclusion was that tea needed an acid soil, but according to Harler[3] neutral soils in Assam, South India, the Dooars and Eastern Africa were occasionally found to grow good tea.

The Brahmaputra Valley of Assam is considered as the most suitable area in the World for producing tea both on account of climatic conditions and the fertility of the soil of the region.

(b) Layout - The next step in the establishment of a tea garden is drainage and its orderly lay-out in sections. The pattern of planting has varied from time to time and from garden to garden. The system of planting depends mostly on the configuration of the land. It is planted at an interval of 4' to 4½' either in a line at 90° or at 60° to the base line. These two different systems are known as square and traingular

[2]Toklai situated in Upper Assam (Jorhat) in 1911, is the biggest research station on tea in the world.

[3]C.R. Harler, The Culture and Marketing of Tea, 3rd ed. London 1964, p. 126.

plantations respectively. Another method which is being introduced recently is "Hedge Planting" where linear interval is 4' to 5' and lateral interval is 2' to 3'. For the success of the plant, tea should be planted with care and refinement of a horticultural operation. The quality of work done at the initial planting operations can determine the development of tea bush throughout its economic life.

(c) Seed and Clone Supply - The development of the technique of seed growing has great importance in tea planting. One of the difficulties of the early planters was to obtain adequate supplies of tea seed. Now a days although many gardens in North East-India grow a great part of their own seed, but obtain the rest of their requirements from the specialist tea seed gardens.

The basic difference between clone and seed is one of adaptibility. Seeds are composed of a large number of genetically distinct units and are elastic and can be suited into a wide range of environmental and cultural conditions. On the other hand, thousands of bushes of clone seperated widely in space and time behave in most ways as a single bush. Lack of elasticity of clones makes it more selective to environment and cultural treatments.

(d) Vegetative Propagation - In general the individual tea bush is not self-fertile, but the flowers must be fertilized by pollen from another bush. Consequently the seed obtained in the

normal way is the result of cross-fertilization and the characteristics of the progeny therefore vary considerably. To meet this difficulty the technique of vegetative propagation is very much necessary.

(e) Cultivation or Planting - Cultivation means keeping the ground under the bushes free from weeds or vegetation which might harm or weaken them. Practice in this department of tea industry has changed considerably in the present century.

(f) Pruning - Pruning is a very necessary operation in tea cultivation.

The objects of pruning are -

(1) to change the form which the plant takes and turn it into a bush instead of a tree, (2) to encourage the bush to produce leaves rather than wood and (3) to cause it to spread into a ramification of twigs giving a large area from which leaf can be plucked, but not so dense as to obstruct the passage of light which is essential to the healthy life of the plant. The permanent operation for these purposes is pruning.

(g) Fertilizing - The object of manuring and fertilizing is that without detriment to the plant, to maintain in the soil a sufficiency of materials necessary to maintain the growth required to produce a certain level of crop. By continuous manuring, the yield can be increased to the optimum level

(h) Shade Trees - The planting of the tea is closely associated with the growth of shade trees amongst the tea plants. The method is still the subject of controversy. In general, most planters and scientists would accept the need for shade for tea in North-East India while recognising the need for a better understanding of its direct effects on the tea bush, its effects on the soil and on the atmosphere immediately round the bush.

(i) Plucking - The harvesting of tea leaves from the bushes in the tea plantation is called plucking. It is an important operation because the quality of manufactured tea very much depends upon the care and attention with which plucking is done.

In plucking, modern practice is very different from that of the first generation of planters. In India plucking is done by hand. Women are mostly employed in this operation due to their smooth plucking without injuring the plant. The young freshly sprouted leaves are plucked, the accepted formula for normal plucking being, "<u>two leaves and a bud</u>". The plucker at the same time must leave some active new leaves to enable the plants to synthesise the substance necessary for developing it. Much importance is now attached to a regular plucking round and at any rate in Assam a seven-day round is regarded as the norm.

(j) Pests and Diseases - The tea bush is subject to attack by many insects, pests and fungus diseases. The danger of disease is further aggravated by the fact that an epidemic out break of disease affects very large areas in a comparatively short time.

It is not possible in a non-technical work to describe the effective pesticides, fungicides, and sprayers, with which the modern planter is equipped to deal with the pests and blights. It need only be said that the need to find remedies for these afflictions was one of the factors which led to systematic scientific research in the industry.

(k) The Life of the Tea Bushes and Replantation - The old aged plants are to be replaced with new one because the aged bushes yield inferior quality of tea.

(l) Drainage and Irrigation - Good drainage is very essential in the tea garden. Stagnation of water at the roots of the plant is very injurious. The primary object of drainage operations is to maintain the soil at its optimum water content for as long a period as possible.

(m) Weeding - Weeding in the plantation is very essential. The plants must be kept free from weeds which might harm or weaken them. Therefore, regular weeding is very essential for the health of the tea plant.

B. Manufacture

(a) Transportation of Tea Leaf into the Factory - The first phase of manufacture starts with the transportation of the leaves to the factory. After the tea leaf is plucked, it is collected into large buskets and when it is heaped into busket it tends to get hot and turn red. The leaf is weighed and buskets of leaf are sent to the factory as soon as possible.

(b) Withering - Withering is regarded as the most important stage of manufacturing. It involves the exposure of the leaf to air for a considerable period, during which both physical and chemical changes take place. The physical changes are relatively simple. Even on a dry day, about seventy five percent of the leaf by weight consists of water, and unless this quantity is reduced the ensuing processes could not be properly effected. In addition to loss of water certain chemical changes takes place during withering. After withering the leaf becomes placid so it can easily be rolled.

(c) Spreading - Immediately on receiving the leaves at the factory, spreading is started without delay. During spreading the leaf should not be left in heaps. Spreading is finally evened up by judicious tapping under the hessian and by gently knocking over any leaf which is collected in heaps. Leaves from different fields are spread seperately so that withering and manufacturing can be simplified.

(d) Rolling - Rolling process breaks down the leaf cells and releases the juices and enzymes contained in them. As soon as the cells are reptured the enzymes or ferments in the leaf come in contact with oxygen of the air oxidization necessary for the substances responsible for flavour, aroma etc. takes place.

(e) Fermentation - After the tea leaf is crashed and bruished in the rollers, fermentation commenses where certain chemical substances in the leaf become oxidised through the action of an enzyme, also present in the leaf, and thereby transformed into tannis. In some ways, this is the most critical of all the processes of manufacture. High humidity without excessive temperature is necessary for its satisfactory operation. The value of the tea depends to some extent on the proportions in which these various tannis are present and this in turn is partly determined by the conditions of fermenting.

(f) Firing or Drying - After fermentation the tea has to be fired. The primary object of firing tea is to quest fermentation. A subsidiary object is dehydration of the leaf, the moisture content of which is reduced to perhaps two or three percent.

(g) Sifting or Sorting and Grading - The long fine mixture is thus sorted out and while sifting it is ensured that the fluff and dust from sifters do not find their way into their way into their parts of the factory.

The grading of tea has reference only to the size and appearance of the processed leaf and not the quality or flavour. The two main classifications in grading are leaf grades and broken grades.

(h) Packing and Marketing - After grading the tea is packed in plywood boxes and despatched for marketing. After the grading it should not be kept without being packed for any length of time.

C. Mechanisation.

(a) Technical Development in Agriculture - The process involved in the cultivation of the tea bush do not differ greatly from those applied in other forms of agriculture and the technical developments in the field have, therefore, not been as spectacular as those in the factory. Nevertheless, considerable changes of practice have resulted from the accumulation of knowledge regarding one of the stages of agriculture like, for example, site selection and clearance, production of seed, the establishment of nurseries or the use of vegatative propagation, weeding and hoeing, the use of shade, the application of blights and pests and irrigation etc.

Stress has been given on the selection of the suitable location of the garden, need for suitable land is regarded now a days as the basic criteria for tea cultivation.

Importance has been given to the soil chemistry. Planters have developed a good deal of empirical knowledge on this subject.

In this regard, Tocklai scientists have made careful study of the chemical constitution of tea soil and have been able to contribute a lot for the development of this aspect of cultivation.

In case of tilling the land for tea cultivation, tractors are used intensively replacing primitive methods of ploughing. Previously weeding was done by manual labour which is now being replaced by use of medicine, and automatic irrigation system has been introduced replacing spraying by labour.

A two stroke engine operated plucking aid along with a battery operated Japanese plucking aid received earlier have tried out at Tocklai experimental plots. Due to various difficulties like inexperienced workers and frequent interruptions, the experiment could not be conducted properly. It is presumed that the system might be tried again and if this sort of plucking aid will be introduced in near future in Assam, a considerable amount of cultivation cost would be reduced, as also a certain number of labour.

It is expected that increased production can be achieved by obtaining substantially increased yield per unit of land from the existing tea areas. Better yields from existing tea areas can be obtained by the use of better methods of cultivation and management. Advanced researches in this respect are constantly being made and some spectacular improvement has been witnessed. In the various operations of cultivation of tea technological innovations are being rapidly increased.

(b) Modern Innovation in Tea Manufacture

With the past few years showing a massive escalation in costs of production, a certain section of the tea industry is pressing hard for mechanisation. It is hoped that mechanisation will bring down cost per unit.

Tea is a food product, so automation becomes a must and it can be achieved to a large extent.

Orthodox tea manufacture in India today generally involves some processes used by the Chinese tea makers. The development of new methods of manufacture began in the late Sixties of the Nineteenth century; was rapid in the Seventies and Eighties, and it was substantially complete by the end of the Nineteenth century.

The most common methods of tea manufacture are orthodox and C.T.C. systems. The production of C.T.C. has been increasing in India. The production figures for North-India under different methods are given below for the period 1961 to 1980.

The table shows that the manufacture of C.T.C. tea is gradually increasing while quantity of manufacture of orthodox tea remains more or less stable.

The methods applied for the manufacture of orthodox tea is more or less primitive in nature, whereas manufacture of C.T.C. tea requires more of modern technology.

TABLE NO. 10

Production of Tea in North India By Different Methods of Manufacture

(Quantity in million Kgs)

Year	C.T.C. Quantity	Percentage	Orthodox Quantity	Percent	Leg-cut Quantity	Percent	Green Tea Quantity	Perc.	TOTAL Qunty.	Perc.
1961	117.6	43.2	125.2	46.0	24.6	9.1	4.7	1.7	272.1	100.0
1969	195.2	65.8	79.0	26.6	15.0	5.1	7.4	2.5	296.6	100.0
1971	210.2	63.4	103.5	31.2	11.3	3.6	6.4	2.0	331.4	100.0
1973	254.3	69.3	102.5	27.4	1.5	0.4	8.7	2.4	367.0	100.0
1974	277.1	71.3	105.8	27.1	0.6	0.2	5.4	1.4	388.4	100.0
1975	241.3	63.6	131.0	34.5	0.6	0.2	6.3	1.7	379.2	100.0
1976	267.0	66.9	125.4	31.5	0.5	0.1	4.7	1.6	426.9	100.0
1977	300.0	70.4	121.6	28.5	-	-	7.3	1.1	432.7	100.0
1979	324.5	75.0	100.9	23.3	-	-	5.5	1.7	403.9	100.0
1980	298.8	75.5	93.6	23.2	-	-	7.2	1.3	638.5	100.0

(Source : Tea Board Statistics, Tea Board of India, 1981-82)

Following is the table showing of production of tea in India by orthodox and C.T.C. methods of manufacture.

TABLE NO. 11

Production of Tea in India by Orthodox and C.T.C. Methods of Manufacture (Quantity in Million Kgs.)

Year	C.T.C.		Orthodox	
	Quantity	Percent	Quantity	Percent
1961	120.9	34.2	201.4	57.0
1969	217.5	55.5	150.8	38.4
1971	239.1	55.0	174.9	40.3
1973	289.1	61.4	169.6	36.0
1974	312.3	64.0	167.9	34.4
1975	280.2	57.7	197.5	40.7
1976	312.2	61.2	191.1	37.4
1977	349.1	62.8	201.4	36.3
1979	381.9	67.8	173.9	30.9
1980	369.3	67.9	168.4	31.0

Source - Tea Board Statistics, Tea Board of India,1981-82.

From the all India figure it is also seen that the production of tea by C.T.C. manufacturing method is gradually increasing while production of tea by orthodox method remains more or less stable.

Scientific Research :

The History of scientific research in the tea industry in North-East India falls into three phases, the first of which

the foundations were laid by Kelway Bamber, Watt and Mann. The second period, which may be said to have begun in 1919, experimented into particular problems and Carpenter must be regarded as the central figure in it. The third phase, which began in 1936, was associated with the name of Sir Frank Engledow, under whose chairmanship the commission of 1936 first planned the work of Tocklai on a systematic and long-term basis.

The rapid development of the industry which followed the restoration of confidence was greatly assisted by improvements in the methods of manufacturing tea and the adoption of the mechanical means in replacement of manual labour.

Towards the end of the 19th century the industry felt the need for scientific research. One of the progressive planters A.F. Dowling of the Kornaphuli Association wrote as follows.[4]

"There is scarcely an industry of importance which does not call in the aid of the analytical chemist. There are laboratories in most smelting, dyeing, bleaching, mining large works, but Tea ignores the chemist entirely, and yet manufactures an article which depends, perhaps more than any other on quality ...."

In 1900 the Indian Tea Association took the initial help by appointing a scientific officer to work in the laboratory

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[4]P. Griffith - The History of Indian Tea Industry, London 1967. Page-97.

of the Indian museum in Calcutta. A research station was opened in Upper Assam and the same was shifted to Tocklai in 1911. The research was started on all branches of tea cultivation and manufacture. The Tocklai Research Station is still the biggest research station on tea in the whole world.

Work at Tocklai has been expanded considerably great progress has been made in the chemistry of made tea and engineering developments have been remarkable. Steps have in fact been taken which is going to revolutionize the technique and economy of the industry.

Improvements in the Methods of Manufacturing :

Previously in case of tea manufacturing in India, the leaf was withered in the sun, rolled by hand and dried by charcoal fire. From 1870 onwards machines gradually supplemented the manual methods previously used. By doing so, the cost of production was substantially reduced. The two outstanding advances in the process of manufacture were the introduction of mechanical roller in 1872 which was invented by William Jackson and the introduction of sirocco dryer which was invented by Sir Samuel Davidson in 1877. Mechanical packers were also introduced almost at the same period. The introduction of C.T.C. machine in 20th century has been an unique achievements where a new system of tea manufacturing has been evolved over the old Orthodox system in India. In 1932, W.Ackercher invented the crushing, tearing and curling (C.T.C.) machine, which consists of two

engraved metal rollers working like a mangle. If the machine is employed on the course leaf for about ninety minutes after the start of the normal rolling, a strong coloury liquor is obtained.

The technology which has come to India from Sri Lanka only recently is the developed Fluid bed drier. The machine, developed by TRI, Sri Lanka in the early 70's is a very simple, high output, maintanance free unit and fuel cost is halved by its use.

During the last few years, some new technology has been introduced in India, namely, Fluidised Bed dryers, Continuous Tea Rollers, Induced Draft venturing withering system (Supersomic) and Coal stockers underfed and Chain Grate type. Rolling and Drying work is done on existing tea machinery by the various tea machinery manufacturers. In the field of full efficiency the introduction of coal is significant. Also with more and more estates switiching to coal firing from oil firing and then introduction of electric power, the cost to the tea industry will come down substantially. All manufacture heaters are doing some Rolling and Drying to make the equipment more fuel efficient. The economiser which is a result of recent R & D for the Heaters is definitely a fuel saver.

Another recent aid to the mechanisation is the Green Leaf processing machine. For transportation automobiles are extensively used replacing manual labour.

The C.T.C. is widely used in India since 1945. Most of the western countries prefer C.T.C. tea to orthodox tea till 1960. But it is seen that most of the countries prefer Orthodox tea; that is why Orthodox tea is also produced in India in large quantity. The above two tables, table No. 10 and table No. 11 shows the amount of production of tea in India by these two different methods of manufacture.

Withering methods developed after the second World War. The tunnel withering system developed by Tocklai and Trough-withering on which the Tocklai experts tended to frown, but which has been adopted by a number of progressive companies.

Now a days withers may be divided into three types according to moisture removes from the leaf. They are -

(a) Light or Soft withers

(b) Medium withers

(c) Hard withers.

In case of manufacturing Orthodox tea, the recently developed B.C.R (Baruah continuous Roller) is used and it has been an instant success. This one machine replaces four conventional rollers, gives continuous process as against batch processing, consumes only 25 per cent of the power and saves space when compared to the conventional orthodox roller.

One machine known as L.T.P. (Lowrie Tea Process) has many advantages over the C.T.C. machines, one L.T.P. is equivalent

to three C.T.C.'s in giving the required size of grain, it has slightly better or matching output, it is space saving, it is easier to clean and maintain, it involves less recurring expenses, it drastically reduces resharpening cost and, it eleminates use of steel cutters or segments. But it is yet to be introduced in India.

There is a considerable choice of machinery for tea manufacture in the market at present single and double action type of rolling tables are available in different sizes. The latest types are the 'High Efficiency' machines, the 'senior' O.C.B. and 'Mark II Rigid Rapid'. The 46" High Efficiency rollers and 46½" Senior O.C.B. take charge upto 4 tons of leaf.

In case of sifting, the feat type has many advantages over rotary system of Kutcha sifting. Machinery manufacturers in India have evolved a very good sifter - the balanced green leaf sifter.

The old type of drier was used for first firing which was 4 feet and 6 feet sizes. The tallest models 'Quality' driers, are reported to be excellent machines with many improvements on the older machines, such as economy in fuel consumption, automatic removal of the tea which drops the bottom of the machines, and also greater air space per unit area of tray.

The fact revealed from the above discussions is that, there is over all improvements in the methods of tea cultivation and

manufacturing. Innovation and introduction of new machines and equipments ensures more production economizing time, energy and money. Manual labour is being replaced by sophisticated machines - decreasing considerable number of employment in the industry.

CHAPTER IV

IMPACT OF MECHANISATION

Mechanisation is a labour saving device. It also helps to increase the rapidity and speed of work, therby leading to greater efficiency and lower costs. Thus a garden which has mechanised its operations has a greater chance of, economizing time, energy and money, than one which has not mechanised.

Labour saving devices in tea industry have been used fairly extensively in the larger units of the processing factory. It has also been used in those sectors dealing with rolling, cutting and drying processes in tea manufacture. The scope for mechanisation is admittedly greater in factory operations than in field operations. According to Harler,[1] a thousand acre estate producing on the average 1,200 lbs (544.217 kgs) of tea per acre requires 1,500 workers of whom only about 150 are employed in the plantation factories and the rest in outside work.

In the two gardens Sonabheel Bamgaon and Pavoi tea estates selected for our study, we find the following features.

Out of the total of 677.18 hectares of land of Sonabheel Bamgaon tea estate, 550.25 hectares are used for tea plantation,

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[1] C.R. Harler, The Culture and Marketing of Tea, London, 1958. p. 64.

91.54 hectares for nursery and the remaining 35.39 hectares for factory premises, and staff and labour quarters and a small portion of the total is left as fallow land.

Pavoi tea garden with a total of 697.36 hectares uses only 337.02 hectares of land for tea plantation. In Table 7 below we show the land utilisation pattern in Pavoi tea garden.

TABLE NO. X

Distribution of Land Utilisation (Pavoi T.E.)

(in hectares)

Total land Holding	Tea plantation area	Land used for factory, staff houses, Hospital, Bunglow etc.	Rice Cultivation	Nursery	Fallow and Rehalitation area
697.36	347.02	112.32	115.69	3.50	117.85

Source : Primarily collected from the garden

A sizeable portion of the land of the Pavoi tea garden is not fit for tea cultivation as it is low land where water stagnation is found for most part of the year. Such land is not suitable for tea cultivation which does not require damp low land. Therefore, this part of the estate is distributed amongst the tea garden labourers for rice cultivation for which the garden management receives an amount as rent. Fallow

TABLE NO. 12

Population, family size, employment, unemployment and their percentages and average per capita income etc.

Persons not included in the labour force (Children & Old aged persons)	Total Population	Average family size	No. of households selected for survey	No. of literate persons	No. of Employed persons			No. of unemployed persons			Percentage of employment	Percentage of unemployment	Average monthly per capita income
					literate	illiterate	Total	literate	illiterate	Total			
110	501	6.77	74	142	26	115	141	76	174	250	36.06%	63.93%	Rs.112.40
85	338	5.36	63	51	21	91	112	30	91	121	48.06%	51.93%	Rs. 83.87

Source : Primarily collected during the course of investigation.

TABLE NO. 13

Production figures of Pavoi T.E. from 1975-76 to 1984-85.

Year	Quantity of Production in kgs.
1975-76	522567
1976-77	532856
1977-78	538361
1978-79	542151
1979-80	548367
1980-81	551879
1981-82	552569
1982-83	556769
1983-84	561302
1984-85	621912 (estimated production) 6,15000 kgs.

Source : Primarily collected from the garden.

land measures 117.85 hectares at present, which the management proposes to bring under tea plantation in the near future.

We discuss below the impacts of mechanisation on various sectors of the tea industry in the two gardens of our study.

TABLE NO. 12

(i) Impact on Production and Productivity :

In Pavoi tea garden mechanisation was introduced from 1983.

TABLE NO. 13

It is seen from the above table (No. 13) that in Pavoi garden, the production figures for the years 1975-76 to 1983-84, do not show any spectacular increase in the quantity of tea produced. The rate of increase of tea production per year is negligible during those years. But the production figure for the year 1984-85 shows a spectacular increase in the quantity produced in comparison to the previous years. This sudden increase in the quantity produced can be ascribed to the introduction of mechanical devices in the production processes in 1983.

The productivity per worker during the five years 1980-81 to 1984-85 is found to be of the order of 594 kgs, 595 kgs, 597 kgs, 601 kgs and 628 kgs respectively. The productivity for 1984-85 shows a substantial increase in comparison to the other years. This increase is also to be

explained in terms of the impact of mechanisation on production and productivity.

Sonabheel Bamgaon tea garden is highly mechanised, especially in the manufacturing process. Modern machines have been extensively used during the last four years in its factory. In the plantation operations also, it is experimenting with the use of modern mechanical methods. Thus the new plucking device has experimentally been used in this garden. One would expect that the impact of mechanisation on various sectors of the industry in this garden would be significant.

Mechanisation, of this garden began in 1969, but the process was accelerated from 1981 onwards. The production figures of the Sonabheel Bamgaon tea garden for ten years are given below,(Table No. 14).

The production figures for the years 1982, 1983 and 1984 show a comparatively high rate of increase. This may be because of the introduction of extensive mechanisation in the factory since 1981. The productivity per worker is seen to be 568 kgs, 573 kgs. and 620 kgs. for the years 1982, 1983 and 1984 respectively which shows that productivity per worker increased over these years may be also owing to mechanisation. The production figure for 1984 shows a substantial increase over the previous years which would imply that mechanisation has been greatly responsible for this phenomenon of increased

TABLE NO. 14

Production figures of Sonabheel Bamgaon T.E.

Years	Quantity produced in kgs.
1975	815786
1976	820569
1977	851124
1978	860136
1979	872359
1980	886464
1981	900569
1982	910674
1983	924569
1984	1007009

Source : Primarily collected from the garden.

production and productivity.

(ii) Impact on Cost of Production :

In Pavoi tea garden, the cost of production in 1983-84 was Rs.15.39 per one kg. of tea, which increased during 1984-85. The following Table (No. 15) shows the break up of the cost items during 1983-84 and 1984-85.

TABLE NO. 15

Costs of production per kg. of made tea in different heads

(Pavoi T.E.)

Year -	1983-84 (in Rs.)	1984-85 (in Rs.)
(a) Labour per kg. of made tea	0.23	0.26
(b) Fuel per kg. of made tea	1.92	2.01
(c) Machinery maintenance per kg. of made tea	0.87	0.78
(d) Other manufacturing	0.30	0.24
Per litre T.D. oil produces	2.08 kgs.	2.34 kgs. of tea

Source : Collected from the garden office.

It is seen from the Table that labour and fuel costs have been increasing. There is slight increase in wages too. The price of oil is also seen to be increasing, and although the cost of fuel is increasing, the production per litre of T.D.

oil increases after mechanisation. The costs for machinery maintanence and other manufacturing costs are decreasing after the introduction of modern C.T.C. machine since 1983.

In case of Sonabheel Bamgaon tea garden, the cost of production was Rs.15.05 per kg. of made tea during the year 1983 which showed a marginal decline during the year 1984, to Rs.14.92. Following are the costs incurred in some heads during the years 1983 and 1984.

TABLE NO. 16

Cost of production per kg. made tea in different heads (Sonabheel Bamgaon T.E.)

	1983	1984
(a) Labour cost per kg. made tea	Rs.0.31	Rs.0.38
(b) Machinery maintanence per kg. made tea	Rs.0.85	Rs.1.00
(c) Other manufacturing cost per kg. made tea	Rs.1.50	Rs.1.30
(d) L.D. oil per kg. made tea	Rs.0.02	Rs.0.07
Per litre of T.D. oil produces	2.01 kgs. of tea	2.29 kgs. of tea.

Source : Primarily collected.

It is seen that, apart from the costs of labour, machinery maintanence and L.D. oil etc. the other costs have been decreasing during the year 1984 in comparison to the year 1983. Due to increasing wages the cost of labour was increasing. Sophisticated machines need greater care for which the maintanence cost has gone up.

The cost of L.D. oil in producing per kg. of tea also found to be increasing. This cost depends on all India as well as world price of crude oil which has been going up. However, we find that one litre of T.D. oil produces 2.01 kgs and 2.29 kgs. of tea during the years 1983 and 1984 respectively which would seem to show that the cost of production has a tendency to decline because of mechanisation.

Moreover, the overall cost of production is seen to be declining from Rs.15.05 in 1983 to 14.92 in 1984 which would signify a considerable impact of mechanisation on the cost of production.

IMPACT ON EMPLOYMENT

'Labour' in tea plantations in somewhat unique. It is different from other industries in so far as the conditions of life and employment on plantations are not same as in other industries.[2] Under the old system, the labour contracts

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[2]Report on an Enquiry into conditions of labour in plantations in India - vide R.C. Awathi - Economics of Tea Industry in India, Gauhati 1975. p. 156.

were based on the principle of providing work to every able bodied person in the labourer's family and the wage rate was fixed accordingly.[3] It has been the traditional practice to offer work in the plantation itself to the children of the workers when they become adolescent - and thus the tea garden was expected to have some sort of a responsibility for the economic well being of the dependents of the workers. Therefore, it has always been considered as the 'moral obligation' of the management to provide employment in the tea gardens to the able bodied persons who are dependents and are residing with the labourer in his quarter inside the garden. In 1960, the Indian Tea Association directed that fresh recruitment of labour in these tea estates which needed it should be from among its own labour families or from estates which has surplus labour. Further, the Association at the request of the government decided to tackle the long-term problem of unemployment among its worker population by making available to labour knowledge of technique of family planning. In this study, therefore, we include every able bodied person of a labour household in the tea garden premises as tea garden labour irrespective of whether he is employed or unemployed. Our definition of tea garden, therefore, is both as a unit of an industry and a residential area of workers. The definition

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[3]Industrial Labour in India (I.L.O) 1956, p. 35-36.

of 'employment' and 'unemployment' of tea garden labour thus correspond to the concept of tea garden given above.

IMPACT ON EMPLOYMENT

Table No. 12 shows that the percentages of employed and unemployed persons in Pavoi tea garden during the year 1984 to be 48.06 and 51.93 respectively.

The figures which have been collected from garden office reveal that for the year 1984-85, the total number of permanent labour force of the garden was 923 while it was 908 on 1.1.1969, a slight increase of 15 workers during the period 1969 to 1984-85. In 1983-84, the number of casual worker was only 10. But during 1984-85, the average number of casual worker was 67.

Mechanisation of tea production process has greatly increased the requirements of green leaf. More labours are required in the plantation sector to supply more leaf. The highest number of casual workers needed during April'85 was 321. Following is the number of labour force permanent and casual for the period 1973 to 1984-85.

The process of mechanisation was more rapid in the factory than in the field. This reduced the employment of the regular labour force to a relatively small number in factory than in the plantation. But no permanent worker could be retrenched

TABLE NO. 17

Number of Labour Employed in Pavoi T.E.

Year	No. of Permanent Labour	No. of casual Labour	No. of Total Labours
1975-76	908	8	916
1976-77	912	10	922
1977-78	912	8	920
1978-79	916	10	926
1979-80	916	10	926
1980-81	918	11	929
1981-82	918	10	928
1982-83	920	12	932
1983-84	923	10	933
1984-85	923	67	990

Source : Primarily collected from the garden.

as per the agreement reached on 23-10-1969.[5] Therefore, total number of permanent workers remained more or less stable during the last 16 years. The excess persons due to mechanisation were diverted to other fields rather than be retrenched.

The distinguishing factor is that from the beginning of 1969 upto 1985, only 15 persons have been permanently employed which implies that an increasing number of persons have been left without any employment opportunity in the tea gardens. Some persons were casually employed during the peak season who were paid lower wages than the regulars; the period of their employment did not exceed six months.

About 50% of the workers engaged in factory works were diverted to other fields after mechanisation. The number of casual labour force in other fields has also been reducing consequent on mechanisation. As there is no agreement regarding service conditions of casual labour, their number and engagement period varies with work load.

Before the amalgamation of Sonabheel and Damgaon tea estates into one, there were two factories located in both the

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[5]Agreement reached on 23-10-1969 between (1) I.T.A. (2) Assam Tea Plantations' Association (3) Tea Association of India (4) Bharatiya Cha. Parisad and the workers represented by (1) Assam Chah Karmachari Sangha (2) Assam Chah Mazdoor Sangha (3) Indian Tea Employees' Union and (4) Cachar Cha Sramik Union. The Govt. of India acted as the intermmediator. Collected from the office of Assam Chah Mazdoor Sangha - Biswanath Charali Branch.

gardens. After amalgamation, new machineries were bought and tea was produced in one factory instead of two. Naturally the labour force engaged in producing tea was reduced. However, agreement reached on 23-10-1969[6] prevented the workers who were permanently engaged from being retrenched and to be diverted to field work. But any additional employment in either the factory or the plantation has become timid because of both amalgamation and mechanisation. According to the agreement the garden has been marginally increasing its permanent labour force. Following is the number of labour force - permanent and casual - for the period 1975 to 1984 as ascertained from the garden itself.

TABLE NO. 18

Number of Labour employed in Sonabheel Bamgaon T.E.

Years	No. of permanent Labour	No. of casual Labour	No. of total Labour
1975	1170	318	1488
1976	1171	335	1506
1977	1177	366	1543
1978	1180	390	1570
1979	1182	408	1590
1980	1187	416	1603
1981	1192	420	1612
1982	1195	430	1625
1983	1192	445	1643
1984	1201	481	1682

Source : Primarily collected from the garden.

[6]Agreement reached on 23-10-1969. It has all ready been discussed before.

A significant aspect is that the increase in the number of casual labour during the period is more pronounced than that of the permanent labour. The number of permanent labour has also increased, but the increase is very slow. Mechanisation has increased the quantity of tea produced by the machines which require more green leaf for processing, resulting thereby in the engagement of more labour in the plantation.

The peak season of plucking is from four to five months of the year, for which a sizeable number of work force is needed. Tea plucking in the peak season in India is done largely through casual labourers who are sometimes paid lower wages than the regulars owing to their weak bargaining powers. The same case is applicable to this garden, where more and more casual labours are employed for plucking purpose. The uncertainity of the casual labourers' future employment run side by side the exploitation done by the management without providing them their due facilities.

The employment of more casual labour in the field operations would be reduced if the new plucking device were to be used in the field. However, the application of the new plucking device continues to be in the experimental phase. But if sophisticated devices have to be introduced in the plantation field, there would be deduction of working force which would accentuate problem of unemployment.

A perusal of the table no. 12 reveals that the percentage of unemployed persons in the garden is much more than the employed persons, the percentage of employed and unemployed being 36.06 and 63.93 respectively.

Unemployment and seasonal unemployment are found to be common feature amongst the tea garden labourers of this garden. There is no surplus land in the garden where the labourers can use it for paddy cultivation. Therefore, the seasonally unemployed labours are left without work for most part of the year. Moreover, tendency of diminishing the number of casual labours from the side of the authority is there which could forecast the trend of unemployment in near future.

In case of permanent labour force, it has been found from the perusal of the table no. 18 that during the time period of ten years from 1973 to 1984 the increase of permanent labour is not at all spectacular. The increase of permanent labour force during the said period is only 31. On the other hand, the production during the period increased from 815786 kgs in 1975 to 1007009 kgs in 1984, an increase of 191223 kgs. Had there been no agreement of 1969, there would not have been any increase in the number of permanent work force at all.

Though the tea industry is a labour intensive industry, efforts are being made to change the production pattern by reducing the labour force and introducing capital intensive techniques. Modern sophisticated machines have been replacing

the old ones reducing the scope of prospective employment.

IMPACT ON THE CONDITIONS OF WORK

Unless the conditions of work like education, housing, health, bonus and the other socio-economic conditions of the labourers are improved, productivity may not be increased. When we include in the concept of social overhead capital such components as educational investment, low and middle income housing, hospitals, slum clearance, community welfare programmes, and recreation centres etc. aimed at long range social advantages, whether those components be publicly or privately financed, we may see the far reaching importance of social overhead capital formation for socio-economic progress along with the productivity of labour.[7]

Therefore, improvement of the conditions of work like education, health, housing and bonus etc. lead to more productivity of the labourers.

It is found that out of the total expenditure of Rs.17.23 per kg. made tea in Pavoi T.E. during the year 1984-85, the expenditure incurred on labour welfare, medical and providend fund were Rs.1.43, Rs.0.33, and Rs.0.73 respectively and for

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[7]K.K. Kurihara - Economic Growth and Welfare Statecraft, Mysore 1974. p. 42-43. Prof. J.K. Galbraith has also expressed similar view - Education and Economic Development : An Economists' view, Kautilya - Jan. 1962. J.M. Keynes in his General Theory p. 164, also emphasized on social overhead costs.

maintanance of buildings was Rs.1.03. In case of Sonabheel Bamgaon T.E., the cost of production per kg. of made tea during 1984 was Rs.14.92 of which the costs for housing, health, education and labour welfare are Rs.0.74, Rs.0.08 and Rs.0.06 respectively.

(a) Education :

The Table No. 12 shows that the number of literate employed and unemployed persons (age group of 12-60) for Pavoi T.E. were 21 and 80 respectively (the percentages being 25.49 and 74.5 respectively), whereas these were 26 and 76 respectively (41.49% and 68.5% respectively) for Sonabheel Bamgaon T.E. It reveals that a sizeable section of the literate persons in both the gardens were without getting any employment.

In Pavoi T.E. which is less mechanised, less than 40% and in Sonabheel Bamgaon T.E. which is highly mechanised, more than 50% of the households have been found to be sending their offsprings to school. The probable causes may be of two types - Ist, the labourers might have been realizing the necessity of education and the second is that as the job opportunity inside the garden is minimum, they might have been sending their children to educational institutions with the hope that in near future they will be getting jobs outside the garden.

Though the inclination towards education among the tea garden labourers are there, the facilities provided to them

have not been found sufficient. The expenditures on education incurred by the two gardens which are Rs.0.08 and Rs.0.06 for Pavoi and Sonabheel Bamgaon respectively reveal this fact.

Housing :

Thatched huts could be seen in most of the labour lines of Pavoi T.E. Construction of new pucca lines could be seen inside the garden. In 1983-84, the expenditure on housing was Rs.0.90 per kg. made tea while it was increased upto Rs.1.03 during the year 1984-85. The garden was in transitional phase of mechanisation requiring a substantial amount of money, which was to be diverted from other fields. Therefore, most of the houses could be found to be thatched huts.

In case of Sonabheel Bamgaon T.E., housing facilities provided to the workers have been found to be satisfactory. Excluding a few labour lines most of the lines have been found to be full of pucca quarters.

Health :

The expenditures on health that could be found to be Rs.0.33 for Pavoi T.E. during the year 1984-85 and Rs.0.22 per kg. made tea for Sonabheel Bamgaon T.E. during the year 1984. Normal medical facilities are provided to the workers. The workers who are enganged in the factory work need special medical facilities. But no such special medical facilities could be found provided to such type of workers.

Bonus :

In case of bonus, the impact of mechanisation is certainly there though not remarkable. Because, in Pavoi T.E., during the year 1984-85 the rate of bonus distributed was 20% which was 10% during the preceeding year. Both are higher than the minimum rate i.e., 8.33%. In case of Sonabheel Bamgaon T.E. the bonus distributed among the workers during the year 1984 was 20% which was 12% during the preceeding year.

In Pavoi T.E. the expenditure on labour welfare has been found to be Rs.1.43 per kg. made tea in 1984-85 which signifies that a considerable amount of money has been spent on labour welfare. On the other hand, in Sonabheel Bamgaon T.E. the cost incurred on labour welfare during the year 1984 was a very low amount of Rs.0.07 which was very negligible in comparison to Pavoi tea garden. Of course, the housing facilities and bonus provided to the workers were considerably good for which it can be ascertained that the socio-economic conditions of workers of Sonabheel Bamgaon T.E. are good enough.

Statistics does not prove the fact which is different from the expectation. Inspite of the high costs incurred on labour welfare, the socio-economic conditions of the labourers have not been found improved. The monthly percapita income of the families were low which has been shown in the table no. 12.

The habit of taking 'Laupani' and playing gambling and performing various religious festivals make them moneyless at any time. Therefore, saving was found to be almost nill. Moreover bonus money is spent on wine and on conspicous goods and taking loans from 'Marwari Golas' and 'Kabliwallas' make them moneyless and indebted for ever.

Mechanisation reduces employement opportunity. Therefore, there is every apprehension of deteriorating socio-economic conditions of the tea garden labourer due to repaid mechanisation.

A comparative study of the two gardens on the impact of mechanisation on employment :

From the above discussions following facts could be revealed -

(i) That, the process of mechanisation has started from the year 1983 in case of Pavoi T.E. and in case of Sonabheel Bamgaon, it started from the year 1969.

(ii) That, the intensity of mechanisation in the Sonabheel Bamgaon T.E. is higher than that of Pavoi T.E.

(iii) That, the cost of production is less in Sonabheel Bamgaon T.E. than that of Pavoi T.E.

(iv) That, the percentage of permanent labour employed is higher in Pavoi T.E. than that of Sonabheel Bamgaon T.E.

(v) That, the percentage of casual labour employed is higher in Sonabheel Bamgaon T.E. than that of Pavoi T.E.

(vi) That the percentage of total labour employment in Pavoi T.E. is higher than that of Sonabheel Bamgaon T.E.

(vii) That the percentage of unemployment in Sonabheel Bamgaon T.E. is higher than that of Pavoi T.E.

(viii) That the percentage of literate unemployment is higher in case of Sonabheel Bamgaon T.E. than that of Pavoi T.E.

(ix) That the average per capita real income of the labour in case of Sonabheel T.E. is higher than that of Pavoi T.E.

A comparative study can be presented from the above facts which are discussed below.

(i) Pavoi tea garden has started introducing modern technique of production from the year 1983. Prior to that, it was producing orthodox tea by old method. The World demand for C.T.C. tea has grown up and as the production of tea could be increased by applying mechanised method, Pavoi tea garden has shifted its production process from orthodox to C.T.C. manufacturing.

On the other hand, Sonabheel Bamgaon tea garden has started the process of mechanisation sixteen years back, i.e., from 1969 though the pace of mechanisation geared up from the year 1981. Amalgamation of two factories into one enabled it to modernise the method of production.

(ii) The intensity of mechanisation has been found to be higher in Sonabheel Bamgaon T.E. than in Pavoi T.E. The

production figures for both the gardens justify the claim. Perusal of the table no. 13 and table no. 16 reveals that the increase of quantity of tea produced per year by Sonabheel Bamgaon T.E. during the years 1982, 1983 and 1984, are more rapid than the productions of the previous years as during that period the process of mechanisation found to be faster.

In case of Pavoi T.E. it has introduced mechanisation just during 1983. It is expected that the fruits of mechanisation will be gained by this garden in near future.

Not only that but also, Sonabheel Bamgaon T.E. has atleast experimentally introduced the new plucking device which Pavoi T.E. is yet to think of. These facts naturally claim that the intensity of mechanisation in Sonabheel Bamgaon T.E. is higher than that of Pavoi T.E.

(iii) The costs of producing per kg. of tea are Rs.17.23 for Pavoi T.E. and Rs.14.92 for Sonabheel Bamgaon T.E. This justifies the case for mechanisation which can lower the cost of production. Sonabheel Bamgaon T.E. has been found to be lowering its cost of production than Pavoi T.E. as this garden is highly mechanised than Pavoi T.E.

(iv) A review of the table no. 15 and table no. 18 reveals the following facts which are presented in the form of a table.

TABLE NO. 19

Percentage of Employment

Name of the garden	Permanent labour	Casual labour
Sonabheel Bamgaon T.E.	75.4%	34.6%
Pavoi T.E.	88.47%	11.53

Source: Estimated from the primary data.

A perusal of the above figures reveals that Pavoi T.E. which is less mechanised employs more permanent labour in comparison to Sonabheel Bamgaon T.E. which is highly mechanised. Production of orthodox tea requires more labour than production of C.T.C. tea. Before 1983 Pavoi T.E. was producing orthodox tea for which it has to employ more labours. It failed to lower the number of permanent labour because of the agreement of 1969 that has been discussed earlier.

But in case of Sonabheel Bamgaon T.E., it required comparatively less labour force in its factory. Therefore, we find low percentage of permanent labour employed in this garden.

(v) A perusal of the table no. 19 reveals that the percentage of casual labour employed is found to be 31.6% and 11.53% for Sonabheel Bamgaon T.E. and Pavoi T.E. respectively. It shows that Sonabheel Bamgaon T.E. is employing more casual labour than Pavoi T.E.

The fact is that mechanisation improves the productivity of the machines which require more green leaf for processing. Plucking being seasonal, employment of casual labour meets the purpose, the mechanised gardens avoid employment of permanent labour and employ casual labour instead. That is why Sonabheel Bamgaon T.E. is found to be employing more casual labour than Pavoi T.E.

(vi) Perusal of table no. 12 reveals the fact that the percentages of total employment are 36.06% and 48.06% for Sonabheel Bamgaon T.E. and Pavoi T.E. respectively. It signifies that the percentage of total employment in Pavoi T.E. is higher than that of Sonabheel Bamgaon T.E., the reason being, Pavoi T.E. is less mechanised than Sonabheel Bamgaon T.E. Hence it can be concluded that mechanisation leads to less employment.

From the table no. 12 it can be revealed that the percentages of unemployment are 63.93% and 51.93% for Sonabheel Bamgaon T.E. and Pavoi T.E. respectively. It shows the intensity of unemployment due to mechanisation. Sonabheel Bamgaon T.E. which is highly mechanised than Pavoi T.E. requires less manual labour for which the percentage of unemployment in the former is higher than the latter which is less mechanised.

(iii) A review of the table no. 12 above reveals the following facts which are presented in the form of a table.

TABLE NO. 20

Percentages of employed and unemployed
Literate and illiterate

	Sonabheel Bamgaon T.E.	Pavoi T.E.
Percentage of literate employed persons	25.49%	41.17%
Percentage of literate unemployed persons	74.5%	58.82%
Percentage of illiterate employed persons	39.79%	50%
Percentage of illiterate unemployed persons	62.2%	50%

Source : Estimated from primary data.

A perusal of the above figures reveals that the percentage of literate unemployment is higher in case of Sonabheel Bamgaon T.E. than that of Pavoi T.E. Because of the high itensity of mechanisation and high rate of literate persons prevailing in the former tea garden, the percentage of literate unemployment is higher than that of the latter tea garden. Though the inhabitants of this garden use to send their children for education, financial constrain and lack of employment opportunities outside the garden accelerates the percentage of literate unemployment among the tea labourers.

(ix) From the table no. 12, it can be revealed that the per capita income of the labourers of Sonabheel Bamgaon T.E. is Rs.112.40 which is higher than that of Pavoi T.E. which is found to be Rs.83.87. The reason being, mechanisation increases the productivity and revenue as well for which real wages of the labourers could be increased. The same is the case for Sonabheel Bamgaon T.E. where the labourers are provided with more real wages.

On the other hand, though the percentage of permanent labour in Sonabheel Bamgaon T.E. is less than that of Pavoi T.E. the number of permanent labour is more in the former than the latter which has boosted up the per capita income of the labourers while instead of high percentage of permanent labour in Pavoi T.E., the number is less than that of Sonabheel Bamgaon T.E. and therefore, the per-capita income here is low.

Conclusion :

Mechanisation leads to more productivity economizing time, energy and money. As the tea industry is a labour intensive one, mere mechanisation in the factory does not effect much on employment. But the germination of the affect of mechanisation on prospective employment could be found from the above discussions. Because, it lessens the number of labourers in the factory, lowers the number of permanent workers in the plantation, and it aggravates the prospective

unemployment among the tea garden labourers.

The two tea gardens selected for study reveals the fact that though the impact of mechanisation on employment starts in a mild form these days, it might accelerate the number of unemployment in the near future if more and more sophisticated machines and tools would be used in the factory and in the plantation as well.

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CHAPTER V

ROLE OF TRADE UNIONS

As the bargaining strength of labour has been poor, it had to rely on Government for the protection of its rights until its own organisations were in a position to deal with management on an equal footings. In the immediate post-war period the growth of trade unions and collective bargaining had been slow, but they grew faster since independence. However, the growth was slow in the tea industry.

Labour in tea estates has been illeterate, unorganised and isolated from their homes, and consequently they were weak and powerless against the planters. The latter were well organised in the Indian Tea Association, founded in 1881. Nevertheless, there were instances where the workers 'fought' back at the individual garden level.

The interest of trade unions in the tea garden labour began in 1927, when in December of that year a two member delegation of British Trade Union Congress was assisted by local congressmen to get first hand knowledge of the working conditions in the Assam tea gardens.

Originally, the trade union activities were carried on under the banner of All India Trade Union Congress (AITUC). It took up such demands as old age pension, ration to children, supply of cheap cloth, a minimum daily wage of Rs.1.25 and a

dearness allowance of Rs.25 per month on behalf of labourers in the tea gardens. A few of these demands were conceded by the managements.[1] After 1946 the Indian National Trade Union Congress (INTUC), organised legitimate trade union activities in the tea gardens, and in subsequent years, the Assam Chah Mazdoor Sangha formed in Jorhat in 1947, emerged as the biggest trade union in the State. At present the trade unions in the tea estates are attached to one or the other of the three main all India bodies, i.e. Indian National Trade Union Congress, All India Trade Union Congress and Centre of Indian Trade Unions. The majority of the trade unions in the tea gardens in Assam are now associated with the Indian National Trade Union Congress.

The trade unions have had to systematically 'struggle' against the management for the redress of their various grievences after independence. The following table indicates some of these labour union 'disputes' which occured in the fifties and sixties.

Since the middle of the sixties, there has been a reduction in strikes, partly owing to restrictions imposed on the agitational activities of the union's and partly owing to efforts of management to avoid conflicts. The Indian National Trade Union Congress, the largest workers union has been preferring voluntary

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[1] A. Guha - Planter Raj to Swaraj p. 295. ICHR (New Delhi).

TABLE NO. 7

Strikes in tea industry of Assam after independence

Year	No. of Strikes	Reasons for strikes
1953-54	203	Strikes over profit sharing, proper fixing of tasks, reinstatement of discharged and dismissed personnels, leave with wage and retirement benefits etc.
1961-62	14	Strikes over payment of dearness allowance, bonus, supply of clean rice, fire, woods, water supply, double wages for the manufacture of green tea on Sunday, refusal to grant leave etc.
1962-63	19	Change of plucking rate, suspension of labourers, non-payment of hazira, change of nirikh.
1963-64	8	Demotion of workers, demand of bonus payment, suspension of workers etc.
1964-65	18	Dismissal, suspension, demand for judicial enquiry into the firing in a tea estate, non-payment of interium wage increase non-fulfilment of workers' demand and non-implementation of fire-wood agreement to workers etc.

Source : Labour Commissions , Assam.

negotiations for the settlement of disputes rather than confrontation with the management.

The other trade unions like All India Trade Union Congress and Centre of Indian Trade Unions have been fighting casually for bonus, increase in wage and reinstatement of the discharged and dismissed workers etc. In the former Darrang district, of which Sonitpur District was a part, Akhil Bharatiya Chah Mazdoor Sangha, affiliated to Centre of Indian Trade Unions, led several strikes[2] against the management for fulfilment of the demand for 20% bonus, increase in wages, reinstatement of the workers discharged and dismissed by the management etc. However, while the strength of this union in this district is considerable, we could not find any significant organisation of this union in the two gardens surveyed for this study.

As organisationally the other unions are weak, it is the Indian National Trade Union Congress which can fight for the betterment of the plantation workers. But the Indian National Trade Union Congress seems to favour voluntary settlement of disputes as much as the Indian Tea Association and the Government. Therefore, in these days we can hardly find any strike spearheaded by the Indian National Trade Union Congress to be a reckoned with.

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[2]D.R. Khosla - Secretarial report to the 8th District Conference (Akhil Bharatiya Chah Mazdoor Sangha), Dhekiajulee, Darrang 1982.

Basic wage and dearness allowance have been substantially raised owing to the efforts of the trade unions. There has been an increase in wages of tea garden workers in Assam between 1950 and 1966 by about 260 percent. The increase has been by about Rs.1/37 paise for male i.e. from 0.87 paise to Rs.2/25 paise in April 1966. The comparative increase in wage rates since 1950 can be seen from the table given below -

TABLE NO. 21

Basic wage of tea garden workers in Assam

(1950 to 1984)

The Trade Unions have been instrumental in securing the following benefits for the workers of the tea gardens and their families :-

(i) Free housing as per prescribed specification

(ii) Free medical facilities

(iii) Free education to children upto primary stage

(iv) Free fuel and cereals at a subsidised rates

(v) Land to cultivate on a very nominal rent

(vi) Free grazing land for the workers' cattle

(vii) Chowkidars to look after cattles

(viii) Chowkidars to security purposes in workers' land and lines

(ix) Free water supply

(x) Free sanitary arrangements

(xi) Equipped creches for workers' children with attendant

TABLE NO. 21

Basic wage of Tea garden workers in Assam

(1950 to 1984)

Categories	1950	1955	1960	1965	1966	1971	1983	1984
Male	0.14 annas (Rs.0.87)	1.10 annas (Rs.1.62)	1.89	2.07	2.25	2.62	8.83	9.64
Female	0.12 annas (Rs.0.75)	1.8 annas (Rs.1.50)	1.75	1.92	2.07	2.45	8.66	9.41
Children	0.6 annas (Rs.0.37)	0.13 annas (Rs.0.31)	0.91	1.00	1.09	1.28	4.38	4.76

Source : Tea Statistics, Tea Board of India.

(xii) Recreation centres, with arrangements of open air cinema shows, outdoor and indoor games, radio facilities etc.

(xiii) Canteens on 'no profit' basis

(xiv) Free liquid tea while on duty

(xv) Grant of festival expenses during pujas etc.

(xvi) Maternity benefit allowance

(xvii) Sickness allowance

(xviii) Leave with wages

(xix) Repartriation where labourers are recruited from outside the state

(xx) Bonus according to the Bonus Agreements.

In addition to the above benefits secured to the labourers the trade unions have been assisting the workers with various other facilities by way of granting educational scholarships and providing the unemployed youths with trainings in knitting, cutting and seweing etc. ACMS has schemes for granting post primary and post matric scholarships and book grants to the needy and meritorious tea garden students. They have been assisting the needy youths in getting government and bank loans for purchasing knitting and sweing machines etc.

Thus trade unions have been rapidly helping the tea garden labourers not only in getting the welfare amenities provided by the management but also have been helping them in various ways.

The problem of unemployment has become acute at present; one cause being mechanisation. Consequent on mechanisation, the growth rate of permanent labour force has been smaller in the

mechanised gardens. Moreover, the employment of casual labour also has decreased because of mechanisation.

The attitude of the trade unions in Assam seems to be more or less lathergic towards this problem. They do not consider the problem to be serious.

In 1969, an agreement was arrived at between the Trade Unions and the Tea Industry Management according to which the management could not retrench the workers at their will.

According to the agreement[3] the management was supposed to increase the permanent labour force every year. Apparently they seemed to be increasing it, but the growth in employment did not correspond to the increase in the total area under cultivation.

We find that in Pavoi tea gardens, only 15 (908 on 1.1.69 and 923 on 1.1.85) more workers have permanently been employed since 1969.

In Sonabheel-Bamgaon tea garden, the total of permanent labour increased from 1155 on 1.1.69 to 1214 on 1.1.85.

On the other hand, the area under tea cultivation increased from 350 hectares in 1969 to 522 hectares in 1985, Sonabheel Bamgaon. It shows that the increase in permanent labour force

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[3]Clause (b). Sub clause (iii) of the Agreement reached on 23.10.69 between the Managements and the Trade Unions.

TABLE 22

Labour employed in tea industry in Assam

Year	Labour employed
1947	8,11,978
1954	5,09,157
1960	4,53,761
1963	4,55,007
1966	4,21,861
1971	3,97,370
1972	4,95,316
1973	3,98,723
1974	4,01,129
1975	4,02,195
1976	4,03,660
1977	4,10,676
1978	4,08,633
1979	4,44,039
1980-81	4,46,773

Source : Tea Statistics, Tea Board of India.

in comparison to the increase in the cultivated area is not sufficient.

Moreover, the two factories of Sonabheel and Bamgaon were amalgamated in 1969. Therefore, more than 50% worker were diverted to work other than factory work because of amalgamation of the two factories and mechanisation in the factory as well.

In the above circumstances, the trade unions having organisation in the tea garden kept silent. Of course apparently, there was no retrenchment because of the above factors. But the employment opportunities for more workers became tight. So, the agreement of 1969 thus did not help the job seekers to get employment opportunities.

The role of trade unions in case of restoring employment of the workers in the tea estates of Assam as a whole is also not at all encouraging. The following table shows that the employment in tea gardens since 1947 has been declining.

The above table shows that nearly 50% of the total labour force has been decreased since 1947 upto 1981. On the other hand, according to Tea Board sources, the area under tea cultivation has been increasing. The following table shows that -

TABLE NO. 23

Year	Area under Tea		Total labour force
1955	1,56,751 Hectares	-	5,17,202
1980-81	1,99,441 Hectares	-	4,46,773

Source : Tea Statistics, Tea Board of India.

From the above data we find that . there has been an increase of 38,633 Hectares of land for tea cultivation since 1955. The ratio of the labour force to land should have been increased whereas the total labour force has been decreased upto 70,829. In 1955 the ratio of labour force to cultivated area under tea was 3.30 whereas it decreased in 1980-81 upto 2.28.

As a result lakhs of labourers could get casual employment for 4 to 5 months in the tea garden. But now a days engagement of contract labour from outside the gardens has been increasing which certainly deteriorates the socio-economic conditions of the labourers of the tea gardens. Thus a large number of labourers out of work are found outside the gardens in search of work and are absorbed at a partly wage in the cultivation of rice.

The trade unions are supposed to do something in favour of the interest of their labourers but they are silent on the pretext that these labourers are not bonafide members of their unions.

Though mechanisation in the tea industry accelerates the pace of production, it hampers the prospective employment opportunities. The trade unions, therefore, as the gardain of the tea garden labourers must be aware of this fact. The industry is bound to provide permanent additional employment to persons perfectly drawn from the unemployed persons of the tea gardens.[4] Because of rapid mechanisation the scope of new employment diminishes in the industry.

Asom Chah Mazdoor Sangha, the largest trade union of Assam tea plantation is more or less aware of the fact that mechanisation might reduce the employment prospects. Therefore, though there is no clear evidence of directly opposing the process of mechanisation by the Asom Chah Mazdoor Sangha, some of its steps for retaining the existing employment level and to have additional employment opportunities, though indirect, are against mechanisation. Some clauses of the Agreement reached on 23-10-69 between the managements and the trade unions bear the evidence of their opposition towards mechanisation.

Akhil Bhartiya Chah Mazdoor Sangha, the second ranking labour organisation is well aware of the effects of mechanisation on employment. Centre of Indian Trade Union (CITU), the parent

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[4]Clause 8, Sub clause (iii) of the Agreement reached on 23-10-69 between the Managements and the Trade Unions.

organisation which the Akhil Bharatiya Chah Mazdoor Sangha belongs, is against fullfleged mechanisation of labour intensive industries. It has been voicing against automation and application of computers in the industries and the offices as well. The organisational strength of Akhil Bharatiya Chah Mazdoor Sangha (ABCMS) in the tea plantation of Assam is comparatively weaker than that of ACMS. Although it was the initiative taken in September 1977 by ABCMS[5] for which the managements of some tea gardens raised the bonus rate upto 10.1% to 20% from the minimum 8.33%.

Pavoi T.E., though situated in the same district like Sonabheel Bamgaon, possessing more or less the same area of land could start new methods of processing only from 1983, whereas Sonabheel Bamgaon started it since 1969. There may be so many causes for which Pavoi T.E. was unable to start modern methods of processing before 1983. The constraints may be of financial, technical or some other factors related to processing, management and marketing etc. Another factor which can be pressumed is the opposition of the Pavoi tea garden branch of trade union for mechanisation. They might have opposed it with the apprehension that mechanisation would curtail the number of labour force employed in the industry.

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[5]D.R. Khosla - Secretarial report to the 8th District Conference (Akhil Bharatiya Chah Mazdoor Sangha), Dhekiajulee, Darrang 1982. p. 8.

The application of the new plucking device is postponed because of the opposition of the trade unions against it. Application of plucking device will certainly diminish the employment in the plantation field. Therefore, the trade unions are against its application. That is why the management of Sonabheel Bamgaon has been hesitating to introduce such type of labour saving devices though it has experimentally used this device for plucking.

The overall reaction of the trade unions on mechanisation in those two tea gardens are not much dignificant. Trade unions opposed to high mechanisation do not have organisational strength in these two gardens. Therefore, their resistence against the evils of mechanisation have been found negligible.

CONCLUSION

The emphasis in our study has been on an analysis of the condition of the tea industry and the impact of mechanisation in the industry on employment. In order to analyse the problem, we thought that it was desirable first to have an idea of the tea industry in India and particularly in Assam. The introductory chapter has dealt with this problem in addition to a discussion of the nature of tea garden employment and the importance of the gardens selected for study.

Tea industry has gone in, for mechanisation with the expectation that mechanisation would bring down the per unit cost of production. Since 1945 the process of mechanisation in the industry has been somewhat rapid, and at present most of the tea estates have introduced sophisticated machines and equipments in the different areas of tea manufacturing. With the growing rate of mechanisation, the demand for labour in the various fields of tea manufacturing has been declining, indicating an increase in unemployment of tea garden labourers owing to mechanisation.

In the post independence years there was a rapid growth of trade unions. They have also come to play a vital role in providing the labourers some welfare amenities. So, it would appear that to mitigate the adverse consequences of mechanisation on employment amongst tea garden labourers, the role of trade unions has become significant.

There are three categories of labour employed in the tea gardens -

(a) The first one is permanent worker. Permanent worker is one who generally resides inside the tea estate and whose name is entered in the estate roll of workers and it is included any workers who completes 6 months probationary period in the occupation, including breaks due to sickness, accident, leave, lockout, legal strike or in voluntary closure of the establishment.

(b) An outside worker is one who generally resides outside the garden but entered in the estate roll. On this case he is behaved like permanent worker.

(c) A 'temporarly worker' who is generally called as 'faltu' is not regular but the authority employs them temporarily. They are discharged whenever the work load diminishes.

For the purpose of our study, two tea gardens viz., Pavoi and Sonabheel Bamgaon of Sonitpur district, Assam were selected. The above two gardens are situated in the middle of Assam Valley which is a highly tea growing area. They are representative of the industry in respect of their size, intensity of mechanisation, volume of employment, trade union activities etc.

In the second chapter, the focus is on some aspects of tea industry in Assam. We briefly look at the position of India in tea production and export in recent times, the

distribution of ownership, position of Assam as a tea producing state and the contribution of tea industry towards the state economy and its role as source of employment in Assam.

The main findings are as follows :-

(i) Tea was cultivated and produced in China in the earlier days. In 1815 A.D. tea bushes were discovered in Assam by Bruce brothers and took the initiative to bring it to the notice of the government of India who acted accordingly. In 1845, The Assam Company was formed in London and in 1858, 'The Jorehaut Tea Company' was established. Thus many British and Indian entrepreneurs entered the business of tea plantation.

(ii) India produces a sizeable quantity of tea per year and it is the largest tea producing country in the world. In the international tea market India is the largest exporting country. It exports more than 30% of the total world export per year. The other exporting countries are SriLanka and the East-African countries.

(iii) After independence the ownership of the tea gardens have been shifting gradually from the British Companies to the indigenous entrepreneurs. Now a days, the distribution of ownership between British Companies and Indian Companies are almost 50% each.

(iv) The North India region accounts for approximately 75 percent of India's tea area and production as well, while

remaining 25% is accounted for by the Southern region.

(v) Tea plantation and manufacturing is a major industry of Assam. It has the largest area under tea cultivation and highest number of employment. In 1982-83, there were 777 tea estates in Assam with 2,00,569 hectares of total area and producing 3,00,700 thousand kgs. of tea.

(vi) A sizeable amount of revenue of the Assam Government comes from the tea industry from the taxes and duties and other levies imposed on the industry. The highest amount of revenue received from the tea industry is in the forms, of Agricultural Income Tax. The state government levies Agricultural Income Tax on 60% of the total income of the plantations. The amount of agricultural income tax received by the government of Assam during the year 1983-84 was Rs.11.09 crores (Provisional).

(vii) The state of Assam alone employs more than 4 lakh workers in tea industry both in the field and in the factories. The number of labour employed in the tea industry during the year 1980-81 was 4,46,773.

(viii) The tea industry also contributed to the economy of Assam in other fields such as :

(a) It is facilitating the plywood industry in Assam

(b) It has played a valuable role in clearing and developing jungles and forests.

(c) It is the main factor for the improvement of the means of communications. It is also responsible for the introduction of railways in the region.

(d) The development of trade and commerce in the region along with the tea industry was another consequence of the growth of tea industry.

The third chapter seeks to study the scientific inventions so far made in the field of tea cultivation and manufacturing and its application in different areas of tea industry. The findings of the chapter II are as follows :

Considerable changes of practice have resulted from the accumulation of knowledge regarding one of the stages of agriculture like for example, Site selection and clearance, production of seed, the establishment of nurseries or the use of vegetative propagation, weeding and hoeing, the use of shade, the application of blights and pests and irrigation etc.

(i) Stress has been given on the selection of the suitable location of the garden, need for suitable land is regarded now a days as the basic criteria for tea cultivation.

(ii) Importance has been given to soil chemistry.

(iii) In the case of tilling, the land for tea cultivation, Tractors are used intensively replacing primitive methods of ploughing. Weeding is done by medicine replacing manual labour and automatic irrigation system has been introduced replacing spraying by labour.

(iv) A two stroke engine operated plucking aid along with a battery operated Japanese plucking aid has experimentally been applied by some tea gardens.

Regarding the mechanisation in the factories following facts could be found out during the study :

(i) The development of new methods of manufacturing began in the late sixties of the nineteenth century, was rapid in the seventies and eighties, and was substantially complete by the end of the nineteenth century.

(ii) The production of C.T.C. tea has been increasing in comparison to that of orthodox tea in whole of India. During the year 1980, the production of C.T.C. tea in the North Indian Plantations accounted for 298.8 million kgs., the percentage being 75.5% of the total tea production. The All India figure is 357.3 million kgs., the percentage being 62.8%.

(iii) The rapid development of the industry which followed the restoration of confidence was greatly assisted by improvements in the methods of manufacturing tea and the adoption of the mechanical means in replacement of manual labour.

(iv) Work at Tocklai Experimental Station has been expanded considerably, great progress has been made in the chemistry of made tea and engineering developments have been remarkable. Steps have in fact been taken which is going to revolutionize the technique and economy of the industry.

Following are some of the improvements in the method of manufacturing :

(i) From 1870 machines have been supplementing the manual methods of withering.

(ii) In 1932 C.T.C. machine was invented and this was a land mark in the history of tea manufacturing. Now a days, sophisticated C.T.C. machines are used for crushing, tearing and curling.

(iii) Now a days rolling and drying work is also done automatically by machines.

(iv) Sorting and grading are also done by machines replacing manual labour.

(v) Even in case of manufacturing orthodox tea, the recently developed C.C.R. is used and it has been an instant success.

(vi) The newly invented L.T.P. (Lowrie tea process) is more sophisticated than the C.T.C. machine. It is equivalent to three C.T.C.

Overall introduction of modern machines are continuing in the tea cultivation and manufacturing. Innovation and introduction of new machineries ensures more production economizing time, money and energy. Manual labour is being replaced by sophisticated machines - reducing considerable number of employment in the industry.

The fourth chapter deals with the impact of mechanisation. We find that a tea garden where mechanisation is in higher degree can produce more, economizing time, energy and money. The main findings of the study are given below :

(i) The intensity of mechanisation is higher in Sonabheel Bamgaon Tea garden than that in Pavoi tea garden. Sonabheel Bamgaon started mechanisation right from 1969 but it got momentum from the year 1981. On the other hand, Pavoi T.E. has started introducing mechanisation from 1983.

(ii) The cost of production has gone up in case of Pavoi T.E. which could be found as Rs.15.39 per kg. made tea in 1983-84 and Rs.17.23 in 1984-85. During this period, though some costs like labour and fuel costs were going up, other costs like machinery maintanence and other manufacturing costs were found to be decreasing.

On the other hand, in case of Sonabheel Bamgaon T.E. where mechanisation is of high degree, the cost of production came

down from Rs.15.05 in 1983 to Rs.14.92 in 1984.

(iii) The productivity of the labour in both the gardens could be found increasing after mechanisation. The figures for the last five years (1980 to 1984) are as follows - 594,595, 597, 601 and 628 kgs. respectively for Pavoi T.E. and 564, 566, 568, 573 and 620 kgs. respectively for Sonabheel Bamgaon T.E. The figures show that after mechanisation the productivity of the workers increase.

(iv) Regarding the conditions of work, following facts could be revealed :

(a) Most of the families use to send their children to school with the expectation that they would find some jobs either in the garden office or outside the industry after obtaining higher education. The intensity of sending the children to school is found higher in Sonabheel Bamgaon than in Pavoi T.E.

(b) Most of the houses provided to the workers in Sonabheel Bamgaon T.E. could be found pucca whereas most of the houses provided to the labourers in Pavoi T.E. are thatched houses.

(c) The bonus paid to the labourers in both the gardens during the year 1984 are found to be considerable which is directly related to productivity and the productivity in both the gardens are found to be increasing after mechanisation. The rate of bonus advanced to the workers during the year 1984 is 20% for both the gardens which is much higher than the minimum 8.33%

(d) The welfare amenities provided to the labourers are higher in Sonabheel Bamgaon than that of Pavoi. Because of the century old exploitation and illitaracy prevailed amongst the labourers, their socio-economic condition is found to be

bad.

Mechanisation in the tea gardens give them less opportunity for prospective employment and it is feared that the future socio-economic conditions of the tea garden labourers will be further deteriorated because of rapid mechanisation in the industry if timely steps are not taken.

From the analysis of the data collected from both primary and secondary sources, the broad findings that emerge are :

(i) The degree of mechanisation is higher in Sonabheel Bamgaon Tea garden than in Pavoi tea garden. This may be because Sonabheel Bamgaon began mechanisation in 1969, but it got momentum from the year 1981. On the other hand, Pavoi Tea Estate started introducing mechanisation from 1983, only.

(ii) The cost of production has gone up in Pavoi Tea Estate from Rs.15.39 per kg. in 1983-84 to Rs.17.23 in 1984-85. During this period, the items which accounted for the increased cost were labour and fuel, while other costs like machinery maintenance and other manufacturing costs were found to be declining. On the other hand, in Sonabheel Bamgaon Tea Estate where mechanisation is of high degree, the cost of production came down from Rs.15.05 in 1983 to Rs.14.92 in 1984.

(iii) The productivity of labour in both the gardens was found to be increasing after mechanisation. The figures for the last five years are as 594 kgs., 595 kgs., 597 kgs., 601 kgs. and 628 kgs. for Pavoi Tea Estate, while for Sonabheel Bamgaon tea estate, they were 564 kgs, 566 kgs, 568 kgs, 573 kgs and 620 kgs.

(iv) Pavoi Tea Estate which is less mechanised employs proportionately more parmanent labour than Sonabheel Bamgaon

Tea Estate which is highly mechanised. The percentages of permanent labour for Sonabheel Bamgaon and Pavoi are 75.4% and 88.47% respectively.

(v) Sonabheel Bamgaon which has high mechanisation employs more casual labour than Pavoi which is less mechanised. The percentages are 24.6% in the former and 11.53% in the latter.

(vi) The percentages of total employment among the surveyed households are 36.06 and 48.06 for Sonabheel Bamgaon and Pavoi tea estates respectively.

(vii) The percentages of unemployment that has been found in the surveyed households is higher in Sonabheel Bamgaon Tea Estate than that of Pavoi Tea Estate which are 63.93% and 51.93% respectively.

(viii) The percentages of literate unemployed persons found among the surveyed households are 74.3% for Sonabheel Bamgaon and 58.82% for Pavoi Tea Estate.

<u>The Main Findings</u> :

The main findings of our study are as follows :

(i) That the cost of production is lower in the highly mechanised garden than in the less mechanised garden.

(ii) That the percentage of permanent labour is higher in less mechanised garden than in highly mechanised garden.

(iii) That the percentage of casual labour is higher in mechanised garden than that in less mechanised tea garden.

(iv) That the percentage of total labour employment among the surveyed households in less mechanised tea garden is higher than that in highly mechanised tea garden.

(v) That the percentage of unemployment among the surveyed

households in highly mechanised tea garden is higher than that of less mechanised tea garden.

(vi) That the percentage of literate unemployment is higher in case of highly mechanised garden than that in less mechanised garden.

Mechanisation enables increased productivity, helping to economize time, energy and money. However, the effect of mechanisation on employment is not found to be favourable. It reduces the number of labourers employed in the factory, lowers the number of permanent workers in the plantations, and it aggravates the prospective unemployment among the tea garden labourers.

The fifth chapter, deals with the role of the trade unions. The following aspects of trade union activities could be adduced from our study :

1. At present most of the trade unions are attached to three main all India bodies, i.e. Indian National Trade Union Congress, All India Trade Union Congress and Centre of Indian Trade Unions, which are the labour fronts of Political Parties, Assam Chah Mazdoor Sangha, affiliated to Indian National Trade Union Congress is the biggest trade union in the State.

2. Most of the struggles against management for the redress of various grievances were fought during the sixties.

3. Just after independence, the problem of unemployment in the tea gardens was not much acute.

4. The trade unions seemed to ignore the problem not only during the last three decades, but they seem to have sidelined the problem even during the present decade.

5. The agreement reached between the trade unions and the tea associations in 1969 is a landmark according to which the management could not retrench the workers at their will.

6. In Pavoi tea garden, over the last 17 years, i.e. after 1969, only 15 additional workers have been permanently employed. In Sonabheel Bamgaon tea garden, the total number of permanent labour increased from 1155 on 1.1.69 to 1214 on 1.1.85, an increase of only 64 workers over a period of 16 years.

7. Nearly 50% of the total labour force has been decreased since 1947 till 1981 but the area under tea cultivation has been found increasing. We find that total labour force employed during the year 1947 was 8,11,978 whereas it declined during the year 1980-81 upto 4,46,773.

On the other hand, there has been an increase of 38,633 hectares of land brought under tea cultivation from 1955-56 to 1980-81, whereas the total number of labour force has been found to be decreasing by 70,829 labourers. In 1955, the ratio of labour to cultivated area under tea was 3.30 which came down to 2.28 during the year 1980-81.

As a result, thousands of labourers could get only casual employment for 4 to 5 months of the year in the tea gardens. The trade unions were expected to have taken up the problem of the increasing incidence of unemployment of permanent labour in the tea estates, and of the economic exploitation of labour through provisions of only casual employment for short periods. However, the role of trade unions in these

matters in the tea estates of Assam as a whole has not been at all satisfactory.

On the basis of our study, we venture to suggest a few feasible lines of action to tackle the unemployment problem arising out of machanisation in the tea gardens.

(i) Development of various small industries in the vicinity of the tea plantations with the co-operation of the planters and government may help to absorb a section of surplus labour force.

(ii) The land unsuitable for tea in the tea gardens can be utilised for cultivation of crops other than tea in which a section of the surplus labour could be absorbed.

(iii) A section of the surplus labour may be provided with employment in agriculture in the neighbourhood of the plantations.

(iv) Proper facilities should be provided to the labourers so that they can earn job oriented education which can help them in getting employment outside the industry.

(v) Besides, adequate family planning measures should be undertaken so that it can control the number of population among the tea garden labourers.

(vi) The role of trade unions should be positive in regard to providing employment to the labourers. The unnecessary retrenchment of the workers by the garden authorities should be checked.

(vii) Though capital intensive method is profitable in tea industry, the intensity of more automatization should be minimised

in keeping with considerations of social justice, as it can further aggravate the prevailing unemployment situation in the State and the country as a whole.

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APPENDIX

Impact of Mechanisation on Employment :

We have investigated the following hypotheses in respect of the impact of mechanisation in the industry :

1. It leads to higher production per labour employed

2. Leads to more employment of casual labour

3. That the growth rate of permanently employed labour force in mechanised gardens is smaller than that in non-mechanised gardens. This is complementary to the '2nd' hypothesis.

4. It has a tendency to adopt labour saving devices and hence the growth rate of casual labour will also be less in mechanised gardens.

5. The growth rate of production is higher in mechanised gardens.

6. The rate of increase of cost incurred per unit of production will be smaller in mechanised gardens, though the average cost of production in initial periods might be high due to heavy initial investment in installing machinery.

Let us elaborate the hypotheses stated above.

1. Mechanisation increases the rapidity and speed of work. The work which could be done by a number of workers can be finished by a single labour at the same time if he is supported by a machine.

On the other hand, there are some products which can not be produced by ordinary, non-automatic means because they are out of range of any direct human influence. With the help of machines such types of products could be produced by man

which surely increases the labourer's productivity.

Further, the mechanisation saves time which facilitates the worker more leisure and thus the time of recreation. Recreation gives strength to the workers and raises his productivity.

2. The tea industry is a labour intensive industry particularly in the field works, so, when the productivity of the machines will increase, it will require more green leaf for production. As no sophisticated plucking device has been introduced so far, it is the labour who can be engaged in this task. Therefore, mechanisation will surely lead to more employment of labour.

But, employing more permanent labour will lead to more fixed costs of production. On the other hand, employing casual labours during peak season will not increase the fixed cost of production. Moreover, tea is a seasonal industry in character, the peak season runs from April to December.

Therefore, it is evident that more casual labour will be employed as a result of mechanisation in tea industry.

3. Technology has always been the means of replacing manual labour with machine, an instrument for overcoming the physical limitations of the human frame. By accelerating the speed of processing and achieving greater accuracy, machinery reduces the time spent on producing things and considerably facilitates the work of the labour. The higher the level of technical development, the more is human hand labour ousted, being replaced by machines of increasing complexity.

Further, mechanisation increases the efficiency of labour and raises the production per worker. By its nature it

reduces the quantum of labour required to produce a unit of output.

Moreover, cost of permanent worker will lead to more fixed cost of production. Therefore, the tendency for recruiting more permanent labour reduces in the mechanised gardens.

4. A change in the relative prices of the factors of production is itself a spur to invention and mechanisation, and to invention of a particular kind directed to economizing the use of a factor which has become relatively expensive. The general tendency to more rapid increase of capital than labour which has naturally provided a stimulus to labour saving invention.

The labour cost in the form of wages, bonus and other real wages like medical aid, ration, pension, gratuity, housing etc. has been increasing day by day. Because of higher prices, other things remaining the same, the management has to forgo a substantial amount of profit as labour cost. So out of the factors of production labour cost grows more day by day.

Further, labour unrests are now a days becoming a burning problem for the managements. Frequent strikes, lockouts hampers the production process. In this way labourers become troublesome for the managements.

Therefore, the tea gardens which have started mechanising its production process will surely try to reduce the number of labour and will install labour saving devices.

In the field, where more casual labour is required, utmost stress will be there to invent and introduce such devices which

will certainly reduce the number of casual labours as well.

5. It is well known that technology can faster the rate of production. Higher degree of mechanisation naturally can increase the growth rate of production.

Mechanisation leads to efficiency, saves time and reduces the cost of production per unit. Thus, a garden where mechanisation is in higher rate can surely produce more, economizing time, energy and money.

6. From the above discussions it is seen that mechanisation leads to more production economizing time, energy and money. When the production increases, the cost per unit of production has got a tendency to come down.

But it is evident that at the initial stages, the cost of installing new machines are very high adding additional cost to the fixed cost as cost of installation. After the course of installation the cost does not increase but rather decreases with the utilisation of optimum capacity.

So, when the pace of production by mechanical devices will go up, the average cost per unit produced will naturally come down with time.

We have tested the above set of hypotheses by means of certain statistical methods. Our data base is 1975-84 period at annual level. This time series data all for ten years.

From these we have computed four indices viz., production per permanent labour, production per casual labour, production per labour and ratio of casual labour to permanent labour, then we have subjected them to regression analysis. The results of

the regression analysis are tabulated.

We have used two variants of regression model.

(1) $Y = a + bt$

and

(2) $\log (Y) = a + bt$

The first model gives us the time trend while the second model gives us the idea about the compound growth rate

GROWTH RATE OF PRODUCTION

It is expected that in mechanised tea garden the growth rate of production in the period of reference should be higher than that in non-mechanised garden. For studying this aspect of the two gardens we have now taken to estimate the growth rate by regression analysis. The results show that

(i) $\log (P_{n\ m}) = 13.1435 + 0.0155307\ t$

(ii) $\log (P_m) = 13.5802 + 0.0200186\ t$

Where P_{nm} = Production of non mechanised garden and P_m = Production of mechanised garden.

Here, we find that the growth rate of production in Sonabheel-Bamgaon tea garden, which is mechanised, is higher than that of Pavoi tea garden where mechanisation started just one year back.

Therefore, conclusion may be drawn that in a highly mechanised garden, the growth rate of production is higher than that of non-mechanised garden. The first hypothesis is supported by the above calculation.

GROWTH RATE OF CASUAL LABOUR

It is also expected that the growth rate of casual labour will increase as a result of mechanisation. we find that in Sonabheel-Bamgaon tea estate, the growth rate of casual labour to permanent labour increases from 0.271795 in 1975 to 0.396211 in 1984, which is more significant than in Pavoi where the growth rate of casual labour to permanent labour increases from 0.0088106 in 1975 to 0.0725894 in 1984.

For this purpose if we study the estimate of growth rate by regression analysis, we have -

(i) Log (Cl_{nm}) = 2.118750 + 0.033019 t

(ii) Log (Cl_{m}) = 5.75892 + 0.0417901 t

The above regression analysis shows that in Sonabheel Bamgaon T.E. which is highly mechanised, the growth rate of casual labour is higher than that of Pavoi T.E. which is less mechanised. Our hypothesis that mechanisation leads to more employment of casual labour hence supported by the above analysis.

GROWTH RATE OF PERMANENT LABOUR

It is expected that the growth rate of permanent labour is less in the mechanised garden in comparison to that of non-mechanised garden. Here, by analysing it with regression model, we have the following results -

(i) $\text{Log}\ (PL_{nm}) = 6.8112 + 0.072008\ t$

(ii) $\text{Log}\ (PL_{m}) = 7.06054 + 0.0041265\ t$

Here, we find that the growth rate of permanent labour in Sonabheel-Bamgaon T.E. is lower than that of Pavoi T.E. This is because of the high intensity of mechanisation in Sonabheel-Bamgaon T.E. than that of Pavoi T.E. Hence, the hypothesis is being supported by the empirical analysis.

GROWTH RATE OF TOTAL LABOUR

It is also proposed that the growth rate of total labour is less in mechanised tea garden than in the non-mechanised garden. For studying this aspect we have now taken to compare the growth rates of permanent as well as casual labour for the two gardens. Now, we shall find that,

(i) $\text{Log}\ (Cl_{nm}) = 2.118750 + 0.033019\ t$

and $\text{Log}\ (PL_{nm}) = 6.8112 + 0.072008\ t$

and (ii) $\text{Log}\ (Cl_{m}) = 5.75892 + 0.0417901\ t$

and $\text{Log}\ (PL_{m}) = 7.06054 + 0.0041265\ t$

From the above two sets of regression analysis we can compare and find that the growth rate of total labour in the mechanised garden is less than that of the non-mechanised garden.

Further, we find that the overall tendency of the mechanised garden is to curtail the growth rate of labour which certainly indicates that in near future the mechanised gardens will employ less number of casual labours as well. The hypothesis is empirically supported by the above calculations.

GROWTH RATE OF PRODUCTION

From the above discussions it can be concluded that growth rate of production is higher in mechanised garden than the non-mechanised garden. Here, the growth rate of production in Sonabheel-Bamgaon T.E. is higher than that of Pavoi T.E. which can be tested by regression analysis -

(i) $\text{Log}\ (G_{nm}) = 6.334.74 + 0.0103399\ t$

(ii) $\text{Log}\ (G_{m}) = 6.28112 + 6.55527\ t$

GROWTH RATE OF COST OF PRODUCTION

It is estimated that growth rate of cost of production in mechanised garden is less than the non-mechanised garden in the period of reference. For studying this aspect, we have the following regression analysis results -

(i) Log (C_{xm}) = -5.0436 + 0.12706 t

(ii) Log (C_m) = -1.30162 + 0.0376638 t

Here, it is evident that the growth rate of cost of production in Sonabheel-Bamgaon T.E. which is mechanised is less than that of Pavoi T.E. which is less mechanised. Thus the hypothesis is supported by empirical evidence.