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## SOCIO-ECONOMIC AND ENVIRONMENTAL IMPACT: A STUDY OF TEA GARDENS IN SIKKIM

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**Abstract:**-Unlike many other commercial crops, tea has a very low environmental impact. Tea plantations have long been considered environment-tally friendly. Unlike many crops, quality tea can be plucked and processed throughout the year. Some varieties yield suitable leaf for 30-100 years, reducing the need for replanting and any of the emissions associated with replanting. This also means no downtime for tea pluckers and tea factory workers in the developing world-income continues all year long.

**Keywords:**Employment–Income-Demand-Production-Employment cycle, Directive principles, Planning Commission of India, gross domestic product (GDP), Capital formation in the country, growth rate of GDP NNP and per capita income, falling birth and death rates, increase life expectancy at birth and literacy rates, occurrence of trade cycle in which boom and slump takes place, economic growth and employment generation.

### INTRODUCTION

Tea industry is a crucial source of revenue for the country. Being a labour intensive industry, it plays a vital role in employment generation. A sizeable amount of staff and labour, are directly engaged in tea industry (Baruah 2008).

Depending on the year, South India produces about 24 to 25 per cent of India's tea but around 50 per cent of the exports by volume. Most Southern production is of the crushed, torn and curled" (CTC) type, which is mechanically processed, while a much larger proportion of the North's output is so called 'Orthodox leaf', or hand processed. CTCs are more suitable for teabags and orthodox teas for brewing in the pot (Lines, 2006).

### TEA'S PLACE IN THE INDIAN ECONOMY:

Tea's most important role in the national economy is as an employer in remote and poor rural areas. The tea industry is reported to be the second largest employer in India, directly employing in India, directly employing more than 1.1 million people (Krishnan, 2000). However, tea's financial contribution to the economy has become negligible. Indian merchandise exports are now very diverse, and in 2004 tea provided only 0.5 per cent of India's exports (FAOSTAT database).

### Tea Cultivation in Sikkim

The largest tea estate in Sikkim is Temi Tea Estate, which produces some of the finest quality tea. It currently produces at full capacity and in 1998-99 earned Rs.96 lakhs in revenues. Since then consecutively it is running in losses year after year.

Women make up 75-85 per cent of the tea picking workforce and abuses of women's rights are commonplace. In the barrack-style accommodation, women are allowed very little privacy and are at a higher risk of sexual harassment. A survey conducted on a Sri Lankan Plantation discovered that this lack of privacy has led women to commit suicide. Alcohol abuse is high among males on plantations and drunken violence against women is common, according to UNICEF.(Mc lannah.2011).

In 2010, on an estate owned by Tetley's parent company. Tata Group, a worker who collapsed while

spraying pesticides was reportedly refused medical treatment and later died. Protests in response to the death were quelled by local police, resulting in the deaths of two protesters and a further 15 injuries, pressure groups claim (Mc Lennah.2011)

#### **IMPACT OF TEA INDUSTRIES ON ENVIRONMENT:**

Unlike many other commercial crops, tea has very low environmental impact. Tea plantations have long been considered environmentally friendly. Unlike many crops, quality tea can be plucked and processed throughout the year. Some varieties yield suitable leaf for 30-100 years, reducing the need for replanting and any of the emissions associated with replanting. This also means no downtime for tea pluckers and tea factory workers in the developing world- income continues all year long. Quality teas are hand-plucked due to the mountainous terrain and high altitude of the world's greatest tea growing region. So for many of the world's teas, like those we sell, the plucking process consumes very little fossil fuel and subsequently releases virtually no CO<sub>2</sub>. As a rule, tea plantations are net absorbers of CO<sub>2</sub>, rather than emitters. Most estates use timber, refuse wood or root stock from exhausted tea bushes for fuel as often as possible. Unlike fossil fuels, wood is much cleaner to burn and is a renewable resource. (julioterra.com/.../the-social-economic-and-environmental-impacts-of-tea/y Mar 18, 2010-The Social, Economic and Environmental impacts of Tea)

Tea plantations not only result in the direct loss of habitat but can impact the wider environment. Land clearance alters the natural flow of water and increases soil erosion leading to the loss of wetland habitats and the pollution of rivers and lakes. In the Tanzanian Usumbara mountains, a hotspot of unique species, streams near tea plantations have shown decreased biodiversity.

Grown in monoculture, tea plants provide ideal conditions for a number of pests, resulting in the widespread use of toxic pesticides. Recently four elephants were found dead in Kaziranga National Park, India, after they wandered into a tea plantation and ate grass which had been sprayed with pesticides. The deaths of cows and vultures in the Assam region has also been blamed on pesticides and has led to renewed calls for its use to be banned. (Mc Lennah.2011) (www.theecologist.org/.../environmental-damage-and-human-rights-ab...y)

To meet their increasing demand for tea, more and more land is being deforested and converted into tea plantations. Cases of 'land grabbing' or the acquisition of land by foreign investors has been reported in many countries and several Indian tea companies have purchased in Uganda and Kenya. These acquisitions can affect local people, who lose rights to the land they depend on, and the local environment. In a recent acquisition of land in Ethiopia the Indian company Verdanta Harvests has been accused of doublespeak. Manipulation and lying in order to purchase large areas of rainforest, which is home to the indigenous Mazenger people, and convert it to tea plantations. (Mc Lennah.2011).

#### **Objectives:**

- a. To measure the economic impact of Tea Gardens in the state of Sikkim
- b. To assess the impact Tea Gardens is making on the society in state of Sikkim
- c. To determine the environmental impact of Tea Gardens in state of Sikkim

#### **HYPOTHESES:**

H0 1: Tea Gardens are not making any impact on the economy of state of Sikkim.

H0 2: Tea Gardens are not making any impact on the society of state of Sikkim.

H0 3: Tea Gardens are not making any impact on the environment of state of Sikkim.

**Sample:** The sample respondents of this research consist of people expected to have deep understanding of the recent development of pharmaceutical industry in Sikkim and its socio-economic and environmental effect. The criteria to select such expert are education, profession and experience. Those selected include people having post graduation/ professional degree in pharmacy, are observers of/ involved in establishment / functioning of Tea Gardens in the state of Sikkim and have a minimum of 5 years of working experience.

**Tools:** The tool is developed using Likert scale in a range of 1 to 5 with 1,2,3,4 and 5 corresponding to Strongly Disagree, Disagree, Neither agree No Disagree, Agree and Strongly Agree respectively. 34 responses from each of 40 respondents equal a total of 1120 responses for analysis in the survey. The statements were evolved based on an exploratory study to identify the economic, Social and environmental issues that may be affected by the emergence of pharmaceutical issues that may be affected by the emergence of pharmaceutical industry. For the exploratory study not only experts but common people were also consulted. This was done to identify real as well as non-real issues. The experts were contacted personally by the researcher and after general introduction the tool was handed

over to them.

**Data Analysis:** All analysis were conducted using Statistical Software (SPSS) 16.0 version. T – test were used to determine the significance of beliefs. For the hypotheses testing the confidence limit is set at 95% . At 95% the Z value is considered significant it is beyond  $\pm 1.96$ .

H0:  $(1.96 > Z < -1.96)$

Or

If Z is within  $\pm 1.96$  null hypothesis is accepted else rejected

**Table – 1 Economic Impact of Tea Industries in Sikkim.**

Statement	Mean	S.D	T - Value	Sign	Salient Findings
Planning of tea industries in Sikkim is in conformance with the strategic economic vision	3,756	0.916	5.285	0	Mean is 3.756, S.D.is 0.916. Thus it is evident that tea industries have been planned with a future vision. At 95% confidence limit the t-value is 5.285 which show that the belie is significant which is further confirmed by the significance vluw which is 0 well below 0.05. The null hypothesis therefore is rejected.
Current implementation of tea industries in the state is fulfilling the strategic planning	3,122	1,0535	0.741	0.463	Mean is 3,122, S.D.is 1,0535. It proves that the state is actively cooperating in fulfillment of its planning. At 95% confidence limit the t-value is 0.741 which is less than 1.96. It shows that the belief is not significant which is further not confirmed by the significance value which is 0.463 well above 0.05.
Demand for tea will continue to grow and hence provide consistent economic returns in future	4.39	0.5864	15.18	0	Mean is 4.39,S.D is 0.5864. It proves that tea productions are going to fetch consistent economic returns in future. At 95% confidence limit the t-value is 15.18 which show that the belief is significant which is further confirmed by the significance value which is 0 well below 0.05 . The null hypothesis therefore is rejected.
Locally available land and geographical conditions are well suited for tea industries and hence economically much more viable.	4.098	0.6247	11.25	0	Mean is 4.098, S.D. is 0.6247. It proves that availability of quality of land and the geographical conditions are well suited for tea industries . At 95% confidence limit the t-value is 11.25 which show that the belief is significant which is further confirmed by the significance value which is 0 well 0.05. The null hypothesis therefore is rejected.
Geographical location and mountainous terrain of Sikkim supports tea industries for economic gains better than other types of industries.	3.707	0.7824	5.788	0	Mean is 3,707, S.D. is 0.7824. Thus it is evident that Sikkim supports tea industries better than any other industries. At 95% confidence limit the t-value is 5.788 which show that the belief if significant which is further confirmed by the significance value which is 0 well below 0.05. The null hypothesis therefore is rejected.

The government policies will continue to provide support to provide support to private players in this sector.	3.61	0.7707	5.066	0	Mean is 3.61, S.D. is 0.7707. Thus it is evident that tea industries will continue getting support from the Government of Sikkim. At 95% confidence limit the t-value is 5.066 which show that the belief is significant which is further confirmed by the significance value which is 0 well below 0.05. The null hypothesis therefore is rejected.
Te a industries are labour intensive and have become economically viable due to availability of such labor locally	3.707	0.8138	5.566	0	Mean is 3.707, S.D. is 0.8138. Thus it is evident that tea industries are economically viable in Sikkim due to availability of cheap labor. At 95% confidence limit the t-value is 5.566 which show that the belief is significant which is further confirmed by the significance value which is 0 well below 0.05. The null hypothesis therefore is rejected.
Tea industry will create substantial employment for next 25-30 years	3.707	0.9551	4.742	0	Mean is 3.707, S.D. 0.9551. Thus it is evident that tea industries will create employment opportunities in future. At 95% confidence limit the t-value is 4.742 which show that the belief is significant which is further confirmed by the significance value which is 0 well below 0.05. The null hypothesis therefore is rejected.
Employment growth in tea industries is only short term	2.951	1.1391	-0.274	0.785	Mean is 2.951, S.D. is 1.1391. Thus it is evident that in the long run the job opportunities created may stagnate. At 95% confidence limit the t-value is -0.274 which is less than 1.96. It shows that the belief is not significant which is further not confirmed by the significance value which is 0.785 well above 0.05.
Tea industry has brought benefits to marginalized section of the society in Sikkim.	3.659	1.0151	4.154	0	Mean is 3.66, S.D. is 1.015. Thus it is evident that tea industries have benefited the weaker section of the society as well. At 95% confidence limit the t-value is 4.154 which show that the belief is significant which is further confirmed by the significance value which is 0 well below 0.05. The null hypothesis is rejected.
Many local youth will be suitably trained to take up jobs in tea industries.	3.659	0.9113	4.627	0	Mean is 3.66, S.D. 0.911. Thus it is evident that establishment of these industries will result in development of human skills. At 95% confidence limit the t-value is 4.627 which show that the belief is significant which is further confirmed by the significance value which is 0 well below 0.05. The null hypothesis is therefore is rejected.

In a few years the shortage of appropriate land for growing tea is expected to stagnate thereby reducing economic returns in future.	3.585	0.9994	3.75	0.001	Mean is 3.585, S.D. is 0.00. Thus it is evident that establishment of tea industries have already been saturated it is expected to stagnate in a few years. At 95% confidence limit the t-value is 3.75 which show that the belief is significant which is further confirmed by the significance value which is 0.001 well below 0.05. The null hypothesis therefore is accepted.
Waste land and steep mountain slopes unsuitable for other forms of industries and agriculture can be used for tea plantation and thus improve economic gains.	3.951	0.8352	7.293	0	Mean is 3.9, S.D. is 0.835. Thus it is evident that if waste land can be used for tea plantations, more economic returns can be availed. At 95% confidence limit the t-value is 7.3 which show that the belief is significant which is further confirmed by the significance value which is 0 well below 0.05. The null hypothesis therefore is rejected.
Number of livelihoods indirectly created by tea industry is higher than other major sectors like hydel, pharmaceuticals and tourism.	2.854	1.0621	-0.882	0.383	Mean is 2.85, S.D. is 1.062. Thus it is not evident that tea industries have contributed to job opportunities more than other major sectors like, hydel, pharmaceuticals and tourism. At 95% confidence limit the t-value is -0.882 which shows that the belief is not significant which is further confirmed by the significance value which is 0.383 well above 0.05
Tea industries have substantially enhanced export from Sikkim.	3.439	0.9233	3.045	0.004	Mean is 3.4, S.D. is 0.92. Thus it is evident that pharmaceutical industries have contributed to Sikkim's export substantially. At 95% confidence limit the t-value is 3.045 which show that the belief is significant which is further confirmed by the significance value which is 0.004 well below 0.05. The null hypothesis therefore is rejected.
Tea industries give higher return on investment as compared to hydel, pharmaceutical and tourism	2.781	1.0371	-1.355	0.183	Mean is 2.78, S.D. is 1.037. Thus it is not evident that tea industries give more returns compared to hydel, pharmaceutical and tourism. At 95% confidence limit the t-value is -1.355 which show that the belief is not significant this is further confirmed by the significance value which is 0.183 well above 0.05 . The null hypothesis therefore is accepted.



Privatization of tea industries will give higher returns to the state	3.39	0.9455	2.643	0.012	Mean is 3.39, S.D. is 0.945. Thus it is evident that privatization of tea industries will fetch higher economic returns. At 95% confidence limit the t-value is 2.643 which show hat the belief is significant which is further confirmed by the significance value which is 0.012 well below 0.05 . The null hypothesis therefore is rejected.
Range of public services available to local communities due to tea industry will go up initially and stagnate subsequently	3.366	0.859	2.727	0.009	Mean is 3.66, S.D. is 0.825. Thus it is evident that tea industries will result in starting a range of public services to the local community in Sikkim. At 95% confidence limit the t-value is 2.727 which show that the belief is significant which is further confirmed by the significance value which is 0.009 well below 0.05. The null hypothesis therefore is accepted.
Drinking water available to local communities may reduce if stream water on which they are dependent is diverted for tea plantations.	3.244	0.9429	1.656	0.105	Mean is 3.24, S.D. is 0.94 . Thus it is evident that availability of drinking water may reduce if stream water is diverted for tea plantation. At 95% confidence limit the t-value is 1.656 which shows that the belief is not significant which is further confirmed by the significance value which is 0.105 well above 0.05.
Local youth will find employment closer home	4.024	0.7242	9.058	0	Mean is 4.024, S.D.is 0.724. Thus it is evident that the local youth will take advantage of the available job opportunities locally. At 95% confidence limit the t-value is 9.058 which show that the belief is significant which is further confirmed by the significance value which is 0 well below 0.05. The null hypothesis therefore is rejected.
Local youth trained in tea industry will be confident to take up jobs in other regions of India where tea is grown.	4.195	0.813	9.413	0	Mean is 4.19, S.D. is 0.813. Thus it is evident that these industries will develop human skills of the local youth and they will be fit to be employed elsewhere if required. At 95% confidence limit the t-value is 9.413 which shows that the belief is significant which is further confirmed by the significance value which is 0 well below 0.05. The null hypothesis therefore is rejected.
Increase in number of tea industries will increase labour union activities and other forms of violence and criminal activities in the state	3.146	1.1082	0.846	0.403	Mean is 3.146, S.D. is 1.108. Thus it is apprehended that the industrial growth may lead to criminal activities in the state. At 95% confidence limit the t-value is 0.846 which shows that the belief is not at all significant which is further confirmed by the significance value which is 0.403 well above 0.05.



Increase in tea industries will attract labour from other states if sufficient workforce is not available within the state which may disturb demographic homogeneity thereby increasing social tension.	3.756	0.7994	6.056	0	Mean is 3.75, S.D. is 0.799. Thus it is apprehended that labor from other states may raise social tension . At 95% confidence limit the t-value is 6.056 which show that the belief is significant which is further confirmed by the significance value which is 0 well below 0.05. The null hypothesis therefore is accepted.
Social culture will enrich by interaction between people from different parts of the country	4.049	1.0235	6.561	0	Mean is 4.05, S.D. is 1.023. Thus it is evident that interactions with people from various parts of the country will enrich the cultural heritage of the state. At 95% confidence limit the t-value is 6.561 which show that the belief is significant which is further confirmed by the significance value which is further confirmed by the significance value which is 0 well below 0.05. The null hypothesis therefore is rejected.
Industrial development in tea plantation will give impetus to better infrastructural development in the state.	3.781	0.9086	5.5	0	Mean is 3.781, S.D.is 0.908. Thus it is evident that industrial development of any kind will lead to better infrastructural development. At 95% confidence limit the t-value is 5.5 which show that the belief is significant which is further confirmed by the significance value which is 0 well below 0.05 , The null hypothesis therefore is rejected.
There has been loss of other forms of farmland because of tea-gardens.	3.195	1.2692	0.984	0.331	Mean is 3.19, S.D. is 1.269. Thus it is evident that establishment of tea industries results in loss of farmland which could have better utilized. At 95% confidence limit the t-value is 0.984 which shows that the belief is not significant which is further confirmed by the significance value which is 0.331 well above 0.05
Forest covers are being lost to promote tea-gardens.	3.146	1.2954	0.723	0.474	Mean is 3.146, S.D. is 1.295. Thus it is evident that promotion of tea gardens will lead to loss of forest cover. At 95% confidence limit the t-value is 0.723 which shows that the belief is not significant which is further confirmed by the significance value which is 0.474 well above 0.05.
Availability of daily-usage water will reduce due to heavy amount of water needed for sustenance of tea-gardens.	3.073	1.0097	0.464	0.645	Mean is 3.073, S.D. is 1.009. Thus it is evident that sustenance of tea-gardens will lead to water scarcity. At 95% confidence limit the t-value is 0.464 which shows that the belief is not significant which is further confirmed by the significance value which is 0.645 well above 0.05.

Tea-gardens has adversely impacted the habitat of some important flora and faunal species.	3.146	1.0383	0.902	0.372	Mean is 3.146, S.D. is 1.038. Thus it is evident that tea-gardens have adverse impacts on flora and faunal species. At 95% confidence limit the t-value is 0.902 which shows that the belief is not significant which is further confirmed by the significance value which is 0.372 well above 0.05
Tea-gardens are resulting in green-belt development and have no pollution.	4.146	0.8234	8.914	0	Mean is 4.146, S.D. is 0.823. Thus it is evident that tea gardens do not result in any kind of pollution. At 95% confidence limit the t-value is 8.914 which show that the belief is significant which is further confirmed by the significance value which is 0(below 0.05). The null hypothesis therefore is rejected.
No waste is generated by tea gardens	3.805	0.7817	6.593	0	Mean is 3.805, S.D.is 0.781. Thus it is evident that tea gardens do not generate any kind of waste. At 95% confidence limit the t-value is 6.593 which show that the belief is significant which is further confirmed by the significance value which is 0 well below0.05. The null hypothesis therefore is rejected.
Tea gardens are easily sustainable as compared to hydel, pharmaceutical and tourism industries.	3.781	0.9621	5.195	0	Mean is 3.781, S.D. is 0.962. Thus it is evident that tea gardens are more sustainable as compared to hydel, pharmaceutical and tourism industries. AT 95% confidence limit the t-value is 5.195 which show that the belief is significant which is further confirmed by the significance value which is 0 well below 0.05. The null hypothesis therefore is rejected.
Soil erosion will increase due to deforestation for use by tea plantations.	2.902	1.2208	-0.512	0.612	Mean is 2.9, S.D. is 1.22. Thus it is not evident that deforestation caused by tea gardens will increase soil erosion. At 95% confidence limit the t-value is -0.512 which shows that the belief is not significant which is further confirmed by the significance value which is 0.612 well above 0.05.

The result, analysis and interpretation have been discussed in Tables 1-3

**CONCLUSION:**

Sikkim is one of the least industrially developed state in India, heavily dependent on central Government grants, and needs to undertake an all-round development effort to be at par with the other states of the country. If tea industries can be properly developed and managed, the production will not only meet the increased domestic demand but also create an export surplus.

There seems to be enough evidence to state that Sikkim as a state has a potential for tea industry. This statement can be confidently be made due to the advantages the hill state has in terms of the weather, quality of soil, and he temperature of Sikkim which is found to be ideal for growing of tea. In comparison to the neighboring states Tea in Sikkim is only 15 to 30 years old. The quality of tea can thus be better than older plants grown elsewhere in Northeast. Further, growing tea is an easier process compared to other agricultural crops. One needs a set of saplings and seedling to begin with. If pruning and maintenance is done regularly, it grows for more than 100 years. The processing plant and machinery needs to be state of the art. IF the Government provides regular facilitation and financial help, tea can be grown in a large scale and can be exported which can boost up the overall economy.

Private farmers have the necessary land for tea plantation; it is a matter of introducing good practices,

funding the tea plantation activities consistently and on a regular basis. The full potential of the state for tea plantation will need to be tapped for economic growth of the State of Sikkim. Tea-industry represents the horticulture sector of the State that has high economic potential. It needs to be nurtured with great thought.

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