

“A CRITICAL STUDY ON IMPACT OF HEALTH, SAFETY, WELFARE MEASURES ON PRODUCTIVITY OF TEA WORKERS OF PROPRIETORSHIP TEA ESTATES IN TERAI REGION OF WEST BENGAL”

Debasish Biswasis¹, Brajaballav² & Subhajit Pahari³

*¹Assistant Professor, Department of Business Administration, Vidyasagar University, Midnapore,
West Bengal, India*

*²Assistant Professor, Department of Commerce with Farm Management, Vidyasagar University, Midnapore,
West Bengal, India*

*³Research Scholar, Department of Business Administration, Vidyasagar University, Midnapore,
West Bengal, India*

Received: 02 Aug 2018

Accepted: 10 Aug 2018

Published: 18 Aug 2018

ABSTRACT

Tea, only because of its unique ability to twist our mood and make us feel refreshed, in the world, it has become the second most consumed beverage, next to water, leaving behind coffee, soda, and others. On the other hand, if we talk about India, India has become the second largest tea producer and fourth largest tea exporter in the world. According to the latest report, published in 2017, by the Tea Board of India, India's tea production in 2016-17 reached 1,250.49 million kilograms -- an increase of 1.41 per cent over the figure of the previous year on account of higher production rate in Assam and West Bengal. But unfortunately, to whom the credit should go for this huge production, the workers, are still being severely afflicted by the master class even after 69 years of independence. In this present circumstances, the paper is a deliberate attempt to explore whether giving greater emphasis on Health, Safety, Welfare measures really leads to better productivity of the tea workers of proprietorship gardens in Terai region of West Bengal and also the paper is intended to give some suggestions regarding effective measures that should be considered to improve the productivity of the tea workers.

KEYWORDS: *Health, Safety, Welfare Measures, Productivity, Proprietorship Gardens, Terai Region*

INTRODUCTION

Around the world, tea is one of the most popular and refreshing beverages. And if we talk about India, India is one the largest & finest quality tea producers in the world. The 172 yearsold Indian tea industry plays a pivotal role in the national economy. With 1692 registered tea producers, 2200 registered tea exporters, 5548 registered tea buyers and 9 tea auction centers across India, Indian tea industry spreads across Uttaranchal, Assam, Tamil Nadu, West Bengal, Sikkim, Kerala, Tripura Karnataka, Himachal Pradesh, Bihar, Arunachal Pradesh, Manipur, Nagaland, Mizoram and Meghalaya. Indian tea industry had a significant contribution to the national GDP in the year 2016-17. We experienced a record-breaking production of 1,250.49 million kilograms of made tea in that year. Indian tea industry was efficient enough to increase the rate of production at 1.41 per cent over the figure of 2015-16. Though all states had significant contribution

behind this achievement Assam and West Bengal were the game changers. It sounds good while we talk about any kind of achievement which has broken all the previous records, it makes us feel good, it makes us feel proud also but we never know the pain, the agony, the sorrow, the grief, the distress the misery behind it; rather we do not want to know also. We have a discussion on tea industry but we hardly have the discussion on the condition of the tea workers. It is really unbelievable that even after 69 years of independence the workers are still being severely afflicted by the master class. Presently also the tea workers are exposed to various social constraints. The daily wage of the labors is lower than the minimum daily wage fixed by the state government; consequently, starvation, malnutrition, untimely deaths have become regular features among the tea workers. Poorly paid Indian tea workers and their destitute families have become a major target for human traffickers who lure away mainly women and children with promises of a new life but who end up enslaved in factories and households. Deaths of workers because of various occupational diseases, snake bites, malaria, have become a regular issue. Now the question is if the concepts of safety, security, welfare, and minimum wages of workers are unable of proper functioning on tea workers, why should they exist in society? And also if these situations prevail in society, how can we raise the question of their productivity? So, in these present crucial circumstances, the status of the working class people should be re-evaluated specifically from the aspect of health, safety & welfare, within as well as outside of the establishment, so that these social factors become efficient enough to create a good impact on the productivity of the tea workers.

OVERVIEW OF LITERATURE

Though a number of social researchers have conducted studies on plantation industry, very few of them have concentrated especially on tea industry that too also mostly center around Sri Lanka, Indonesia, Malaysia, India, and South American plantations, those in the Caribbean islands. However, we have done an extensive literature review that is related to health, safety, welfare measures and productivity and also which are related to the tea industry.

Joshi (1927) in his book, "Trade Union Movement in India" wrote that the uncovered areas, by minimum standard of working conditions fixed by the Factories Act and other benefits under social legislations, are covered by employee welfare which employers make for the benefit of the employees as well as for their long-term benefits.

Seth (1940) in his book "Labor in Indian Coal Industry" discussed the bitter situations of Indian Coal miners under colonial rule, where no welfare activities were done.

Percival Griffiths (1967) on "The History of Indian Tea Industry" described the historical growth of Indian Tea industry and its different aspects like production, labor recruitment, ownership, etc. In his study, there was no separate discussion about the Industrial Relation and Productivity.

Srivastava (1970) in his book, "A Socio-Economic Survey of the Workers in the Coal Mines of India" revealed the poor socio-economic conditions of coal workers in India, especially in Bihar. He found that high indebtedness, low wages, and poor welfare facilities- these factors are responsible for the poor socio-economic conditions of miners.

Kudchelkar (1979) in his book, "Aspects of Personnel Management and Industrial Relations" explained the necessity of labor welfare for maintaining good Industrial Relations. He felt that employees need to be provided good welfare facilities as they are exposed to various risks and hazards.

Dr. Sharit Bhowmick (1981) in his study on “Class Formation in The Plantation System” tried to investigate into different aspects of class formation among tribal workers engaged in Dooars Tea gardens. In his study, he emphasized how the social relations of tribal workers change with the change in Organisation.

Tyagi (1982) in his book, “Labor Economics and Social Welfare” discussed theoretically the intra-mural and extra-mural labour welfare practices in India and also discussed the involvement of various agencies in labor welfare.

Prasannaeswari (1984) studied on “Industrial Relation in Tea Plantation: the Dooars Scene” where he described the condition of labor relation in the tea gardens of North Bengal with special reference to the gardens of Dooars region. It covers various aspects of industrial relations in tea gardens like attitudes of the management towards the workers, the role of the Trade Unions, etc.

Pramod Varma (1987) in his book, “Labor Economics and Industrial Relations” explained that mainly three types of welfare facilities are provided by the organizations. According to him, provision of subsidized canteens, crèches and medical facilities come under the first type of welfare facilities, while cooperative credit facilities and educational assistance come under the second type of welfare facilities. The third type of welfare facilities is provided by community centers, welfare centers etc.

Ahuja’s (1988) book- “Personnel Management” deals with the necessity of labor welfare and social security in India. He explained that employees can be satisfied with the help of the provision of welfare and social security measures and that can lead them to show their improved performance.

Arun Monappa (1990) in his book, “Industrial Relations” explained in detail the labor welfare and social security measures. Problems faced by enforcement machinery for implementation of these welfare and social security measures have also been discussed in this book.

Tripathi’s (1998) book- “Personnel Management & Industrial Relations” deals with the principles of labor welfare services, types of labor welfare services, different legislation. He also gave an insight look into various welfare facilities in terms of medical care, sickness benefit, unemployment benefit, maternity benefit etc., in his book.

B. Sivaram (2000) studied on “Productivity Improvement and Labor Relations in the Tea Industry in South Asia” and highlighted on the importance of tea production in India, Bangladesh, and Sri Lanka in terms of employment and foreign exchange earnings and various aspects on productivity in Tea Industry.

Navinder K Sing (2001) studied on “Role of Women Workers in the Tea Industry of North East India” and explained various social, cultural and functional issues of female workers.

David, A Decenzo and Stephen P. Robbins (2001) in their book, “Personnel / Human Resource Management” discussed in detail the various benefits and services that employers provide to their employees in the companies. Also, they explained the necessity of social security premiums, unemployment compensation, workers compensation and state disability programs.

Michael (2001) in his book, "Human Resource Management and Human Relations" said that quality of work life of employees can be improved with the help of the provision of intra-mural and extra-mural welfare facilities which paves the way of good human relations among different cadres of employees.

Pylee and Simon George (2003) in their book, "Industrial Relations and Personnel Management" explained that besides various welfare facilities, various retirement benefits such as provident fund, gratuity, and pension should be provided to the employees by the companies; so that besides instilling in them a feeling of security, the provision of these benefits assists employees to be free from fear of want and fear of starvation.

Punekar, Deodhar and Sankaran (2004) in their book, "Labor Welfare, Trade Unionism and Industrial Relations" opined that labor welfare is something that is done for intellectual and social-wellbeing and also the comfort and improvement of the employees over and above the wages paid which is not a necessity of the industry.

Shashi, K. Gupta and Rosy Joshi (2005) in their book, "Human Resource Management" deals with a detailed discussion on labor welfare, where all aspects of labor welfare such as types of labor welfare, statutory provisions concerning welfare, approaches to welfare and also the significance of labor welfare has been given emphasis.

Singh (2005) in his book, "Industrial Relations: Emerging Paradigms" stated that disease, wants, squalor, idleness, and ignorance- these five giants can be handled by providing welfare facilities and social security. According to him, social security should not be considered as the burden but it should be considered as a kind of wise investment that offers, in the long run, good social dividends.

Venkata Ratnam (2006) in his book, "Industrial Relations" explained elaborately the labor legislations, Indian constitutional provisions of social security, voluntary and collective agreements for the organized sector. The key issues in social security and welfare, in the context of the emerging socio-economic environment, has also been discussed in this book.

Micheal Armstrong's (2006) book, "A Hand Book of Human Resource Management" deals with various concepts of welfare services provided to employees in detail. According to him, identification of employees with the companies in which they are employed can be improved with the provision of welfare services in terms of individual services, group services, and employment assistance programs.

Aquinas (2007) in the book, "Human Resource Management" explained in detail about welfare facilities provided to employees. He opined that some welfare benefits are provided as per legislation while some other welfare benefits are provided voluntarily by management or as a result of bi-partite settlements between the Management and Trade Unions. The intra-mural and extra-mural welfare benefits also have been discussed in this book.

Huque (2007) in his work opened that tea Industries in the developing countries of Asia are facing huge competition due to inefficiency in the value chain management especially related to land management, Plucking efficiency and manufacturing cost.

Gary Dessler and Biju Varkkey (2009) in their book, "Human Resource Management" threw light on the benefits and welfare services provided to employees in India. They also discussed besides the discretionary benefits, benefits to be provided as per Central or State Law provided to the employees.

Dr. Mitra (2010) in “Globalization and Industrial Relation in Tea Plantations” portrayed in details the nature of Industrial Relations from pre-globalization phase to post globalization phase, factors that create impact on industrial relation, impact of globalization on Industrial Relation, Causes of Sickness and Closer in Dooars and Terai region in West Bengal.

CUTS (2011) conducted a case study on the tea sector in Jalpaiguri and Darjeeling districts of West Bengal and explores the export-oriented value chain in the sector and shows how various stakeholders are interrelated. The study investigates into whether the export of tea has increased (or not) after the introduction of the Foreign Trade Policy of India; what has been the impact on various stakeholders; what are the bottlenecks for exporting tea; and what could be the probable measures that will help in improving the export scenario.

Dr. Horen Goowalla (2012) examined empirically the vital issues affecting the relationship between labor and management in selected tea estates of Jorhat Districts of Assam and suggested measures to make them more effective contributions for the productivity and prosperity of tea estates of Assam.

RESEARCH GAP

Though extensive studies have been done by social researchers on plantation industry in India, the aspects-safety, health, welfare measures & productivity of tea workers have been taken into consideration by few of them. Another thing which has not been clearly explored that the impact of the above factors on the productivity of the tea workers. Above all, the much said Terai region of West Bengal, undertaken in this study, is still untouched in by the social researchers.

OBJECTIVES OF THE STUDY

The study is undertaken to fulfill the following objective:

- To examine the impact of health, safety and welfare measures on productivity of the tea workers of the proprietorship tea estates.
- To determine the nature and degree of relationship between health, safety and welfare measures on productivity of the tea workers of the proprietorship tea estates.

METHODOLOGY:

Area of the Study: It has already been stated that for the study, proprietorship gardens in Terai region of West Bengal have been selected.

Period of Study: To examine the relationship among the variables health, safety and welfare measures and productivity 15 years data have been collected ranging from the year 2003 – 2017.

Sources of Data: We have used both primary and secondary sources for the purpose of data collection. Primary sources have greatly emphasized in this regard. Secondary sources include TBITA, various journals, articles, various publications of Tea Board of India, Planters Associations, various reports published by the Department of Economics and Statistics, Department of Labor, Govt. of West Bengal, and various newspapers, magazines, etc.

Sampling Technique: As there are only three proprietorship gardens, all the gardens have been taken into consideration to examine the relationship.

Standardization of Parameters: The parameters which have been used to establish relational model are welfare expenses, health expenses, safety expenses and labor productivity. Here dependent variable is productivity (y), and independent variables are welfare expenses (x_1), health expenses (x_2), and safety expenses (x_3). In this study, productivity has been calculated as (total production of made tea) / (average number of workers). For explaining productivity, the values of all the independent variables have been taken in terms of expenses; i.e. welfare expenses, health expense, safety expenses for the respective years of the undertaken tea estates.

Hypotheses

H_0 : There is no significant impact on health, safety, and welfare on the productivity of the tea workers.

ANALYSIS WITH INTERPRETATION:

Descriptive Statistics Results

Table 1: Descriptive Statistics

	L_Productivity	L_Welfare_Expenses	L_Health_Expenses	L_Safety_Expenses
Mean	7.544403	16.05360	14.51483	13.34276
Median	7.545677	16.04490	14.51031	13.33685
Maximum	7.595911	16.23303	14.69813	13.52498
Minimum	7.491940	15.91257	14.34558	13.20360
Std. Dev.	0.032166	0.105833	0.111955	0.109354
Skewness	-0.001945	0.243211	0.091179	0.183131
Kurtosis	1.803279	1.739805	1.800974	1.731103
Jarque-Bera	0.895097	1.140435	0.919323	1.090155
Probability	0.639193	0.565402	0.631497	0.579797
Sum	113.1660	240.8040	217.7224	200.1414
Sum Sq. Dev.	0.014485	0.156809	0.175476	0.167415
Observations	15	15	15	15

Source: Computed by authors

From table 1, it is apparent that during the study period, the variables- Health, Safety, Welfare & Productivity of the tea workers are very stable and not much varying from their mean values. The low value of the standard deviation of all the three variables in this regard also confirms the stability. In the case of all four variables, p values of the results of Jarque-Bera statistics are greater than 0.05. Therefore, we can assert that all the variables are approximately conform to the normality and it is also observed that the results of the median of various variables are more or less equal to the respective mean values.

Unit Root Test Results

Unit root test has been conducted to see whether the time series variables are non-stationary and possesses a unit root. The null hypothesis here is the series are non-stationary and the alternative hypothesis is series is stationary.

Table 2: Descriptive Statistics

Variables	Level			First Difference		
	Intercept	Intercept & Trend	None	Intercept	Intercept & Trend	None
L_Productivity	0.692563	-4.526477	5.617683	-4.490176	-4.403133	0.500784
	0.9864	0.0155	1.00	0.0055	0.0233	0.8047
L_Welfare	2.264855	-1.834437	9.805397	-2.381086	-2.71732	1.018036
	0.9997	0.6339	1.00	0.0473	0.2528	0.9060
L_Health	2.471518	-1.954099	17.03864	-3.224677	-3.002108	0.712810
	0.9998	0.5743	0.999	0.0439	0.1797	0.8537
L_Safety	1.988327	-4.833060	8.409159	-4.805084	-4.6744235	0.202937
	0.9994	0.0109	1.000	0.0034	0.0158	0.7276

Source: Computed by authors

We can see the detail of the ADF test result in table no-2. Here, at level- with trend and intercept, the t-statistics for the variables- welfare, health are non-significant whereas the variables- safety and productivity are significant; meaning that welfare & health are non-stationary at the level and productivity & safety are stationary at level with trending and intercept. But if see at the first difference at intercept all variables are significant; meaning that all variables are stationary at first difference with trend only.

Granger Causality Test

Granger causality test has been conducted to investigate causality between three sets of two variables i.e. welfare & productivity, health & productivity and safety and productivity in the time series model.

Table 3: Granger Causality Test between Welfare and Productivity

Pair wise Granger Causality Tests			
Sample: 2003 2017			
Lags: 1			
Null Hypothesis	Obs.	F-Statistic	Prob.
L_WELFARE_EXPENSES does not Granger Cause L_PRODUCTIVITY	14	3.23146	0.0997
L_PRODUCTIVITY does not Granger Cause L_WELFARE_EXPENSES		1.04481	0.3287

Source: Computed by authors

The above table, table no-3 gives us a glimpse of the granger causality test result between two variables- welfare expenses and productivity. Here the first null hypotheses- ‘welfare expenses do not Granger cause productivity’ of the workers can be rejected at 10% significance level; meaning that welfare expenses do cause productivity. On the other hand, the second hypothesis-‘productivity does not Granger cause welfare’ cannot be rejected. That means there is a unidirectional causality running from welfare expenses to productivity with lag (1), F stat. =3.23146 (prob. 0.0997). Now let us focus on the causal relationship between other sets of two variables- health expenses & productivity.

Table 4: Granger Causality Test between Health and Productivity

Pairwise Granger Causality Tests			
Sample: 2003 2017			
Lags: 1			
Null Hypothesis	Obs	F-Statistic	Prob.
L_HEALTH_EXPENSES does not Granger Cause L_PRODUCTIVITY	14	9.07070	0.0118
L_PRODUCTIVITY does not Granger Cause L_HEALTH_EXPENSES		0.71412	0.4161

Source: Computed by authors

The above table, table no-4 shows us a result of Granger causality test result between two variables-health expenses and productivity. Here the first null hypotheses- 'health expenses do not granger cause productivity' of the workers, can be rejected at a 5% significance level; meaning that health expenses do cause productivity. On the other hand, the second hypothesis-'productivity does not Granger-cause health expenses' cannot be rejected. That means there is a unidirectional causality running from health expenses to productivity with lag (1), F stat. =9.07070 (prob. 0.0118). Now let us concentrate on the causal relationship between other sets of two variables- safety expenses & productivity.

Table 5: Granger Causality Test between Safety and Productivity

Pairwise Granger Causality Tests			
Sample: 2003 2017			
Lags: 1			
Null Hypothesis	Obs	F-Statistic	Prob.
L_SAFETY_EXPENSES does not Granger Cause L_PRODUCTIVITY	14	12.6021	0.0046
L_PRODUCTIVITY does not Granger Cause L_SAFETY_EXPENSES		6.45159	0.0275

Source: Computed by authors

The above table, table no-5 reveals the result of Granger causality between two variables-safety expenses and productivity. Here the first null hypotheses -'safety expenses do not Granger cause productivity' can be rejected at a 5% significance level; meaning that safety expenses do cause productivity of the workers. On the other hand, the second hypothesis-'productivity does not Granger cause safety expenses' can also be rejected at 5% level of significance; meaning that productivity does cause safety expenses. So, from the above table it can be said that there is bidirectional causality running from safety expenses to productivity and productivity to safety expenses with lag (1), observation- 15, F stat.=12.6021 (prob. 0.0048) & F stat.= 6.45159 (prob. 0.0275).

Regression Analysis

Now let us concentrate on regression analysis considering the variables welfare expenses, health expenses, safety expenses and labor productivity.

Relation between Welfare & Labour Productivity:

If we concentrate on proprietorship tea estates, we can see the following regression model that has come out from log estimation of the variables productivity and welfare, where productivity is a dependent variable and welfare is an explanatory variable:

Table 6

Dependent Variable: L_PRODUCTIVITY				
Method: Least Squares				
Sample: 2003 2017				
Included observations: 15				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	2.696934	0.154080	17.50351	0.0000
L_WELFARE_EXPENSE	0.301955	0.009598	31.46145	0.0000
R-squared	0.987037	Mean dependent var		7.544403
Adjusted R-squared	0.986039	S.D. dependent var		0.032166
S.E. of regression	0.003801	Akaike info criterion		-8.183763
Sum squared resid	0.000188	Schwarz criterion		-8.089356
Log likelihood	63.37822	Hannan-Quinn criter.		-8.184769
F-statistic	989.8231	Durbin-Watson stat		0.636396
Prob(F-statistic)	0.000000			

Source: Computed by authors

From table-6, the following regression equation can be formed:

$$\text{Log}(y) = 2.696934 + 0.301955 \log(x_1) \text{ ----- (Eq. - 1)}$$

$$(17.50351) * (31.46145) *$$

$R^2=0.636396$, $F=989.8231$, $DW= 0.636396$, y =labor productivity, x_1 = welfare expenses, *=significant at 5% level.

A quick glance at the results reveals- the coefficients, in equation-1, are statistically significant and the fit is moderately tight. But before making estimation & forecasting, Correlograms and Q-Statistics have been tested to confirm error term is serially correlated or not. Because we know, if the serial correlation exists, we cannot use the equation for estimation.

Table 7

Sample: 2003 2017
Included observations: 15

Autocorrelation	Partial Correlation	AC	PAC	Q-Stat	Prob	
		1	0.403	0.403	2.9589	0.085
		2	0.229	0.080	3.9912	0.136
		3	0.025	-0.111	4.0044	0.261
		4	-0.152	-0.175	4.5366	0.338
		5	-0.282	-0.188	6.5593	0.256
		6	-0.249	-0.047	8.3193	0.216
		7	-0.318	-0.188	11.549	0.116
		8	-0.235	-0.084	13.559	0.094
		9	-0.250	-0.200	16.218	0.062
		10	-0.086	-0.014	16.599	0.084
		11	0.001	-0.039	16.599	0.120
		12	0.019	-0.147	16.630	0.164

Source: Computed by authors

From Table 7, we can see the correlogram has desirable spikes at all lags, indicating no serial correlation in the residuals. But, before moving towards estimation we have also tested one of the most recognized tests i.e. Breusch-Godfrey Serial Correlation LM Test.

Table 8

Breusch-Godfrey Serial Correlation LM Test			
F-statistic	2.493699	Prob. F(1,12)	0.1403
Obs*R-squared	2.580810	Prob. Chi-Square(1)	0.1082

Source: Computed by authors

The above test also accepts the hypothesis of no serial correlation which indicates that equation-1 can be used for forecasting.

1% increase in welfare expenditure per year in proprietorship farm lead to 0.301955% increase in labor productivity per year during the period of 2003 – 2017, which is significant at 5% level.

Relation between Health & Labour Productivity

If we concentrate on the variables productivity and welfare in proprietorship tea estates, we can get the following regression model from regression analysis, where production is a dependent variable and health is an explanatory variable:

Table 9

Dependent Variable: L_PRODUCTIVITY				
Method: Least Squares				
Sample: 2003 2017				
Included observations: 15				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	3.381812	0.070152	48.20658	0.0000
L_HEALTH_EXPENSES	0.286782	0.004833	59.33796	0.0000
R-squared	0.996321	Mean dependent var		7.544403
Adjusted R-squared	0.996038	S.D. dependent var		0.032166
S.E. of regression	0.002025	Akaike info criterion		-9.443373
Sum squared resid	5.33E-05	Schwarz criterion		-9.348966
Log likelihood	72.82530	Hannan-Quinn criter.		-9.444378
F-statistic	3520.994	Durbin-Watson stat		2.018641
Prob(F-statistic)	0.000000			

Source: Computed by authors

From table-9, the following regression equation can be formed:

$$\text{Log}(y) = 3.381812 + 0.286782 \log(x_2) \text{ ----- (Eq. - 2)}$$

$$(48.20658) * (59.33796) *$$

$R^2 = 0.996321$, $F = 3520.994$, $DW = 2.018641$, $y =$ labour productivity, $x_2 =$ health expenses, $*$ = significant at 5% level.

As per the results, given by table-9- the coefficients, in equation-2, are statistically significant and the fit is tight. But before making estimation & forecasting, Correlograms and Q-Statistics have been tested to confirm whether error term is serially correlated.

Table 10

Sample: 2003 2017
Included observations: 15

Autocorrelation	Partial Correlation	AC	PAC	Q-Stat	Prob	
		1	-0.164	-0.164	0.4926	0.483
		2	-0.022	-0.050	0.5020	0.778
		3	0.206	0.200	1.4065	0.704
		4	-0.046	0.021	1.4561	0.834
		5	-0.223	-0.236	2.7211	0.743
		6	-0.114	-0.261	3.0913	0.797
		7	-0.136	-0.233	3.6811	0.816
		8	-0.011	0.019	3.6858	0.884
		9	-0.227	-0.187	5.8766	0.752
		10	0.083	-0.012	6.2264	0.796
		11	0.159	0.089	7.8309	0.728
		12	-0.221	-0.255	11.980	0.447

Source: Computed by authors

From Table 10, we can see the correlogram has desirable spikes at all lags, indicating no serial correlation in the residuals. But, before moving towards estimation we have also tested one of the most recognized tests i.e. Breusch-Godfrey Serial Correlation LM Test.

Table-11

Breusch-Godfrey Serial Correlation LM Test:			
F-statistic	0.343985	Prob. F(1,12)	0.5684
Obs*R-squared	0.417999	Prob. Chi-Square(1)	0.5179

Source: Computed by authors

The above test accepts the hypothesis of no serial correlation which indicates that equation-2 can be used for forecasting.

1% increase in health expenditure per year in proprietorship farm lead to 0.286782 % increase in labor productivity per year during the period of 2003 – 2017, which is significant at 5% level.

Relation between Safety & Labour Productivity

Now let us discuss the variables productivity and safety in proprietorship tea estates. The following regression model has come out from regression analysis, where production is a dependent variable and safety is an explanatory variable:

Table 12

Dependent Variable: L_PRODUCTIVITY				
Method: Least Squares				
Sample: 2003 2017				
Included observations: 15				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	3.647504	0.129405	28.18666	0.0000
L_SAFETY_EXPENSES	0.292061	0.009698	30.11484	0.0000
R-squared	0.985868	Mean dependent var		7.544403
Adjusted R-squared	0.984781	S.D. dependent var		0.032166
S.E. of regression	0.003968	Akaike info criterion		-8.097458

Sum squared resid	0.000205	Schwarz criterion	-8.003051
Log likelihood	62.73093	Hannan-Quinn criter.	-8.098463
F-statistic	906.9038	Durbin-Watson stat	1.210154
Prob(F-statistic)	0.000000		

Source: Computed by authors

From table-7, the following regression equation can be formed:

$$\text{Log}(y) = 3.647504 + 0.292061 \log(x_3) \text{ ----- (Eq. - 3)}$$

$$(28.18666) * (30.11848) *$$

$R^2 = 0.985868$, $F = 906.9038$, $DW = 1.210154$, $y =$ labor productivity, $x_2 =$ health expenses, $*$ = significant at 5% level.

A quick glance at the results reveals- the coefficients, in equation-3, are statistically significant and the fit is tight. But before making estimation & forecasting, Correlograms and Q-Statistics have been tested to confirm whether error term is serially correlated or not.

Table 13

Sample: 2003 2017

Included observations: 15

Autocorrelation	Partial Correlation	AC	PAC	Q-Stat	Prob	
		1	0.047	0.047	0.0395	0.842
		2	-0.168	-0.170	0.5911	0.744
		3	0.146	0.169	1.0457	0.790
		4	-0.038	-0.094	1.0793	0.898
		5	-0.122	-0.059	1.4580	0.918
		6	-0.084	-0.125	1.6602	0.948
		7	-0.152	-0.161	2.3946	0.935
		8	-0.098	-0.098	2.7423	0.949
		9	-0.169	-0.225	3.9564	0.914
		10	0.008	0.013	3.9594	0.949
		11	-0.058	-0.185	4.1717	0.965
		12	-0.109	-0.125	5.1868	0.951

Source: Computed by authors

From Table 8, we can see the correlogram has desirable spikes at all lags, indicating no serial correlation in the residuals. But, before moving towards estimation we have tested one of the most recognized tests i.e. Breusch-Godfrey Serial Correlation LM Test.

Table 14

Breusch-Godfrey Serial Correlation LM Test:			
F-statistic	0.026811	Prob. F(1,12)	0.8727
Obs*R-squared	0.033439	Prob. Chi-Square(1)	0.8549

Source: Computed by authors

The above test accepts the hypothesis of no serial correlation which indicates that equation-3 can be used for forecasting.

1% increase in safety expenditure per year in proprietorship farm lead to 0.292061% increase in labor productivity per year during the period of 2003 – 2017, which is significant at 5% level.

CONCLUSION & SUGGESTIONS

This paper attempts to examine the impact of health, safety and welfare measures on productivity of the tea workers of proprietorship tea estates of Terai region of West Bengal and to determine the nature and degree of relationship between health expenses & productivity, safety expenses & productivity and welfare expenses & productivity of the tea workers. For this purpose, fifteen years of data of three proprietorship tea estates were considered in this study. From Granger causality test it has been found that there is a unidirectional causality running from welfare expenses to productivity; meaning that welfare expenses do cause productivity of the tea workers. On the other hand, there is an existence of a unidirectional causality running from health expenses to productivity which means health expenses do cause productivity of the tea workers. However, we have observed an existence of a bi-directional causality running from safety expenses to productivity and productivity to safety, meaning that as safety expenses cause productivity of the tea workers, in the same way, productivity of the tea workers causes safety expenses. From the regression analysis, it has been found that during the period of 2003 – 2017, 1% increase in welfare expenditure per year in proprietorship farm leads to 0.301955 % increase in labor productivity. On the other hand, 1% increase in health expenditure per year in proprietorship farm lead to 0.286782 % increase in labor productivity per year during the period of 2003 – 2017. Again if we talk about safety expenses and productivity, 1% increase in safety expenditure per year in proprietorship farm lead to 0.292061% increase in labor productivity per year during the period of 2003 – 2017. So, it can be clearly said from the above explanation that health expenses, safety expenses & welfare expenses do create a positive impact on the productivity of the tea workers. But one thing must be mentioned here that here for the tea workers of proprietorship tea estates, the workers’ productivity is not increasing at the same rate with the rate of increase in expenses. Obviously, it is not possible. But the rate of increase in productivity is low. That means there must be certain other factors that are affecting labor productivity; which has to be found out. To conclude, it can be said that, if management incurs more expenditure for health, safety & welfare measures for the tea workers, obviously they can expect better labor productivity from the workers’ side. But management has to find out & work on the other factors that are obstructing the rate of increase in productivity of the tea worker to get the better return on investment.

LIMITATIONS

- Researchers claiming that limited time period and budget are definitely the limitations of the research.
- However, the study was restricted to Terai region of West Bengal & based on only selected the tea gardens of proprietorship ownership pattern, thus neglecting the cases of other ownership patterns like Public & Partnership.
- A limited time period of 15 years, was considered by the researchers for this study.

SCOPE FOR FURTHER RESEARCH

- The future studies can be done by increasing the time period.
- Other ownership patterns like public & partnership can be taken into consideration for future research.
- The current research is based on only three attributes to explain productivity but still, some other attributes might be there which can affect the productivity of the tea workers.

REFERENCES

1. Bhowmik, Debesh.(2016).Nexus Between GDP Growth Rate and Tea Export in India,Business Sciences International Research Journal.
2. Biswas, Debasish (2012). Productivity and industrial relations an empirical study on tea estates in Dooars region of West Bengal.
3. Mitra, Neelanjana, *Indian Tea Industry: Problems and Policies*, Economic and political Weekly, Vol. 26, No. 48 Nov. 30, 1991, pp. M153-M155.
4. Asopa, V. N.(2009).India's Global Tea Trade, Centre for Management in Agriculture, IIM, Ahmedabad, December, CMA Publication No-235
5. Bai, Jushan., & Perron, P.(2003).Critical values for Multiple Structural Change Tests, *Econometrics Journal*,6,72-78.
6. Dutta, S., Sarmah, S.P. & Goyal, S.K. (2010). Evolutionary Stability of Auction and Supply Chain Contracting: An Analysis Based on Disintermediation in the Indian Tea Supply Chains. *European Journal of Operational Research*, 207, 531-538.
7. Enders, W.(1995).Applied Econometric Time Series, John Wiley & Sons, New York.
8. Ganguly, Arnab., Ghosh, Keya & Biswas, Susmita.(2011).Tea Export and its impact at the grassroots, CUTS Briefing No-1/2011.
9. Granger, C.W.J.(1969). Investigating Causal Relations by Econometric Models and Cross-spectral Methods, *Econometrica*, 37(3), 424-438.
10. Griffiths, Percival. (1967).The His-tory of the Indian Tea In-dustry. London: Weidenfeld and Nicolson.
11. Hansen, H.,& Doornik ,J .A.(1994).An omnibus test for univariate and multivariate normality. Discussion Paper, Nuffield College, Oxford University.
12. Hazarika, Kakali.(2011,August). Changing Market Scenario for Indian Tea, *International Journal of Trade, Economics and Finance*, 2(4).
13. Johansen, S.(1988).Statistical Analysis of Cointegrating Vectors. *Journal of Economic Dynamics and Control*, 12,231-254.

14. Joseph,Merlin.(2002). *Problems and Prospects Of Tea Plantation Industry In Kerala,PhD Thesis, Department Of Applied Economics,Cochin University Of Science And Technology.*
15. Juselius,Katarina.(2006).*The Cointegrated VAR Model, Oxford University Press.*
16. Kumar, Pramod., Badal, P. S., Singh, N. P. & Singh,R.P.(2008,Jan-March). *Tea Industry in India: Problems and Prospects, Indian Journal of Agricultural Economics, 63(1).*
17. Liu, Hong.& Shao, Shuang.(2016). *India’s Tea Price Analysis Based on ARMA Model, Modern Economy, 7, 118-123*
18. Nathan, Varun.& Sreenivas, Shanmukha.(2014,December). *Dynamics Of India’s Tea Production: An Econometric Analysis, International Journal of Scientific and Research Publications, 4(12).*
19. Samantaray,Manmath Nath & Kumar Ashutosh.(2012,October). *An analysis of trends of tea industry in India, The International Journal of Management,1(4).*
20. Sarkar, Goutam. (1972).*The World Tea Economy. Delhi: Oxford University Press.*
21. Shil,Parag., &Das,Suchismita.(2012,October). *Indian Tea Industry In The Context Of Intellectual Property Right (IPR) And Geographical Indication (GI), Asia Pacific Journal of Marketing & Management Review,1(2).*
22. Savur, Manorama, *labor and Productivity in the Tea Industry, Economic and political Weekly, Vol. 8, No. 11 (Mar. 17, 1991).*
23. Bhowmik, Sharita, *Wages of tea garden workers in West Bengal, Economic and political Weekly, Vol. 17, No. 40 (Oct.2, 1982).*
24. Reddy, V.N. *Global Tea scenario: 2001 AD, Economic and political Weekly, Vol. 26, No. 48 (Nov. 30, 1991).*
25. Prasanneswari, *Industrial Relation In Tea Plantation: Dooars Scene, Economic and political Weekly, Vol. 19, No. 24/25 (June. 16-23, 1948).*
26. Savur, Manaroma, *Labor and productivity in the Tea Industry, Economic and political Weekly, Vol. 8, No. 11 (March 17, 1973).*
27. Das Gupta, Manas, *labor In Tea gardens, Gayan Sagar Publication, Delhi, 1999.*

