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INDIAN JOURNAL OF SCIENCE AND TECHNOLOGY

RESEARCH ARTICLE

A Machine Learning Model for Estimation of Village Level Soil Nutrient Index

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Abstract

Objectives: To propose an innovative technique for designing an efficient and adaptive machine learning model using classifier assembly for estimating village level soil nutrient index using soil datasets. **Methods:** Freely available soil datasets were collected from the concerned authority of Govt. of India. These datasets were used by the proposed machine learning model designed with a classifier assembly of fifteen diverse classifiers for nutrient class identification. The performance of each classifier was evaluated in terms of five well-accepted standard metrics. The outputs of the best performing classifier were then used for estimation of village level nutrient index using modified Parker's method. **Findings:** The model was applied for nutrient class identification, and estimation of the nutrient index of different villages using freely available benchmarked Soil health Card datasets provided by the Govt. of India. The empirical results depicted that for nutrient class identification, this proposed machine learning model overperformed the other existing models in terms of average accuracy score. In the case of Copper, it provided the highest average accuracy of classification (0.949) and estimation accuracy of 95.48%. For Sulphur, an average classification accuracy of 0.891 and an estimation accuracy of 90.66% were achieved. Similarly, for Zinc, an average classification accuracy of 0.883 and an estimation accuracy of 89.63% were observed. **Novelty:** This study suggests a novel architecture of a machine learning model using classifier assembly to estimate the village level nutrient index with the highest possible accuracy, using freely available soil datasets.

Keywords: Nutrient index; Village level soil fertility; Fertilizer management; Machine learning; Classifier assembly

1 Introduction

Depleting soil fertility is a major threat to the sustainable agricultural production system and food security. Before cultivating a crop, prior assessment of soil fertility is

International Journal of Applied Science and Engineering

Artificial intelligence in agriculture: Application trend analysis using a statistical approach

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ABSTRACT

To ensure food security and sustained production of crops, the traditional practices of agriculture should be replaced by modern artifacts. Artificial intelligence provides advanced methods and procedures that support domain-specific problem-solving and agricultural decision-making. They have immense successful applications for devising suitable solutions in agriculture. Several literature surveys have been reported worldwide regarding the applications of different artificial intelligence techniques in agriculture. However, none of them presented a complete scenario in a single nutshell. Moreover, a traditional and descriptive way of literature review with a limited number of papers is not sufficiently adequate to recognize the application trajectory of various artificial intelligence techniques in agriculture. Only a statistical study can emphasize the advancements and new frontiers of future applications prevailing in the field, compare the various aspects of different techniques and suggest the best one for a particular problem. Trend analysis provides a predictive guideline for forecasting any technique or approach prospect. However, no statistical study or application trend analysis of prevalent artificial intelligence techniques in the major subdomains of agriculture has been reported. This paper presents a statistical study to cover all multidimensional aspects of applications of various artificial intelligence techniques in agriculture concisely, based on a large number of articles published during the last three and a half decades.

Keywords: Artificial intelligence, Agriculture, Application trend analysis, Statistical study.

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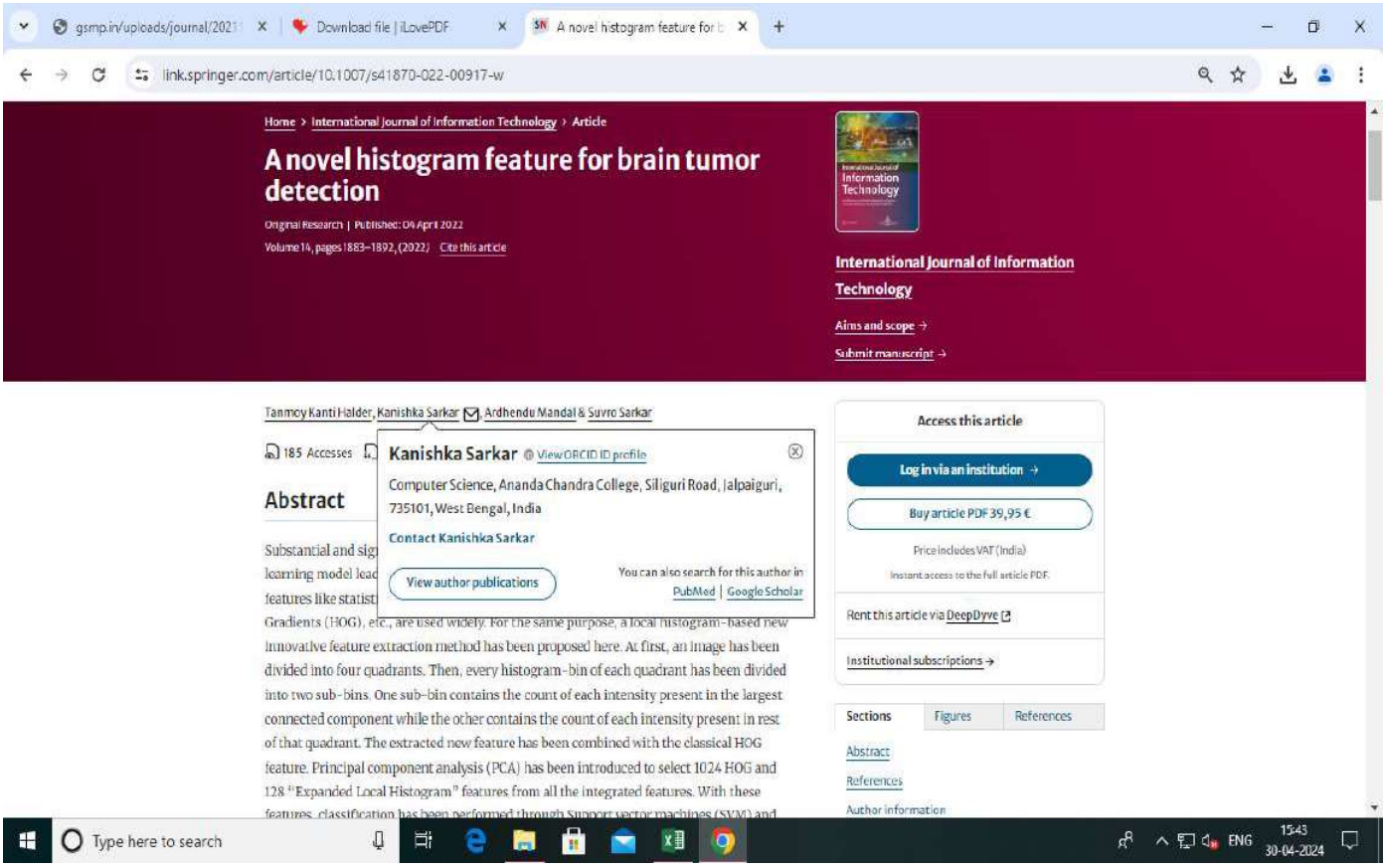
1. INTRODUCTION

Agriculture is one of the prime resources of human sustenance. According to the world bank, it employs almost 26.85% of the entire human population worldwide and is a source of raw materials for numerous allied industries (Employment in agriculture, 2020). Agriculture and allied sectors are among the key areas contributing to 6.40% of the global Gross Domestic Product (GDP) (Countries by GDP Sector Composition, 2020). Alexandratos and Bruinsma (2012) estimated that the agriculture sector would have to feed a population of about 9 billion by 2050. The demand for agricultural products is gradually increasing to meet consumer needs, whereas the land under cultivation is approaching its limit. Traditional practices should be replaced by modern tools and technologies to boost production and meet the massive demand.

The agriculture sector faces significant challenges like the infestation of insect pests and diseases, improper irrigation practices, poor selection of crops, indiscriminate use of fertilizers, the decline of soil fertility, etc. All these problems lead to huge crop and



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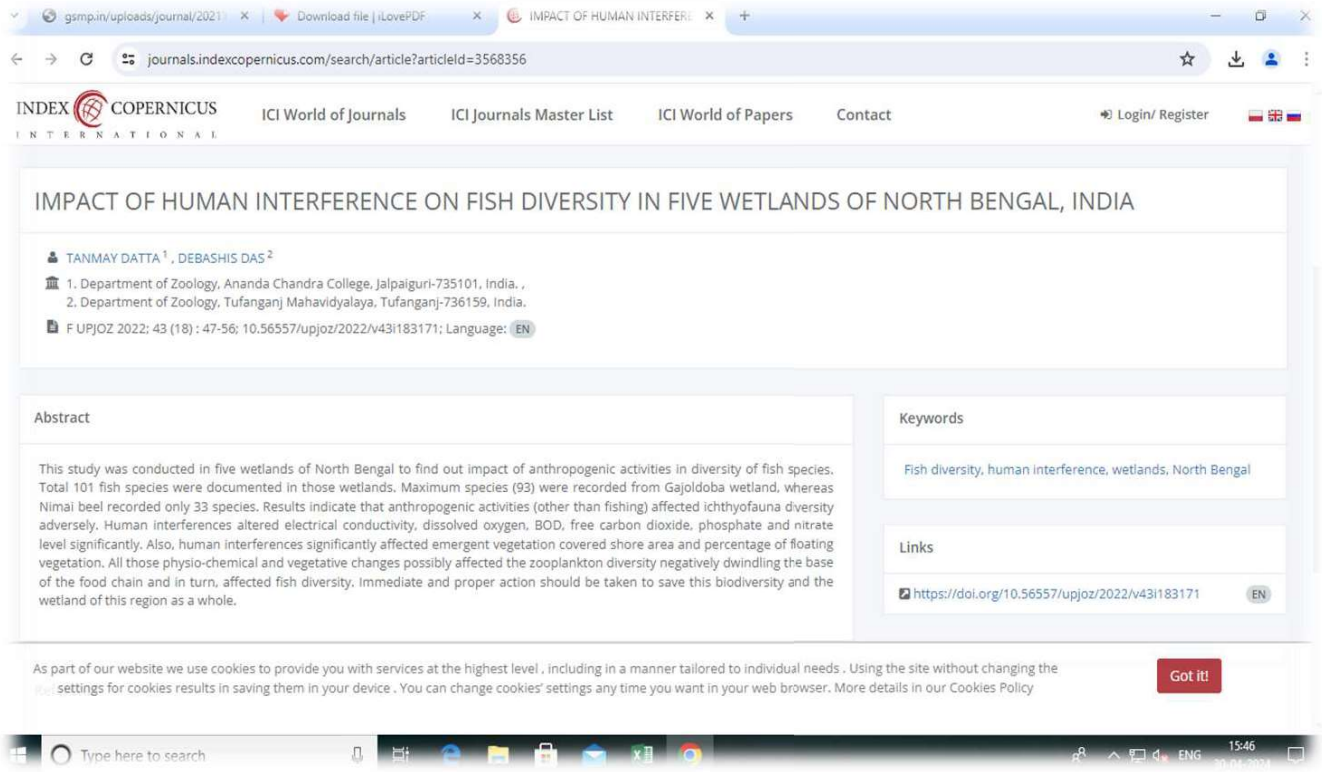
জলপাইগুড়ি জেলার সাহিত্যচর্চা

ড. বিশ্বজিৎ রায়

সহকারী অধ্যাপক, বাংলা বিভাগ, আনন্দচন্দ্র কলেজ, জলপাইগুড়ি

জলপাইগুড়ি পশ্চিমবঙ্গের এমন একটি জেলা যে জেলায় ভারতবর্ষের চারটি ভাষাগোষ্ঠীর (আর্য, দ্রাবিড়, অষ্ট্রিক ভোটবর্মী) মানুষই কমবেশি বসবাস করেন। স্বাভাবিক ভাবেই এই জেলার ভাষা-সংস্কৃতি বৈচিত্র্যময় হয়ে উঠেছে। 'জলপাইগুড়ি' নাম নিয়েও নানা বিতর্ক দানা বেঁধেছে বিভিন্ন সময়। ১৭৮৮ খ্রী: জেমস্ রেনেলের 'Memoir of a map of Hindoostan or the Mogul Empire' গ্রন্থের 'Map of the Inland Navigation'-এ নাম পাওয়া যাচ্ছে 'Jelpigory'। আবার ১৮৪৯ খ্রী: এর মার্চ মাসে স্যার জোসেফ ডালটন হুকার জলপাইগুড়িতে আসেন। তিনি তাঁর 'Himalayan Journals'-এ লিখলেন— 'Jeelpigori, a large straggling village near the banks of the Teesta, a good way south of the forest," (Page no-270)। অন্যদিকে David field Rennie ১৮৬৩ খ্রী: তাঁর 'Bhotan and the Door war' গ্রন্থে লিখলেন— 'The Station and village of Julpigori are prettily situated, and straggle along the bank of the Teesta for some two miles. All the house European and native, are built of the same meterial-namely, Mats supported on frame-work of bamboo." (Page No-357) আবার জেলা গেজেটিয়ারে পাওয়া যাচ্ছে— "Jalpaiguri is said to have derived its name from the olive tress (Jalpai in Bengali) Which grows in the town and were seen even in 1900. The suffix guri Means a place. The name might as well be associated with Jalpes. the presiding deity (Siva) of the entire region who had been in the minds of men there from time immemorial." (Page-1) অন্যদিকে সমালোচক পরিতোষ দত্ত বলেছেন--- "JE-LE-PE-SWAR" শব্দের অর্থ ভোট-তিব্বতিতে ভারতের পূর্ব দিকে কম্বলাদি গরম জিনিস বিনিময় কেন্দ্র। আবার JE-LE-PE-GO-RI শব্দের অর্থ হল 'JE-LE-PE' বিনিময় কেন্দ্র। 'Go' দরজা বা দুয়ার, 'RI' পাহাড় অর্থাৎ পাহাড়ে যাবার কম্বলাদি গরম জিনিস বিনিময় কেন্দ্ররূপী দরজা বা দুয়ার। ভুটানের প্রবেশ পথকে দুয়ার বলা হয়। যেখান থেকে ইংরেজদের সময়কালে 'Duars' শব্দটি চলে এসেছে। অনেকেই মনে করেন 'জলপাইগুড়ি' নামের সঙ্গে জলপাই গাছের সম্পর্ক নেই। কিন্তু বহু বছর ধরে এই অঞ্চলের ভূমিপুত্র রাজবংশী সমাজের মানুষের



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Livelihood of Tribal Population and Associated Problems in Koch Bihar District of West Bengal

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Assistant Professor,
Department of Geography, Kalinagar Mahavidyalaya, North 24 Parganas.

DR. BIPUL CHANDRA SARKAR
Assistant Professor,
Dept of Geography,
A.C. College, Jalpaiguri

Abstract:
The paper is an attempt to study the livelihood patterns through the factors related to socio-economic condition of tribal people in the district of Koch Bihar. In view of the legs in available literature of selected communities in the study area, this paper focuses on various issues related to the livelihood of the tribal people in the district. It was found that the tribal people in the district are socially, economically, and educationally disadvantaged and marginalised groups. Regional variation in every aspect of their livelihood regarding their residence, demography, literacy, gender, economy has been a major issue for their balanced and proper development in various parts of the district. Hence attempt has been made to study the regional variations in different aspects by selecting development blocks as unit of study. This study basically based on secondary sources of data, review of related literature and observation. The study also includes problems of livelihood of tribal people in the district on available background and concludes with recommended policy prescription.

Keywords: *Tribal People, Livelihood, Development, Socioeconomic Condition, Occupational Patterns, Regional Variation*

1. Introduction

Tribes are the ethnic group of primitive people or earliest inhabitants. It is a caste having distinct socio-cultural and economic characteristics. In India the tribes are known to be the autochthonous people of the land. They are often referred to as Adivasi, Vanyajati, Vanvasi, Pahari, Adimjati and Anusuchit Jan Jati. India is home to tribal population of about 10.3 crore, with 705 groups each with their distinct cultures, social practices, religions, dialects, and occupations and are scattered in all States and Union Territories in India. Tribal population in India constitutes 8.6% of the total population. 89.97% of them live in rural areas and 10.03% in urban areas. The decadal population growth of the tribal population from Census 2001 to 2011 has been 23.66% against the 17.69% of the entire population. The sex ratio for the overall population is 940 females per 1000 males and that of Scheduled Tribes 990 females per thousand males.

Livelihood is defined as a set of activities essential to everyday life. It involves the capacity to acquire necessities of food, water, shelter, clothing etc. thus livelihood depends on the social and economic condition of any individual. Aspects like demography, literacy and educational attainment, health and workforce and occupational structures, income and expenditure etc plays vital role in determining the livelihood of any household or any community in any place. Tribal groups are at different stages of social, economic, and educational development. Some tribal communities have adopted modern way of life availing themselves with modern agricultural practices along with other economic activities, attaining education and health awareness, political participation etc whereas there are ethnic groups who still characterized by pre-agriculture level of technology, stagnant or declining population, extremely low literacy, and subsistence level of economy.

PAPER

Two-phase binding of drug in a three-layered arterial wall following stent implantation

Akash Pradip Mandal[3,1] and Prashanta Kumar Mandal[2]

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Physica Scripta, Volume 97, Number 4

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Abstract

Journal Of
Historical Studies and Research

The Historical Importance of Census: A Case Study of few District of Bengal

in Articles

Author:

Gourango Chandra Roy

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Department of History
Ananda.Chandra. College
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Email: gourangochandraroy@gmail.com

Abstract: The census is a very important programme to provide better government for the people of the country and it also helps to rule the country of the rulers. Not only has that it also becomes the determinant factor of social, economic and cultural affairs of the society. Using the data of census, various researchers can write their research book or research papers. The census data help to identify the different races people. But before the British government, no Indian rulers conducted the modern census. At first the British government conducted census of India. As a result, many unknown information came to light after the remuneration of population of India. Therefore, the period of paper started from the first census operations time and this paper also covers only the Colonial period.

Key Words: East Bengal, Identity, Linguistic, Kshatriya, Koch King, Namasudra, Rajbansi

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Genomic, morphological, and biochemical analyses of a multi-metal resistant but multi-drug susceptible strain of *Bordetella petrii* from hospital soil

Urmi Halder, Raju Biswas, Ashutosh Kabiraj, Rajendar Deora, Moitri Let, Rajendra Kr Roy, Annapurna Chitikineni, Krishnendu Majhi, Shrabana Sarkar, Bhramar Dutta, Anubhab Laha, Arunava Datta, Dibyendu Khan, Rajeev K. Varshney, Dipnarayan Saha, Saswati Chattopadhyay & Rajib Bandopadhyay

Scientific Reports **12**, Article number: 8439 (2022)

Krishnendu Majhi

Microbiology Section, Department of Botany, The University of Burdwan, Burdwan, West Bengal, 713104, India

Abstract

Contamination
facilities has en
collected soil s
bacterial isolat
was found to b
heavy metals and metalloids like cadmium, chromium, copper, mercury, arsenic, and others. This strain was motile and potentially spore-forming. Whole-genome shotgun assembly of BMCSI 3 produced 4.95 Mb genome with 4,638 protein-coding genes. The taxonomic and phylogenetic analysis revealed it, to be a *Bordetella petrii* strain. Multiple genomic islands carrying mobile genetic elements; coding for heavy metal resistant genes, response regulators or transcription factors, transporters, and multi-drug efflux pumps were identified from the genome. A comparative genomic analysis

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https://doi.org/10.1140/epjp/s13360-022-02685-9
Regular Article

Wormholes in *f*(*R*, *T*) gravity with density-dependent *B* parameter in SQM

Rumi Deb[1], **Priyanka Mandal**[2] **and** **Bikash Chandra Paul**[3c]

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Abstract

Wormhole solutions are obtained in the modified *f*(*R*, *T*) gravity with strange quark matter. The equation of state of the strange quark matter (SQM) is the phenomenological MIT Bag model. Both constant and density-dependent bag parameters (*B*) are considered in the framework of modified *f*(*R*, *T*) gravity. We have examined the possible construction of a stationary, spherically symmetric and spatially inhomogeneous wormhole spacetime supported by the SQM. It is shown that there are two types of wormhole solutions are permitted in the theory where null energy condition (NEC) is obeyed and in other case NEC is not satisfied with power law shape function. In the case of hybrid shape function, a new class of wormhole solutions are obtained satisfying all the energy conditions.

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Changing Rural Health System of Jalpaiguri District in Colonial Period

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Abstract:*The climate of Jalpaiguri was un-healthy. It is rainy area. Almost, all the areas of the district were covered with dense forest, copies, jungle etc. There were many diseases, like- fever, Terai fever, stomach diseases, lungs/respiration and others. Educationally and economically the society was backward. The people were not aware about the disease. Therefore, scientific treatment was not prevalent in this area specially in the rural area. In rural area, there were no modern types of health care centre. Before the advent of the Britishers, people depended on Baidya, Ojha, Hakim etc. The patients were depended on indigenous treatment (health system) but most of treatments were unscientific. They believed in superstition even most of the people depended on different God and Goddesses. W.W. Hunter wrote that almost 57 type native medicines and drugs, which were prescribed by the Kabiraj or Baidy (Hindu medical practitioners). Britishers started or had taken initiative to develop the modern health system. They established hospital, dispensary, clinic and appointed qualified doctors etc. However, it was done gradually, not at a time.*

Keywords: *Allopathic, Baidya, Dysentery, homeopathy, Indigenous, Pollution, Vaccination*

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Ergonomic Study of Work-Related Musculoskeletal Disorders Among the Female Tea Pluckers- A Review

Sanaj Kumar Das[1], Anindita Chakraborty[2], Bikramjit Raychaudhury[1#]
[1]Department of Physiology, Ananda Chandra College, Jalpaiguri, W.B.
[2]Department of Physiology, Acharya Brojendra Nath Seal College, Coochbehar, W.B.

Abstract
Musculoskeletal Disorders (MSDs) are a major cause of disability, lost work time, and economic loss in both developed and developing countries. Muscle, bone, joint, nerve, and blood vessel disorders are all examples of MSDs. This research looks at the role of ergonomic tools in detecting MSDs, and ergonomic interventions in reducing problems and musculoskeletal injuries among female tea garden workers. The review of literature summarizes various problems and risk factors associated with tea plucking activity such as incorrect techniques, repetitive work, long duration of work, awkward plucking postures, forward bending, high exertion of work, prolonged static posture, manual cutting of leaves, carrying of heavy load, working in high temperature and relative humidity during work and different methods and supportive tools e.g., REBA, RULA, OWAS, SNQ, OCRA, etc. to detect the risk. All of these issues contribute to musculoskeletal injuries, particularly in the lower back, neck, buttock, thigh, and knee joints. Musculoskeletal symptoms such as muscle pain, and muscle cramps, are common among tea garden workers. The paper concludes that ergonomic interventions can reduce problems and musculoskeletal injuries among female tea pluckers.

Key words : Musculoskeletal Disorders (MSDs), Tea Pluckers, Ergonomics

Introduction

North Bengal, region is on the foot of the Himalayas, traditionally known for its tourism, timber, and most importantly tea industries. Small tea cultivation belongs to the informal or unorganized sector of the economy. Small Tea Growers (STGs) of North Bengal are mainly spread over Jalpaiguri, Darjeeling, Uttar Dinajpur, and some parts of Coochbehar district beside large tea estates. (Choudhury et al, 2019). According to the 66th Annual report of the tea board of India: 2019-20, there is a total of 37365 STGs covering 33711.27 hectares of tea plantation area in West Bengal which directly or indirectly creates jobs for people. Due to the reduction of labour costs, tea companies ignore their responsibilities like health, safety, working conditions, proper training, ergonomic tools, etc. for the workers.

From the unorganized sector, half of our country's GDP is earned. According to National Sample Survey (NSS) report in the year 2017-2018, in India, approximately 81% workforce is from the unorganized sector while 19% are from the organized sector (NSS, 2021). Unskilled, untrained workers involve with unorganized sectors, and skilled or trained workers are involved with organized sectors. Poverty is more prevalent among those associated with the unorganized sector due to a lack of technology and marketing strategies. Since a mass workforce is working in these sectors, prior importance should be given so as to improve the conditions of the workforce (Satpathy et al, 2017).